

ISSN 1563-0358; eISSN 2617-7161

ӘЛ-ФАРАБИ атындағы ҚАЗАҚ ҰЛТТЫҚ УНИВЕРСИТЕТІ

ҚазҰУ ХАБАРШЫСЫ

Экономика сериясы

КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ УНИВЕРСИТЕТ имени АЛЬ-ФАРАБИ

ВЕСТНИК КазНУ

Серия экономическая

AL-FARABI KAZAKH NATIONAL UNIVERSITY

THE JOURNAL

of Economic Research & Business Administration

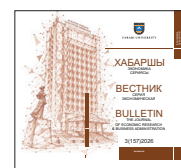
№3 (157)

Алматы
«Қазақ университеті»
2026



ХАБАРШЫ

ЭКОНОМИКА СЕРИЯСЫ №3 (157) қыркүйек



04.05.2017 ж. Қазақстан Республикасының Ақпарат және коммуникация министрлігінде тіркелген

Күәлік № 165000-Ж

*Журнал жылына 4 рет жарыққа шығады
(наурыз, маусым, қыркүйек, желтоқсан)*

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IMPLEMENTATION OF WIDE-REACHING ONLINE ADVERTISING CAMPAIGNS: EVALUATING THE EFFECTIVENESS OF ADVERTISING CHANNELS

This article proposes an original approach to evaluating the effectiveness of online advertising, based on a combination of various indicators: consumer attention, the view-through rate of advertising banners and messages, banner placement on a web page, the use of short videos with and without sound — in short, everything that can attract the attention of the target audience and encourage them to make a decision to purchase goods requiring particular caution (such as property), or goods that have less of an impact on consumers’ perception of their income level but reflect their cultural status (premieres of new films). A mixed-methods research methodology was employed, combining desk research into existing theoretical sources on the topic of analyzing the effectiveness of online advertising campaigns with up-to-date statistical data on the state of the online advertising market drawn from open sources. To select relevant sources of information, a combined approach was used to identify academic articles based on the keywords: online advertising campaigns and evaluation of the effectiveness of online advertising as well as case studies. The structural-logical analysis of selected texts was used as well as data from completed two online advertising campaigns. As a result, in order to analyze the effectiveness of online advertising campaigns for various products, it was proposed to use the aCPM metrics for assessing consumers’ perception of online advertising messages and evaluating users’ attention to different types of advertising messages, what can be considered as a novelty of this study.

Keywords: broad-reach media campaign, online advertising effectiveness, viewability, viewers’ attention, aCPM, ad impressions, valid impressions, AdRecall.

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Интернеттегі кең ауқымды жарнамалық науқандарды іске асыру: жарнама арналарының тиімділігін бағалау

Бұл мақалада интернет-жарнаманың тиімділігін бағалаудың әртүрлі көрсеткіштердің үйлесіміне негізделген өзіндік тәсілі ұсынылады. Оларға тұтынушылардың назары, жарнамалық баннерлер мен хабарламалардың көріну көрсеткіші (view-through rate), баннердің веб-бетте орналасуы, дыбысы бар және дыбыссыз қысқа бейнероликтерді пайдалану жатады. Басқаша айтқанда, мақсатты аудиторияның назарын аударып, оларды сатып алу кезінде ерекше сақтықты талап ететін тауарларды (мысалы, жылжымайтын мүлікті) немесе тұтынушылардың өз табыс деңгейін қабылдауына азырақ әсер еткенімен, олардың мәдени мәртебесін көрсететін тауарларды (мысалы, жаңа фильмдердің премьераларын) сатып алу туралы шешім қабылдауға ынталандыра алатын барлық факторлар қарастырылады. Зерттеуде аралас әдіснама қолданылды: интернеттегі жарнамалық науқандардың тиімділігін талдау мәселелеріне арналған қолданыстағы теориялық дереккөздерді кабинеттік зерттеу ашық дереккөздерден алынған интернет-жарнама нарығының қазіргі жай-күйі туралы өзекті статистикалық деректермен ұштастырылды. Релевантты ақпарат көздерін іріктеу үшін «интернеттегі жарнамалық науқандар» және «интернет-

тиімділігін бағалау» түйінді сөздері бойынша ғылыми мақалаларды іздеуді, сондай-ақ кейстерді талдауды қамтитын кешенді тәсіл қолданылды. Сонымен қатар, іріктелген мәтіндерге құрылымдық-логикалық талдау жүргізіліп, интернетте аяқталған екі жарнамалық науқанның деректері пайдаланылды. Нәтижесінде әртүрлі өнімдерге қатысты интернеттегі жарнамалық науқандардың тиімділігін талдау үшін тұтынушылардың интернеттегі жарнамалық хабарламаларды қабылдауын және пайдаланушылардың жарнамалық хабарламалардың әртүрлі түрлеріне назар аударуын бағалауға арналған аСРМ метрикаларын пайдалану ұсынылды. Бұл осы зерттеудің ғылыми жаңалығы ретінде қарастырылуы мүмкін.

Түйін сөздер: кең ауқымды қамтитын жарнамалық науқан, интернет-жарнаманың тиімділігі, жарнаманың көрінуі, аудиторияның назары, аСРМ, жарнама көрсетілімдері, жарамды көрсетілімдер, AdRecall.

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Реализация широкомасштабных рекламных кампаний в интернете: оценка эффективности рекламных каналов

В данной статье предлагается оригинальный подход к оценке эффективности интернет-рекламы, основанный на сочетании различных показателей: внимания потребителей, показателя видимости (view-through rate) рекламных баннеров и сообщений, расположения баннера на веб-странице, использования коротких видеороликов со звуком и без звука – иными словами, всего того, что способно привлечь внимание целевой аудитории и побудить ее принять решение о приобретении товаров, покупка которых требует особой осмотрительности (например, недвижимости), либо товаров, которые в меньшей степени влияют на восприятие потребителями уровня собственных доходов, но отражают их культурный статус (например, премьеры новых фильмов). В исследовании применялась смешанная методология, сочетавшая кабинетное исследование существующих теоретических источников по вопросам анализа эффективности рекламных кампаний в интернете с актуальными статистическими данными о состоянии рынка интернет-рекламы, полученными из открытых источников. Для отбора релевантных источников информации использовался комбинированный подход, предусматривавший поиск научных статей по ключевым словам «рекламные кампании в интернете» и «оценка эффективности интернет-рекламы», а также анализ кейсов. Кроме того, применялся структурно-логический анализ отобранных текстов и использовались данные двух завершенных рекламных кампаний в интернете. В результате для анализа эффективности рекламных кампаний в интернете применительно к различным продуктам было предложено использовать метрики аСРМ для оценки восприятия потребителями рекламных сообщений в интернете и оценки внимания пользователей к различным типам рекламных сообщений, что может рассматриваться как научная новизна данного исследования.

Ключевые слова: рекламная кампания с широким охватом, эффективность интернет-рекламы, видимость рекламы, внимание аудитории, аСРМ, показы рекламы, валидные показы, AdRecall.

Introduction

Over the past two decades, marketing communications and advertising have undergone dramatic changes. Traditional channels of communication with consumers are losing their effectiveness in comparison to online advertising communications, which are based on a data-driven approach that takes into account not only consumer characteristics but also enables advertisers and producers of goods

and services to track the effectiveness of communications using various metrics. The most significant trends in advertising communication in the 2020s are personalized advertising (which anticipates the internet user's physical request), the growing role of influencer marketing, the quality of video content (for discerning users), as well as the automated purchase and placement of digital advertising on the internet, based on algorithms and user data (programmatic advertising). A researcher from the

UK, S. Kumar (2025), writes about all these trends. Based on extensive research into the marketing communications market, the researcher states that these are enduring trends characteristic of many national markets, albeit with a certain degree of adaptation, which advertisers in different countries must take into account. This article will examine the media factors that are most universal across all product categories and enable an increase in the effectiveness of an awareness campaign (the Awareness stage).

The aim of this study is to analyze approaches to evaluating the effectiveness of online advertising campaigns for promoting various products and services, based on an assessment of different performance metrics, including an evaluation of the attention of potential consumers as it is captured when viewing various advertising formats: large and small banners, short videos, etc.

Literature review

According to Waheed *et al.*, (2018) and Saulite, (2022), the traditional media mix model is undergoing a transformation designed to achieve the target user reach at a specified effective frequency of exposure. This is based on data regarding the audience's media consumption within a specific market.

It should be noted that previously (before the era of internet advertising) the range of traditional media channels for informing and attracting consumers' attention was limited. Advertising formats were standardized (Kumar, 2025). For example, when placing an advertisement on TV, a 30-second main spot was typically used, along with shorter versions (such as a 15-second version), which were employed to optimize the budget. The shorter version was aired as a reminder once the main advert had achieved significant reach and become recognizable. This approach was used for broadcast media: on TV and radio (Aleksunin *et al.*, 2018). The factor of attention to the advertising medium was not taken into account. If, at the time of the commercial's broadcast, the consumer was watching the channel or listening to the radio station, they were compelled to take in the information, as at that moment there was a single advertiser occupying 100% of the airtime.

Before the rapid growth of online media advertising, the traditional approach did not require revision. According to Romanian researchers Ungureanu & Popescu, a view with which one cannot help but agree—the development of the online environ-

ment has led to the emergence of a large number of websites that feature several advertising blocks on every web page (Ungureanu & Popescu, 2022). Across a wide variety of markets, technologies and forms of advertising are evolving, user devices are being modified, and new media platforms (search engines, social media, video hosting sites) are emerging, offering various opportunities for placing adverts and analyzing the effectiveness of advertising campaigns, which has led to a significant increase in the number of advertisers.

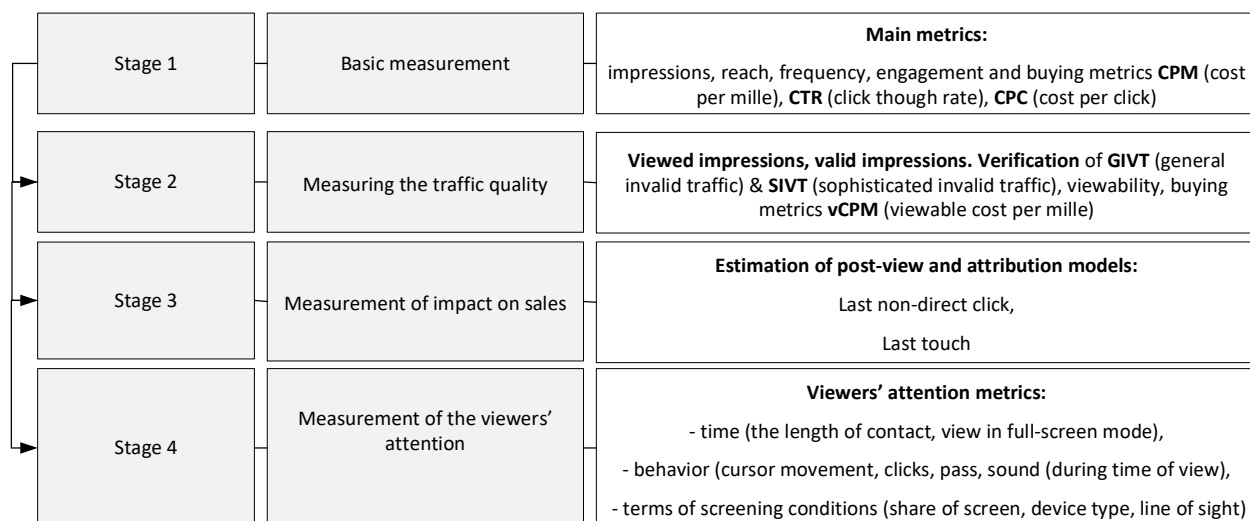
The constant growth in the number of advertisers on the internet leads to fierce competition for users' attention, whilst user behavior has changed significantly. The Digital worldwide Advertising Market was estimated at 938.79 USD Billion in 2024. The Digital Advertising industry was projected to grow from 1013.91 USD Billion in 2025 to 2189.37 USD Billion by 2035, exhibiting a compound annual growth rate (CAGR) of 8.0% during the forecast period 2025 – 2035 (Market Research Future, 2025).

At the same time, according to researchers of online media consumption, the average duration of visual contact with online advertising is decreasing, a trend attributed to the audience's constant shifting of attention and high advertising clutter (Hammer *et al.*, 2009).

Approaches to measuring the effectiveness of online advertising in different channels

The online advertising market has undergone a series of changes in the approaches used to measure the effectiveness of advertising and video content on the internet. It should be noted that academic discourse has devoted considerable attention to the approaches used to measure the effectiveness of online media advertising since the period, when the popularity of placing advertising messages and banners on the Internet began to grow (Danaher & Dagger, 2013), (Kumar, 2025), (Savelyeva & Nikulin, 2014), (Wu *et al.*, 2022). So far, we have systematized these approaches and present it in Figure 1.

In the early stages of development, only basic media outcomes and metrics (impressions, clicks, CTR) were tracked. The mere fact that a page containing a banner had loaded was treated as an ad impression, which was the main limitation when assessing effectiveness Kyle Bagwell (2007). For example, if a user loaded a page and immediately closed it, or did not scroll down to where the advertising banner was located and therefore did not see it, the ad impression would still be counted as having taken place.

Figure 1*Stages of the evolution of measurement of online media advertising effectiveness**Note: Composed by authors*

The development of ad monitoring and verification platforms enables the quality of ad impressions to be audited. A wide range of metrics are recorded (fraud levels) (Todri *et al.*, 2020), viewability, number of views and much more. (Danaher & Dagger, 2013).

The advertising industry is currently developing a standard for online ad viewability, which, among other things, defines what constitutes an ad (Click-Fortify, 2026). The IAB (Interactive Advertising Bureau) has established the following viewability metrics (standards for screening the online advertising): for video, $\geq 50\%$ of pixels in the frame for at least 2 seconds; for banners, $\geq 50\%$ of pixels for at least 1 second.

In the next stage of effectiveness evaluation, a methodology was developed to assess the impact of media placements on target actions and sales. Post-view analytics comes into play when assessing effectiveness (Savelyeva & Nikulin, 2014). Over the last decade, attribution models have also been developed that take into account the contribution of each channel to the commercial and user outcomes of an online advertising campaign (Wu *et al.*, 2022). Consequently, the tools for evaluating the effectiveness of online advertising campaigns have become more sophisticated and precise at this stage, but they still rely on an assumption: if an ad or banner is recorded as having been displayed, it means the user actually saw the advert.

On websites and mobile apps overloaded with adverts, a user may quickly scroll past a page, fail to notice the creative, or interact with the content without focusing on the advert (Dukes & Liu, 2024), (Grunwald *et al.*, 2025). At the same time, events such as impressions, viewability and views will be recorded and will continue to be included in post-view analytics and attribution calculations. As a result, effectiveness models end up including contacts that did not actually occur, whilst post-view conversions account for impressions without the user's actual attention (Todri *et al.*, 2020), (Ritson, 2024), (Yeo *et al.*, 2025).

A Nielsen study shows that ad attention correlates 180% (almost three times) better with return on ad spend (ROAS) than viewability alone (Gilberti, 2022). This means that higher levels of attention lead to a greater positive impact on brand and business metrics.

All of this presents researchers with a challenge: to find a way to measure audience attention. Attention metrics allow us to see the audience's reaction, which helps determine the number of users who actually saw the advertising message as part of an online advertising campaign.

Factors influencing the level of audience attention to online advertising

There are numerous factors that influence the level of audience attention to online advertising. It

appears that these should be grouped into four categories.

- Group 1: Market factors: the level of competition within the niche, product category, and seasonality of demand for a specific product category.

- Group 2: factors describing the audience of the advertising message: the audience's socio-demographic characteristics, the user's interest in the product category, which contributes to the formation of unmet demand.

- Group 3: factors relating to the advertising message: the relevance of the message, the presence of personalization, and triggers that stimulate interest (Nettelhorst *et al.*, 2020).

- Group 4: ad unit parameters: placement on the website or within the mobile app, ad unit size in pixels, ad unit production technology, and the surrounding content; factors which, in our view, may influence ad perception and increase viewing time (Grunwald *et al.*, 2025).

According to researchers, for effective placement of an advertising message, it is not enough to select media channels visited by the target audience and predict the number of impressions; it is necessary to devise a strategy for using advertising formats that will differ in both type and content, based on the objectives of the advertising campaign (Nettelhorst *et al.*, 2020). It is believed that, in today's world of information overload across a wide variety of online channels, the criterion for selecting media is the ability to attract the maximum attention of the audience (Pasqualotti & Baccino, 2014).

If we trace the evolution of impression measurement, it becomes clear that, at the most basic level, an impression was simply recorded without taking into account the duration for which the ad was displayed on the screen. Subsequently, the concepts of "viewed impressions" – an ad impression that meets viewability criteria – and 'valid impressions' (synonyms: True Impressions, Valid impressions, Eligible impressions) – the number of impressions after IVT filtering – emerged, which is defined as a process designed to identify and exclude invalid bot traffic from statistics, thereby improving the accuracy of analytics and optimizing advertising campaigns. Thus, the industry gains the ability to evaluate campaign data based on the volume of impressions that meet technical requirements, namely: invalid impressions and impressions that do not meet visibility criteria are excluded. Given the current capabilities for assessing media visibility levels, it is necessary to develop methodological recommen-

dations for forecasting "visible impressions". The analysis of existing literature gave us opportunity to formulate the research gap: traditional methods of evaluating the effectiveness of online advertising take into account basic metrics (impressions, reach, frequency), audience response – clicks on ad units (CTR) – and an analysis of the audience's subsequent actions after clicking on an ad unit (post-click analytics). However, CTR and click-through rates in display advertising do not provide insight into how the ad is perceived by the audience who did not click on the banner, as click-through rates in display advertising typically range from 0.1–1 per cent of the total number of impressions. Consequently, there has been insufficient research into the attention paid by audiences who did not click on the ad but did see the advertising message. At present, there are no studies that take into account the level of audience attention to ad formats and enable the effectiveness of a campaign to be predicted, taking into account the 'visibility' parameter for each format used. So far, the research problem of this study is considered as follow: high advertising clutter and audience resistance to advertising in the online environment reduce the effectiveness of marketing campaigns. The size and placement of advertising media are among the factors influencing the audience's level of attention. It is necessary to assess the actual visibility of advertisements. Traditional media advertising metrics answer the question 'was the impression recorded?', but not 'was the ad seen by the user?'. Without assessing the actual number of impressions seen, it is impossible to accurately forecast the expected impact of a campaign and the cost of reaching the target audience.

Methodology

The aim of this study was to analyze approaches to evaluating the effectiveness of online advertising campaigns, including the assessment of potential consumers' attention to advertising formats; to identify the criteria that influence the level of attention paid to the medium; and to develop methodological recommendations for their application, taking into account the type of advertising campaign. This determined the choice of research methods.

Desk-based methods were used to conduct the study. To begin with, academic sources were identified in the scient metric databases Academia.edu, ResearchGate.net, Elibrary.ru, ANFR and Google Scholar; these were selected using keywords, char-

acterizing the effectiveness of online media campaigns. Scientific articles that contained studies in which effectiveness was measured using classical metrics: consumer attention, consumer engagement, reach, click-through rate, and ad recall, were also selected

Certain criteria were applied when selecting academic sources; specifically, the authors reviewed the initial pool of over 1,500 sources. The papers with number of 30-50 references were chosen for the analysis published within the last 15 years in the respected international scientific journals or as a conference paper to meet criteria of “recentness”. This period is recognized by experts as a time of rapid development of online advertising and the refinement of approaches to organizing wide-reaching campaigns).

As a second type of desk research the case-study were chosen. Two of selected cases contain data of implemented wide-reaching online advertising campaigns for two different products: one – is new film (movie) promotion and another one for the property estate in the new residential complex on Moscow city. In the first case study it was considered that online advert campaign was developed and implemented to reach wide audience with interest and attention to the cultural issues, but the campaign itself was with minimum budget. It means that the evaluation of online advertising effectiveness was very important for the producers. Second case were chosen because of the difference in evaluation the target audience – the digitally active, young professionals who wanted to buy new property estates in the well-designed residential complex in Moscow city, and who are looking for appropriate information online to make purchase decision. In this case the interest, attention of online advert viewers are crucial, as well as evaluation of the viewers’ interest to advert formats, used to promote the residential complex.

So, based on the theoretical and practical examples and recommendations described above, the following hypotheses were formulated to test in the research.

H1. The level of viewers’ attention paid to an advertising medium influences the communicative and economic effectiveness of a campaign.

H2. Attention metrics influence effectiveness across all types of advertising campaigns.

An analysis of academic articles enabled the authors to propose a new metric for assessing the effectiveness of online media campaigns, which was named aCPM (attention CPM). Two hypotheses were then formulated and tested using data from online media campaigns. Analysis of these campaigns and their results indicated that the inclusion of the proposed new metric for assessing the effectiveness of advertising campaigns is entirely justified.

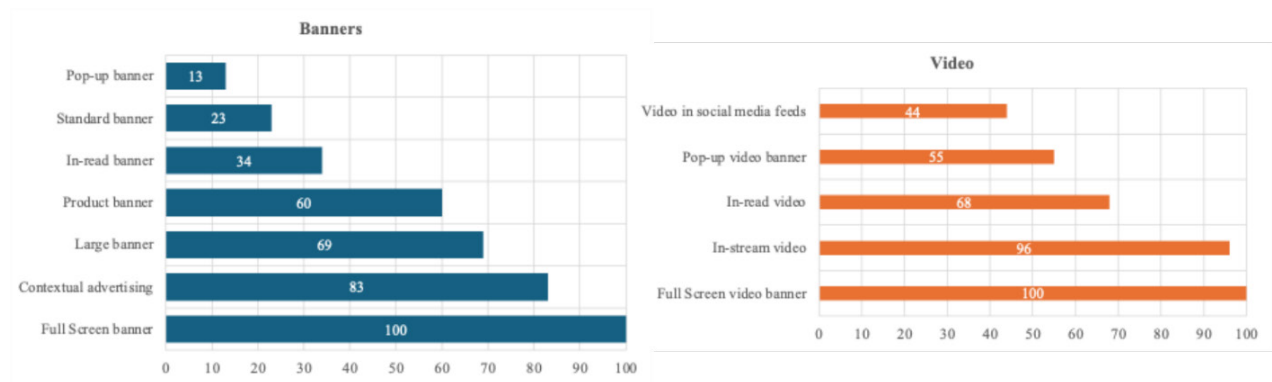
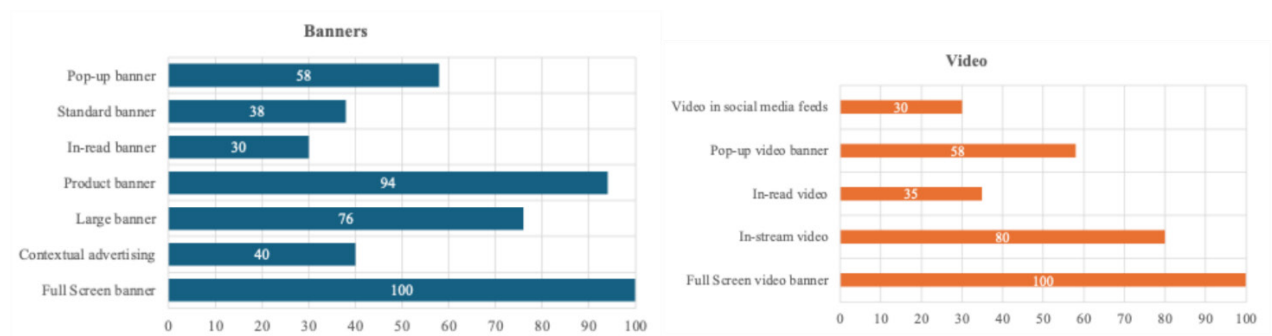
Besides of the research articles we had used the statistical data of the online advertising development (International trends of worldwide advertising market). Also the description, planning metrics of the effectiveness and results of two online media campaigns were analyzed to test the proposed hypothesis.

Results and discussions

To clarify, let us begin by examining the factors in Group 4: media parameters. The effectiveness of a message’s impact on the viewer is influenced by its placement on the web page and the level of attention the user pays to the media.

The level of user attention to online advertising depends on the media format. Figure 2 presents the results of a research, what was done by the agency Mera by Okkam, which measured user attention to advertising across three media formats, including various online formats. The study revealed that certain formats are characterized by a relatively high level of user attention. These formats include: in-stream – 96%, large banners (69%) or full-screen banners, which are a format that takes up the entire screen of a device, without borders, toolbars or other user interface elements. This mode allows users to focus entirely on the content, minimizing distractions, whilst standard banners are considered formats with low attention-grabbing potential (23%) (Okkam, 2025), (Okkam, 2024).

In Figure 3, the agency Mera by Okkam presents the results of a study into user attention levels in the mobile environment (smartphones). Attention levels in this media channel are generally higher than for desktop placements, with the following formats performing best: in-stream video – 80%, product gallery banner – 94% and large banner – 76%.

Figure 2*Desktop: distribution of impressions that received engagement (%)**Note: Composed by authors on the report of research of Mera by (Okkam, 2024)***Figure 3***Mobile: distribution of impressions that caught users' attention (%)**Note: Composed by authors on the materials of the Okkam Conference "About Price and value" (Okkam, 2025)*

Traditional digital advertising metrics answer the question "was the impression recorded?", but not "was the ad seen by the user?". CTR measures user response, but does not explain the reason behind it. Various viewability criteria confirm the presence of an ad within the visible area, but do not guarantee attention. GIVT and SIVT (GIVT and SIVT are metrics in digital advertising used to identify invalid traffic (fraud)) assess the validity of traffic. Views show video progress, but do not reflect awareness of perception.

For effective advertising placement, it is not enough to select media channels visited by the target audience and forecast the number of impressions; it is necessary to devise a strategy for using advertising formats that will differ in both type and content, based on the objectives of the advertising campaign. One of the criteria for selecting media channels is the ability to attract maximum attention.

When running a broad-reach advertising campaign, the level of attention paid to the ad allows for a more accurate assessment of its effectiveness. The nature of a broad-reach campaign is such that the audience sees the ad but rarely clicks on it. This is because the campaign targets a broad (unengaged) audience that is not currently involved in the process of choosing a product or brand. However, the audience may subsequently take an interest in the brand and convert. Thus, the higher the user's actual attention, the higher the conversion rate after viewing – even without a click. When evaluating the effectiveness of this type of campaign, in addition to analyzing click-through rates (CTR, CPC) – the response of a small proportion of the audience reached (as a rule, this figure in media advertising rarely exceeds 0.5%) – it is advisable to analyze the "user attention" – metric, which will allow us to assess the response of 99.5% of the audience.

For a wide-reach campaign, ad placements on websites and within apps can be selected based on ad visibility metrics, rather than solely on audience engagement (clicks).

During the planning stage, new metrics should be added to the core metrics to calculate effectiveness. Analyzing the cost of impressions by format

can inform adjustments when selecting placements and formats. Positions with identical performance may have different potential upon closer analysis.

Based on data from Mera by Okkam's study on media visibility levels, the calculation of advertising effectiveness was prepared, and it is presented in table 1.

Table 1
Effectiveness of advertising formats (desktop placement)

Banners	Visibility of advertising format (%)	Impressions // Purchase volume	Forecast// Viewed impressions	CTR	Forecast //Clicks	CPM	Budget	Forecast// Seen impressions	aCPM// Cost per 1000 seen impressions	Forecast // Ad recall// in thousands of persons
Full Screen Banner	100	1,000,000	870,000	1,20%	12000	1300	1,300,000	870,000	1,494	43,500
Contextual advertising	83	1,000,000	870,000	0,80%	8000	350	350,000	722,100	485	36,105
Large banner	69	1,000,000	870,000	0,40%	4000	1100	1,100,000	600,300	1,832	30,015
Product banner	60	1,000,000	870,000	0,80%	8000	540	540,000	522,000	1,034	26,100
In-read banner	34	1,000,000	870,000	1,50%	15000	650	650,000	295,800	2,197	14,790
Standard banner	23	1,000,000	870,000	0,23%	2300	450	450,000	200,100	2,249	10,005
Pop-up banner	13	1,000,000	870,000	0,20%	2000	470	470,000	113,100	4,156	5,635

Note: Composed by authors

For the analysis, forecast of CTR values and the base CPM (excluding discounts and mark-ups) of a high-traffic website were used. Based on this data, media metrics were forecast: number of clicks and valid impressions (the number of impressions after IVT filtering (synonyms: True Impressions, Eligible impressions). For the calculation for each medium, a uniform volume of 1,000,000 impressions was used as the basis, which allowed for a comparison of the media and the determination of the final budget for each position. Next, the metric of "viewed impressions" was added, and it was calculated using the following formula:

$$\text{Impressions seen} = \# \text{ of impressions viewed} \times \% \text{ of ad's visibility} \quad (1)$$

Calculating this metric makes it possible to estimate how many users will actually see the advertisement. In online advertising planning, all metrics re-

lating to the cost per impression and audience reach are standardized to 1,000. For example, CPM stands for cost per thousand impressions, and CPT stands for cost per thousand users. This approach allows us to compare different placement options. Based on our reasoning, the new metric aCPM (attention CPM) was proposed, which represents the cost per 1,000 impressions with user attention. This metric allows to estimate the cost per 1,000 seen impressions and the calculation is performed using the following formula (2):

$$\begin{aligned} \text{The cost per 1,000 seen impressions} &= \\ &= \frac{\text{online ad budget}}{\# \text{ of impressions}} \times 1,000 \end{aligned} \quad (2)$$

As mentioned above, a wide-reach advert campaign has a delayed effect. The impact of a past campaign can be assessed by conducting Brand Lift studies to determine whether the target audi-

ence's brand awareness or AdRecall (a metric that measures how well the target audience remembers an advert after viewing it). It is measured through a survey in which respondents are asked whether they remember a specific advert within a given time frame has changed. In the calculations presented, the Ad-Recall metric was projected based on a benchmark value (5%). The calculations demonstrate that the "full-screen banner" and "large banner" formats, despite having a higher cost per 1,000 impressions (CPM) and a maximum budget in absolute terms, deliver the best cost per 1,000 viewed impressions (aCPM). Only the "contextual ad" and "product banner" formats demonstrate a lower cost per 1,000 impressions, which is explained by the specific nature of these formats – they target an engaged audience and therefore have a higher response rate.

Therefore, to maximize the impact of the campaign within the budget, it is advisable to maximize the number of impressions for the "large banner" format. This will ensure a higher level of attention from a larger number of users within the budget and, consequently, a larger proportion of the audience will remember the advert after viewing it (Ad Recall), and consequently, a higher volume of subsequent target actions and sales can be predicted.

When forecasting effectiveness, it is necessary to focus on a comprehensive assessment of future media effects, rather than just standard metrics such as CTR and CPC.

During the implementation phase, baseline media results and attention metrics can be recorded by format and message using ad campaign tracking,

and the delayed effect can also be measured. Thus, at the tactical planning level, forecasting additional parameters will improve ad recall metrics, as well as subsequent target actions and sales within the existing budget, suggesting a new point of economic efficiency. The proposed methodology will enable a "re-evaluation" of media channels and formats to create a more effective media mix. It should be noted that this approach will also reveal the audience's genuine response to advertising communications, 'stripped' of adjustments for advertising placement and contact quality, thereby revealing the true strengths or weaknesses of the marketing and communications strategy.

To test the proposed hypotheses regarding the evaluation of online advertising effectiveness, the authors utilized the results of two media campaigns designed to promote different product categories: film productions and a new residential complex (two cases). The aim of this experiment was to identify the most significant factors influencing the effectiveness of advertising formats.

Case 1. Promotion of a new film (cinema release (or premier) – the official process of making a completed movie available to the public for viewing, either in theaters, on streaming platforms, or via home media. It marks the end of production and the beginning of distribution, where the film is marketed and exhibited to its intended audience (as it is defined by Ainslie et al., 2005) (table 2).

Research objective: to test the effectiveness of online advertising formats in terms of size and placement.

Table 2

Description of online media campaign to promote new film release

Campaign parameters	Description of parameter
Target audience	Broad audience. Age: 18-35, all genders, sites 400K+ Audience segments: interests to film and film series
Time period of campaign	5 weeks
Channels of distribution	• Websites selected according to visits by TA • Programmatic placement • Social networks (media)
Campaign description	A wide-reaching online advertising campaign was launched, targeting both the general public and each specific audience segment. Reach was achieved through the use of banner adverts. The OLV In-stream/Out-stream format was used to attract attention and increase visibility. Short-form video content was tested on social media.
Volume of placement (forecast)	37 600 000

Table continued

Campaign parameters	Description of parameter
Campaign phase	A1 – Awareness. Given the specific nature of promoting film productions, the campaign addressed a range of objectives (awareness, consideration, ticket purchase).
Advertising formats	Banners: 12 standard sizes (desktop and mobile web). Video formats: vertical and horizontal formats lasting 20 and 6 seconds, with sound, with subtitles.
Place for displaying the media (banners) on the website	Different places on websites were used for media (banners) in desktop and mobile web environments.
Results	Impressions 39,454,528 Reach 7,736,181 Average Frequency 5.1 Viewability 89.70% (viewed impressions as a percentage of total impressions)

Note: Composed by authors

Target metrics were set at the start of the campaign. Metrics were compared separately by audience segment, and results relating to broad audience reach were analyzed separately.

Results of the film promotion campaign

The campaign tested the effectiveness of banners, taking into account their size and placement on the webpage. Each of the core creative formats (banners, video formats) achieved at least 350,000 impressions.

When targeted at a broad audience, large-sized banners achieved the best behavioral metrics and engagement time metrics. These banners also had a higher CTR compared to standard banners, but the difference in CTR was not significant. Large banners in the mobile environment attract a higher level of attention compared to desktop placements.

When targeting an engaged audience (the “film and TV series enthusiasts” and “repeated cinema-goers” segments), a relatively high level of attention was recorded regardless of banner size, with only minor differences between banner sizes.

When promoting in neutral and thematic contexts, a set of five banners was placed. There were no significant differences in attention metrics. However, banners within thematic content had a higher CTR compared to those placed in a neutral context.

When promoting video formats, a sharp drop in attention levels was observed after the 6-second mark. Only 35% of users watched more than 50% of the video’s total duration. Videos watched with sound generated a higher response rate (+29%). Placement in a mobile environment demonstrated the effectiveness of vertical video. Attention levels

were 1.7 times higher compared to horizontal video placements.

Results of the evaluation of online advertising campaigns for new film realisations

When targeting a broad audience, the size and position of the banner on webpage influence the level of audience’s attention. Engaged audiences (audience segments with an interest in cinema) demonstrate a high level of attention regardless of the banner size. In other words, engaged audiences respond to a relevant message from the brand, even if the advertising format is standard.

When placed in a thematic context, the level of attention remains consistent and is virtually independent of the banner size. Thus, the contextual environment takes precedence over the banner size.

A smaller proportion of the audience watches the video for more than 6 seconds. Video formats (vertical, full screen) with sound attract the highest level of attention among all video formats. When developing creative content, it is advisable to place the key message at the beginning of the video so that the majority of the audience can take in the message within the first few seconds of playback.

Case 2. Online media campaign to promote new residential complex

Research objective: to test advertising formats in order to determine the impact of users’ attention levels towards advertising media on subsequent target actions. Description of media campaign is presented in table 3.

As in previous case the targets of campaign were set for a wide audience and for each audience segment and for each promotional channel at the beginning of campaign.

Table 3*Description of media campaign for promoting new residential complex*

Campaign parameters	Description of parameter
Description	A cross-channel online advertising campaign aimed at two target groups: 1. High-income demographic (aged 25–55) in Moscow and the Moscow Region. 2. Audience segments interested in real estate. Targeted reach was achieved through banner placements and a Smart TV campaign. Reach was expanded through the use of video inventory (OLV) Programmatic placement ensured exposure to an audience interested in real estate
Time period of campaign	10 weeks (2 phases)
Channels of distribution	• Websites selected according to visits by TA • Programmatic placement • Smart TV. Given that the target audience consists of light TV viewers (a large, desirable, and growing audience segment—comprising nearly half of households—who watch very little traditional linear television (often defined as <10–15 hours/week, or as little as 30–39 minutes a day). They are often younger, high-income, and college-educated professionals who prefer on-demand streaming over linear TV (Ceber et al., 2008), advertising on linear and thematic TV channels was not utilized; instead, video formats were promoted on Smart TVs
Volume of placement (forecast)	29 500 000
Campaign phase	A1 – Awareness, A3 – Ask
Advertising formats	Banners: 12 standard sizes. Production technologies: HTML5 and GIF banners Additional elements for designing banners: visuals, text, buttons, CTAs. Video formats: vertical and horizontal formats lasting 20 and 10 seconds, with sound.
Place for displaying the media (banners) on the website	Different places on websites were used for media (banners) in desktop and mobile web environments.
Results	Impressions: 29,900,600 Reach: 3,180,914 Average Frequency: 9.4 Viewability: 92.20% (visible impressions as a percentage of total impressions) Ad Recall: 14% increase. VTR on OLV for a wide audience was 42%, against a target of 35%; VTR on OLV for an involved audience was 82%, against a target of 65%;

Note: Composed by authors

Results of online cross-channels media campaign to promote the new residential complex

The effectiveness of banners was tested, taking into account their size, placement on the webpage and production technology (HTML5 and GIF banners). Each of the basic creative variants (banners, video formats) achieved at least 290,000 impressions. Traffic was directed to the brand's website.

The campaign was targeted at a high-income audience. It was necessary to segment the audience by income and identify audience segments with relevant interests. Residential property is a product with a long decision-making cycle, so this phase of the campaign lasted 10 weeks, allowing us to carry out

all the planned experiments to analyze advertising formats.

To implement the campaign, the audience was segmented by income and by relevant interests. A residential complex is a product with a long decision-making cycle, which is why the campaign ran for 10 weeks. Two phases were implemented sequentially, enabling all planned experiments to analyze advertising formats to be carried out. When targeting a broad audience, universal banners were used to highlight the complex's benefits. When targeting an engaged audience (with an interest in property), both universal banners and personalized banners were tested, with the latter taking into account

the audience's interest in a specific type of property. Depending on the user's socio-demographic parameters and interests, they were shown a banner highlighting various benefits: a children's playground, convenient transport links, a good environment, infrastructure, and recreational areas. During the campaign, various versions of standard and custom creatives were tested. The availability of ready-made banner components allowed for the rapid testing of options, without wasting time on creating and approving creatives during the campaign.

Conclusions on the wide-reach online campaign's implementation for the promotion of residential complex

The effectiveness of banners and video formats was assessed using a methodology that included an evaluation of attention metrics, including the 'viewed impressions' parameter.

Large-sized banners demonstrated a high level of attention and higher conversion rates. On some pages within a single domain, the difference in conversion rates reached 2.2 times, depending on the media format. The use of video formats on Smart TVs ensured significant attention to the advertising.

A Brand Lift study was conducted following the first phase of the campaign. The Ad Recall metric increased by 14%.

A correlation was identified between the level of attention paid to the advertising medium (interaction

time, activity (scrolling, mouse movement)) and the subsequent number of conversions among a broad audience. Ads with high audience engagement delivered 2.3 times more post-view conversions and a lower bounce rate on the advertiser's website, which stood at -29.5%.

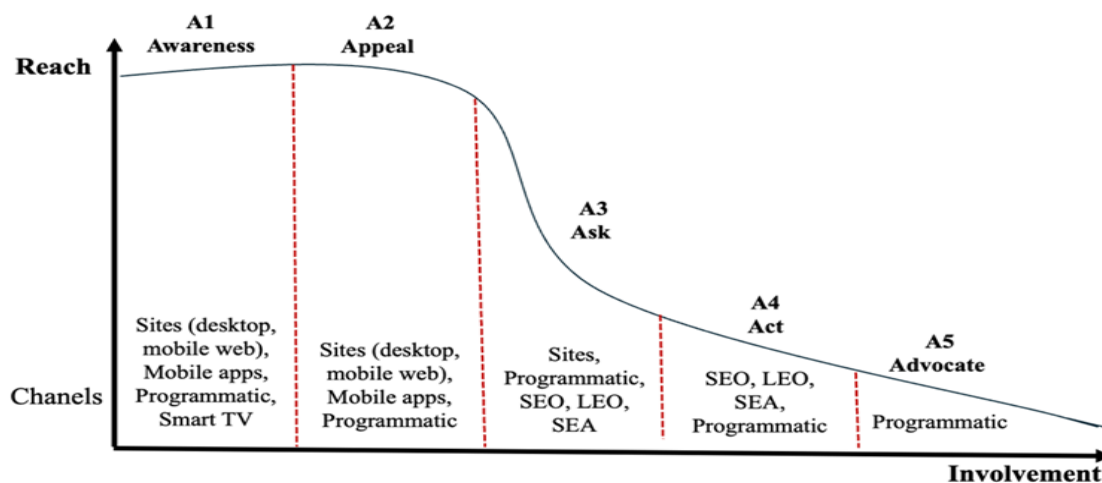
As audience engagement increases, the influence of ad unit size on campaign effectiveness decreases (phases A1 and A3). Attention to ad units among audience segments is higher compared to the general audience and is virtually independent of ad unit size.

Proposed recommendations for online media campaign planning

A. Campaign planning: selecting channels and media

When implementing a broad-reach campaign (particularly with direct placement), the choice of formats and placement locations must be one of the key considerations during the planning stage. The media strategy is based on the consumer's journey within the category. Based on this, scenarios of the user's journey to purchase are developed and the touchpoints between the user and the brand's advertising message are identified. Figure 4 shows Kotler's model (5A), which outlines five stages of the user's journey to purchase, from phase A1 "brand awareness" to phase A5 "advocate" (Kotler *et al.*, 2016).

Figure 4
Touchpoints and stages of the user's journey towards a purchase



Note: Composed by authors based on (Ritson, 2024)

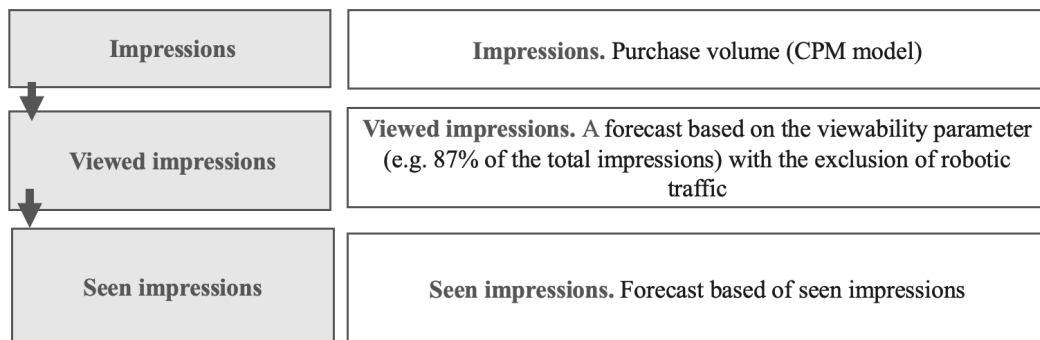
In stages A1 and A2, the advertising targets a broad audience that is not yet engaged in the decision-making process. Competition for the user's attention takes place amidst high media clutter, and advertising expenditure is at its highest; therefore, at these stages, it is essential to consider the level of attention paid to advertising media.

In phases A3 and A4, the user becomes involved in the selection and purchase process. It appears that various media formats can be used at this stage. Far more important at this stage is the use of contextual environments for placement, triggers and personalization in advertising communication. The following principle applies: the importance of using large formats decreases once the user has formed the intention to make a purchase. In phase A5, interaction takes place with a loyal audience; therefore, personalization is far more important than the size of the advertising medium.

For each phase, touchpoints and channels of presence are identified. Next, within each channel, the most effective formats are determined, and a comprehensive effectiveness forecast is carried out, which includes all basic parameters as well as a forecast of attention metrics. Subsequently, a split is formed according to the relevant stage (phase).

The volume of adverts buys in impressions is forecast for the selected media. Figure 6 illustrates the planning logic for this stage. The volume of ad buys is determined – the number of impressions for each format. Next, the volume of viewed impressions is forecast based on viewability standards. Subsequently, a forecast of 'seen' impressions is carried out for each format. This will enable us to identify the channels that generate the highest volume of such impressions, so that we can prioritise our ad spend based on this metric and the aCPM. (fig.5).

Figure 5
Campaign performance forecast



Note: Composed by authors

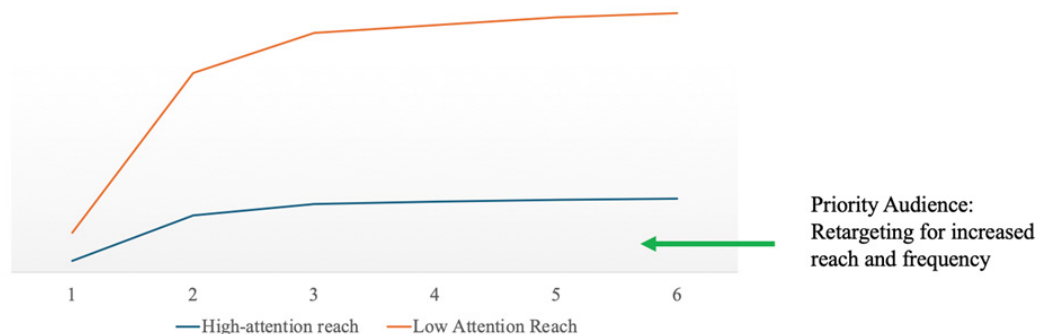
B. Campaign Monitoring

External tracking systems are used for monitoring, which record all metrics. They identify fraudulent traffic, track ad impressions within the viewable area, and use attention metrics to measure user attention and engagement. Experimentation and testing continue throughout the campaign.

C. Optimizing the campaign based on seen impressions

Once the campaign has achieved the required level of reach, users who have demonstrated the highest engagement are identified from the wider audience reached. This engaged audience segment is targeted again (retargeting), which will yield greater results. Fig.6.

Figure 6
Hypothetical reach accumulation curve



Note: Composed by authors

The performance forecast can be expanded using the ‘impressions seen’ metric, and the purchase volume can be prioritized taking this parameter into account.

Conclusion

The viewers’ attention crisis and information overload are driving new requirements for online media planning and the creation and quality of advertising materials, as well as strong programmatic planning based on the data-driven marketing approach to achieve the high level of advertising effectiveness (Sheynina & Skorobogatykh, 2026).

The study and analysis of the results of two online advert campaigns confirmed the first hypothesis (H1). It means that the level of users’ attention paid to an advertising medium influences the communicative and economic effectiveness of a campaign. The campaign results confirm that the higher the user’s actual attention, the higher the post-view conversion rate. Moreover, it does not matter whether a click was made on the advertising medium. An audience with a high level of attention remembers the advertisement better (Ad Recall).

The second hypothesis (H2) – “attention metrics” influence effectiveness in any type of advertising campaign – was partially confirmed. It was noted that when targeting a cold audience, there is a correlation at stage A1. At the same time, the size of the advert’s banner shown to an engaged audience has virtually no effect on their level of interest.

The attention factor must be taken into account in media planning. When planning, it is necessary

to consider the level of attention paid to advertising media, and to forecast the volume of ‘impressions seen’ and attention metrics across all placement types. This approach will ensure growth in post-view conversions and brand awareness within the budget.

For any type of placement, it is best to use the most effective formats, but when running reach campaigns (A1 and A2) to promote to a broad audience, this is a key requirement.

Creativity optimization. The study has shown that the majority of the audience does not watch a video for more than a few seconds, so the first few seconds of the video are critically important. With this in mind, it is necessary to rethink the video’s narrative structure. The key message must be conveyed and the main subject highlighted within the first 5 seconds. Further information can then be revealed in the video. A broad (non-engaged) audience will absorb the necessary information in a few seconds, whilst an engaged audience will continue watching the video for a more detailed look.

Based on attention data, different versions of banners and videos can be tested to select the most effective ones. At the same time, the technology used to produce banners is less important than the format.

Thus, despite the audience’s low attention span and highly competitive activity, the potential for effective wide-reach based media campaigns has not yet been exhausted. Prioritizing media channels with high attention levels will have a positive impact when promoting to a broad audience.

Funding

This research received no external funding.

Ethical requirements

Authors guarantee that the International Code on Market and Social Research recommended by the International Chamber of Commerce and the European Society of Market and Public Opinion Research (ESOMAR) ICC/ESOMAR was taken into account while using open sources data.

Acknowledgments

The authors would like to acknowledge gratitude to the colleagues from the film production industry in Russia and the marketers of the new residential complex in Moscow, Russia, who shared with us information about online media campaigns.

Conflicts of Interest

The authors declare no conflict of interest.

“In preparing this work, the authors did not used

ANY MODEL/SERVICE except recommendations of International Code on Market and Social Research recommended by the International Chamber of Commerce and the European Society of Market and Public Opinion Research (ESOMAR) ICC/ESOMAR for the use and way of referencing the open sources data, the and we justify than no AI or other models where used during the work on the manuscript. So, the authors reviewed and edited the content as necessary and take full responsibility for the content of the publication.”

Author Contributions

MASH: Conceptualization, methodology, visualization

IIS: formal analysis

MASH & IIS: resources, writing original draft preparation, writing-review and editing, supervision, project administration

All authors have read and agreed to the published version of the manuscript.

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*Received: 5 May 2026
Accepted: 20 September 2026*

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STRATEGIC HRM, EMPLOYEE MOTIVATION, AND INNOVATION IN CHINESE OIL & GAS SOES: EVIDENCE FROM THE KAZAKHSTAN-CHINA PIPELINE

This study examines how human resource management (HRM) practices influence the innovation performance of Chinese state-owned enterprises (SOEs) working on Belt and Road energy projects. The Kazakhstan-China pipeline project is used as the central case. To understand how HRM operates in this setting, the study draws on survey responses from 50 employees together with interviews with HR managers and senior executives.

The findings indicate that HRM practices tend to work better when they are adjusted to local realities rather than transferred directly from headquarters. Once moved into a different cultural and institutional environment, standard procedures often lose some of their force. In contrast, measures shaped with local needs in mind—such as clearer job stability, performance rewards that employees consider reasonable, and workplace norms that fit local expectations—were more effective in raising motivation.

Higher motivation was reflected in steadier daily operations, more reliable work processes, and healthier financial outcomes. These patterns suggest a pathway in which improvements in HRM help build motivation and, in turn, strengthen the conditions needed for innovation. The findings also show that cultural distance, institutional rules, and the physical conditions of fieldwork influence how HRM initiatives are received and carried out. In practice, this makes flexible management, consistent communication, and well-targeted support especially important.

For Chinese SOEs expanding abroad, the results provide practical guidance for designing incentive systems and improving innovation performance in overseas energy projects. The study also points out that assessments of Belt and Road projects should pay closer attention to people-related and cross-cultural factors, rather than focusing only on technical or financial results. Because this analysis is based on a single case and relies on indirect measures of innovation, the conclusions should be interpreted with caution. Future research could compare additional cases and use more direct indicators, such as patent activity or recorded process improvements.

Keywords: HRM, employee motivation, innovation performance, international management, Oil and Gas Industry.

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Қытайдың мемлекеттік мұнай-газ кәсіпорындарындағы стратегиялық адам ресурстарын басқару, қызметкерлер мотивациясы және инновациялар: Kazakhstan–China Pipeline мысалында

Бұл зерттеу Қытайдың мемлекеттік кәсіпорындарының интернационалдануы барысында адам ресурстарын басқару (HRM) тәжірибелерінің қызметкерлер мотивациясына әсерін талдайды. Негізгі зерттеу нысаны ретінде Қазақстан–Қытай мұнай-газ құбыры жобасы таңдалып, ол трансшекаралық энергетикалық ынтымақтастықтың типтік үлгісі ретінде қарастырылады. HRM жүйесінің осы жағдайда қалай жұмыс істейтінін түсіну үшін аралас зерттеу әдісі қолданылды: 50 қызметкер арасында сауалнама жүргізіліп, сонымен қатар HR менеджерлері мен жоғары деңгейдегі басшылармен сұхбаттар өткізілді.

Зерттеу нәтижелері көрсеткендей, адам ресурстарын басқару тәжірибелері штаб-пәтерден тікелей көшірілген жағдайда емес, жергілікті жағдайларға бейімделген кезде анағұрлым тиімді болады. Өртүрлі мәдени және институционалдық ортада стандартталған басқару тәсілдері өз тиімділігін жиі жоғалтады. Ал жергілікті ерекшеліктерді ескеретін шаралар – жұмыспен қамтылудың тұрақтылығын нақты түсіндіру, әділ қабылданатын марапаттау жүйелері және жұмыс орнының жергілікті күтулерге сәйкес нормалары – қызметкерлердің мотивациясын арттыруға көбірек ықпал етеді.

Мотивация деңгейінің жоғарылауы күнделікті операциялардың тұрақтылығының артуынан, жұмыс процестерінің сенімділігінің жақсаруынан және қаржылық нәтижелердің өсуінен байқалады. Бұл үрдістер HRM тәжірибелерін жетілдіру қызметкерлер мотивациясын күшейтіп, өз кезегінде операциялық тиімділікті арттыратынын көрсетеді. Осы зерттеуде мұндай өзгерістер тікелей инновациялық көрсеткіштерді өлшеу қиын болатын жағдайда процестік жетілдірулерді сипаттайтын инновациялық тиімділіктің көрсеткіштері ретінде қарастырылады.

Сонымен қатар зерттеу мәдени айырмашылықтар, институционалдық шектеулер және өндірістік жағдайлар халықаралық жобаларда HRM тәжірибелерін енгізу мен қабылдауға елеулі әсер ететінін анықтады. Сондықтан тәжірибеде икемді басқару, тұрақты коммуникация және мақсатты қолдау шаралары ерекше маңызды болып табылады.

Интернационалдану кезеңінен өтіп жатқан Қытайдың мемлекеттік кәсіпорындары үшін бұл зерттеу шетелдік энергетикалық жобалардағы ынталандыру жүйелерін жетілдіруге және операциялық тиімділікті арттыруға арналған практикалық ұсыныстар береді. Зерттеу HRM тәжірибелерін жергілікті жағдайларға бейімдеудің халықаралық табыс үшін маңызды екенін көрсетеді. Сондай-ақ «Бір белдеу, бір жол» жобаларын бағалау кезінде тек техникалық немесе қаржылық нәтижелерге емес, адами және мәдениетаралық факторларға да көбірек көңіл бөлу қажеттігін атап өтеді.

Зерттеу бір ғана жағдайлық талдауға негізделген және инновациялық тиімділіктің жанама көрсеткіштерін қолданатындықтан, алынған қорытындыларды сақтықпен түсіндіру қажет. Болашақ зерттеулер бірнеше жобаны салыстырып, патенттік белсенділік немесе нақты тіркелген процестік жетілдірулер сияқты тікелей көрсеткіштерді пайдалана алады.

Түйін сөздер: адам ресурстарын басқару, қызметкерлер мотивациясы, инновациялық тиімділік, интернационалдану, мемлекеттік кәсіпорындар.

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Стратегическое управление человеческими ресурсами, мотивация сотрудников и инновации в китайских государственных нефтегазовых предприятиях: на примере Kazakhstan-China Pipeline

Данное исследование рассматривает влияние практик управления человеческими ресурсами (HRM) на мотивацию сотрудников в процессе интернационализации китайских государственных предприятий. В качестве основного кейса выбран казахстанско-китайский трубопроводный проект, представляющий собой типичный пример трансграничного энергетического сотрудничества. Для анализа функционирования HRM в данных условиях использован смешанный метод исследования, включающий анкетирование 50 сотрудников, а также интервью с HR-менеджерами и руководителями высшего звена.

Результаты показывают, что практики управления персоналом оказываются более эффективными, когда они адаптированы к местным условиям, а не напрямую перенесены из головного офиса. В различных культурных и институциональных средах стандартизированные подходы часто теряют свою эффективность. Напротив, меры, учитывающие локальные особенности – такие как более высокая ясность в вопросах стабильности занятости, справедливо воспринимаемые системы вознаграждения и организационные нормы, соответствующие местным ожиданиям – способствуют повышению мотивации сотрудников.

Рост мотивации проявляется в большей стабильности ежедневных операций, повышении надежности рабочих процессов и улучшении финансовых результатов. Полученные данные указывают на взаимосвязь, при которой совершенствование HRM усиливает мотивацию сотрудников и, как следствие, повышает операционную эффективность. В рамках данного исследования такие улучшения интерпретируются как показатели инновационной эффективности, отражающие процессные улучшения в условиях, когда прямые показатели инноваций трудно измерить.

Исследование также показывает, что культурная дистанция, институциональные ограничения и производственные условия существенно влияют на внедрение и восприятие HRM-практик в международной деятельности. В практическом плане это делает особенно важными гибкое управление, последовательную коммуникацию и адресную поддержку сотрудников.

Для китайских государственных предприятий, проходящих этап интернационализации, результаты исследования предлагают практические рекомендации по разработке систем стимулирования и повышению эффективности зарубежных энергетических проектов. Работа подчеркивает важность локализации HRM для успешного международного развития. Кроме того, исследование показывает, что оценка проектов инициативы «Один пояс – один путь» должна

уделять больше внимания человеческим и межкультурным факторам, а не ограничиваться исключительно техническими или финансовыми показателями.

Поскольку анализ основан на одном кейсе и использует косвенные показатели инновационной эффективности, полученные выводы следует интерпретировать с осторожностью. Будущие исследования могут включать сравнительный анализ нескольких проектов и применять более прямые индикаторы, такие как патентная активность или документально подтвержденные процессные улучшения.

Ключевые слова: управление человеческими ресурсами, мотивация сотрудников, инновационная эффективность, интернационализация, государственные предприятия.

Introduction

HRM is widely recognized as an important factor affecting organizational performance, especially in industries subject to geopolitical risks, economic volatility and operational pressures. The oil and gas industry is particularly dependent on an effective HRM system due to its high capital intensity, specialized skill requirements and complex multinational operating environment. For Chinese SOEs participating in the Belt and Road Initiative, how to motivate employees, maintain organizational vitality and continuously promote technological and management innovation in overseas projects has become a key issue affecting their competitiveness.

Large-scale energy cooperation projects in Kazakhstan and other Belt and Road countries, such as the Kazakhstan-China Pipeline LLP, operate in a highly diverse and ever-changing environment. The local legal system, labor norms, cultural differences, and geopolitical sensitivities may all affect companies' HRM practices. For Chinese SOEs, this means not only allocating labor under different institutional environments, but also creating effective incentives in a cross-cultural context to ensure that employees remain continuously motivated and innovative. In overseas environments, these challenges have placed significant adaptive pressure on the traditional SOE management model, which is primarily characterized by stability and administrative control.

Existing research has pointed out that overly centralized administrative structures may limit organizational flexibility and weaken employee initiative and innovative behavior (Björkman & Lervik, 2007; Ferner et al., 2012). The management characteristics of SOEs that emphasize stability may also reduce employees' work engagement and innovation motivation (Bowen & Ostroff, 2004; Cooke, 2018). Although the relationship between HRM and SOE performance has been extensively discussed, it is only within the domestic context. Existing research remains relatively limited on how Chinese

SOEs should adapt their HRM practices in multinational operational contexts and how to maintain employee motivation and innovation capabilities amid institutional differences and cultural distances. In particular, there is a lack of empirical evidence in a highly strategic, politically and technically demanding industry such as energy cooperation projects.

Based on this, Kazakhstan-Chinese Pipeline LLP, which has operated in Kazakhstan for many years, is taken as a case study in this research. This study systematically analyzes how core HRM practices such as recruitment, training, performance management, and employee engagement affect employee motivation and further explores the relationship between employee motivation and innovation performance. The study also focuses on how cross-cultural management, geopolitical factors, and SOE governance characteristics combine to shape the effectiveness of HRM practices.

This study contributes to the literature by examining the relationship between strategic HRM, employee motivation, and innovation-related performance in a cross-border Chinese state-owned energy enterprise operating under the Belt and Road Initiative, where empirical evidence remains limited. Unlike previous studies that mainly examine domestic SOEs or private multinational firms, the findings suggest that localized HRM practices are more effective than directly transferring headquarters' standardized HRM systems in motivating employees and supporting innovation-related performance.

The study further finds that employee motivation functions as an important mechanism linking HRM practices with innovation-related performance. The analysis shows that improvements in HRM practices enhance employee motivation, which is associated with better operational and financial outcomes related to innovation performance. The findings further indicate that, in large-scale energy infrastructure projects where conventional innovation indicators are difficult to obtain, operational and financial indicators can serve as meaningful proxies for innovation-related performance.

Finally, the findings demonstrate that institutional differences, cultural distance, and cross-border operating conditions shape the effectiveness of HRM practices in overseas Chinese SOEs. By integrating survey evidence with qualitative interviews, this study provides a more comprehensive understanding of these relationships. These findings contribute to the growing literature on international HRM in Chinese state-owned enterprises and provide practical guidance for improving HRM practices, enhancing employee motivation, and supporting innovation performance in overseas energy projects.

Literature review

Chinese SOEs began expanding overseas during the 1990s. Early overseas activities focused mainly on resources, including oil, gas, mining, and infrastructure projects in politically aligned countries (Cooke et al., 2018). The Belt and Road Initiative accelerated this process and increased Chinese investment across Central Asia, where many projects involve long-term cooperation between Chinese and local state-owned companies. Chinese SOEs also carry a distinctive management structure characterised by formal administrative procedures, centralised reporting systems, and political accountability. These features shape the management of overseas subsidiaries, particularly in HRM practices. Existing research suggests that multinational enterprises often face a tension between replicating home-country HRM systems and adapting them to host-country conditions, with the balance between global integration and local adaptation shaped by institutional and firm-specific factors (Cooke et al., 2018; Patel et al., 2024). Existing research shows that strategic HRM practices, including selection, training, appraisal, rewards, and employee empowerment, can strengthen organizational capabilities and contribute to innovation and firm performance (Chawla et al., 2023). Recent evidence further shows that a strategic HR focus can promote firm innovation through high-performance work systems, with the strength of this relationship varying across state-owned and privately owned enterprises (Wang et al., 2024). Prior studies report that clear communication, fair evaluation and supportive work environments improve employees' willingness to contribute (Díaz-Fernández et al., 2023; Saad et al., 2021). Motivation also increases when HRM reflects organizational values, including environmental and social responsibility (Bowen & Ostroff, 2004; Jiang et al., 2012). Recent evidence from the Chinese context further sug-

gests that culturally embedded HRM practices can influence employee innovative behavior, although their effects depend partly on how employees perceive and respond to these practices (Ren et al., 2024). This contextual perspective is also consistent with the AMO framework, which emphasizes that employees' abilities, motivation and opportunities shape work behaviour (Lepak et al., 2006; Van Berkel et al., 2022).

At the same time, many studies show that motivation supports innovation. Employees are more likely to develop or adopt new ideas when they have autonomy, positive emotions, supportive leadership and influence over decisions (Shipton et al., 2006; Muñoz-Pascual et al., 2021). Flexible work arrangements can support employees' adaptability and innovation (Azeem & Kotey, 2023). More broadly, strategic HR practices involving recruitment, training, development, and performance management have also been associated with stronger innovation performance (Trivedi & Srivastava, 2024). Together, these findings suggest that motivation is a key mechanism linking HRM to innovation.

International HRM research has long debated whether multinational firms should standardise HRM systems or adapt them locally (Ferner et al., 2012). Standardisation supports organisational control and consistency across subsidiaries, while local adaptation improves acceptance and effectiveness in the host-country environment. Several studies on Chinese multinational enterprises report a similar pattern. Formal personnel systems are often implemented relatively quickly because they support organisational control and reporting consistency across subsidiaries. Participative and informal practices, however, tend to develop more slowly and unevenly. Cooke et al. (2018) argue that Chinese SOEs often establish formal compliance systems first, while relational HRM practices receive less attention during the early stages of internationalisation. More recent evidence also suggests that the configuration of HRM systems matters for innovation in international settings, as commitment and collaboration-based HRM systems can support different forms of innovation among firms operating across national boundaries (Menzies et al., 2025).

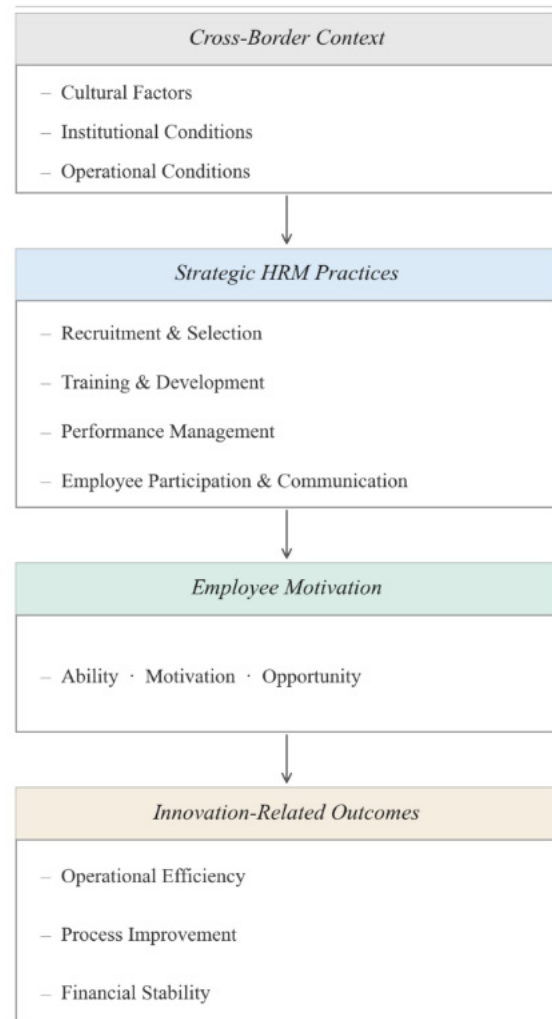
Not all HRM practices transfer equally across borders. Formal HRM systems, such as written job descriptions, structured training programmes, appraisal procedures, and rule-based compensation mechanisms, are relatively easier to standardise because they can be documented and monitored centrally. Relational HRM practices, including commu-

nication quality, employee participation, fairness, and managerial support, are more difficult to transfer because they depend heavily on local management behaviour and workplace expectations (Björkman & Lervik, 2007; Farndale & Paauwe, 2007). However, most of this evidence comes from private firms or domestic public organizations, while research on cross-border state-owned enterprises remains limited. Institutional differences between home and host countries can shape the extent to which multinational headquarters control subsidiary HRM policies and influence how HRM practices are implemented across borders (Fenton-O'Creevy & Gooderham, 2025). Political embeddedness may also affect innovation outcomes in the international activities of Chinese firms, highlighting the importance of the broader institutional and political environment in cross-border operations (Liang et al., 2025). Leadership adaptation and localized HRM are therefore important for maintaining employee motivation and supporting innovation in bureaucratic and multicultural settings (Indrayanti et al., 2025). Despite these insights, few studies examine HRM, motivation and innovation together in one integrated framework. Even fewer incorporate cross-border conditions directly into this relationship. This gap is particularly important for Chinese SOEs in the high-risk energy sector that operate internationally. Such enterprises have a strong demand for innovation, yet their operational improvement processes are difficult to observe directly through publicly available research and development (R&D) data.

To address this gap, the present study adopts a conceptual framework (Figure 1) that treats employee motivation as the main link between strategic HRM practices and innovation-related outcomes.

HRM practices—including recruitment, training, performance management and engagement—are expected to strengthen employees' willingness and ability to contribute. Higher employee motivation contributes to improved operational efficiency and financial performance, and these metrics can be used as proxy variables to measure innovation in an energy industry with opaque data. In addition, the framework recognizes the cross-border environment as an essential contextual factor. It emphasizes that institutional, political, and cultural conditions affect HRM practices and, in turn, the effectiveness with which those practices translate into employee motivation and innovation. Based on this framework, the study addresses three research questions:

Figure 1
HRM-Motivation-Innovation Framework for Cross-Border SOEs



Note: Compiled by the authors based on the literature review

RQ1: How do strategic HRM practices relate to employee motivation in a cross-border SOE?

RQ2: How is employee motivation associated with innovation performance, using operational and financial indicators?

RQ3: How does the cross-border environment influence the relationships between HRM, motivation and innovation?

Methodology

This study uses a mixed-methods design to explore how HRM practices shape employee motiva-

tion and innovation-related outcomes in a cross-border organization. Most of the evidence comes from the survey, but it became clear early in the project that numbers alone would not capture how management practices actually work on the ground. People in overseas SOEs deal with cultural expectations, local regulations and organizational routines that are not easy to quantify. Because of this, interviews were added to help make sense of the survey patterns and provide a view of the context in which employees and managers operate.

The quantitative part of this study was based on a questionnaire survey conducted in March 2024 among employees of Kazakhstan-China Pipeline LLP. Given the case-study design of this research, a purposive sampling strategy was adopted to select employees who had direct experience of the company's HRM practices and organizational operations. A total of 50 valid questionnaires were collected from employees in the operations, engineering, and administrative departments, which represent the company's core functional areas and provide diverse perspectives on the implementation of HRM practices in a cross-border organizational setting. Due to the unique nature of cross-border oil and gas operations, purposive sampling was considered appropriate because it ensured that respondents possess relevant knowledge and practical experience. Although the sample size was relatively small ($n = 50$), the objective of this study was to obtain in-depth evidence from a specific organizational context rather than to achieve statistical generalization.

As shown in Table 1, the respondents represented different age groups, levels of work experience, organizational tenure, departments, and organizational positions, reflecting the diversity of the workforce within the company. This diversity enabled the study to capture perspectives from employees across multiple functional areas and different stages of their careers.

The questionnaire asked about four commonly discussed HRM practices: recruitment, training, performance management and employee engagement. A five-point Likert scale was used. Before running the analyses, the measurement items were checked. Reliability was high across all four dimensions, and the KMO and Bartlett tests indicated that the data were appropriate for factor analysis. Principal component analysis was used to explore how satisfaction items grouped together, and one-way ANOVA was conducted to compare satisfaction levels before and after the HRM adjustments. All survey participation was voluntary.

Table 1

Demographic Characteristics of the Respondents (N = 50)

Variable	Category	n	%
Gender	Male	30	60
	Female	20	40
Age	20–35 years	27	54
	35–50 years	18	36
	Above 50 years	5	10
Work Experience	1–10 years	25	50
	10–20 years	15	30
	More than 20 years	10	20
Tenure at Current Company	1–3 years	22	44
	3–5 years	15	30
	More than 5 years	13	26
Position	Non-managerial employees	33	66
	Supervisory staff	11	22
	Middle and senior management	6	12
Department	Operations	23	46
	Engineering	16	32
	Administration	11	22

Note: Compiled by the authors based on survey data

To complement the survey results, semi-structured interviews were arranged with two HR managers and two senior managers who regularly deal with cross-border management issues. These were individuals who understand the daily pressures and practical limitations of working in an overseas SOE. The interviews focused on how cultural differences are handled, how institutional rules shape HRM practices, and how incentive systems function in practice. After transcription, the interviews were reviewed and coded thematically. The themes are not treated as statistical findings but are used to clarify and enrich the interpretation of the survey results.

This study circumvents the challenge of directly measuring innovation outcomes in the energy sector, where R&D data are seldom public, by using operational and financial indicators as indirect measures. Three indicators were examined over the period 2018–2024: capacity utilization, asset-liability ratio and the interest-bearing debt ratio. Although these do not measure innovation in a strict sense, they do reflect improvements in efficiency, financial stability and operational effectiveness, all of which are typically associated with innovation-related processes in this industry.

In large-scale energy infrastructure projects, conventional innovation outputs, such as patents or R&D outputs, are often unavailable or do not adequately capture process-oriented improvements. Therefore, innovation-related performance in this context is more likely to be reflected through process improvements. Higher capacity utilization may indicate more efficient resource utilization and operational efficiency, while lower asset-liability and interest-bearing debt ratios may reflect improved financial stability associated with these process improvements. These operational and financial indicators can serve as indirect proxies for innovation-related performance in situations where direct innovation measures are unavailable.

In the final stage of analysis, the quantitative and qualitative materials were brought together to develop a more grounded interpretation of the findings. The survey identified the patterns and direction of change, while the interviews helped explain why those changes might occur and how they are linked to the realities of managing a cross-border SOE.

Results and discussion

Changes in satisfaction before and after HRM practice adjustment

This study measured employee satisfaction before and after the implementation of HRM optimization initiatives in March 2024 in four areas: recruitment, training, performance management, and employee engagement. Tables 2 and 3 provide the detailed distributions.

As shown in Table 2, recruitment registered the highest level of dissatisfaction, with 55.69% of employees selecting “very dissatisfied” or “dissatisfied.” Training followed with 48.11% dissatisfaction. Performance management recorded a higher level of satisfaction, with 64.55% of responses falling in the “satisfied” or “very satisfied” categories. Employee engagement displayed a wide distribution, with 44.30% reporting dissatisfaction and 40.51% reporting satisfaction.

Table 2

Employee satisfaction with HRM practices before optimization

HRM practice	Very dissatisfied (%)	Dissatisfied (%)	Neutral (%)	Satisfied (%)	Very satisfied (%)
Recruitment	29.11	26.58	5.06	37.97	1.27
Training	16.46	31.65	6.33	43.04	2.53
Performance Management	12.66	18.99	3.80	56.96	7.59
Employee Engagement	6.33	37.97	5.06	10.13	40.51

Note: The table presents employee satisfaction levels before HRM optimization. Dissatisfaction is calculated as the sum of the first two categories, while satisfaction is calculated as the sum of the last two categories. Compiled by the authors based on the survey data

Table 3

Employee satisfaction with HRM practices after optimization

HRM practice	Very dissatisfied (%)	Dissatisfied (%)	Neutral (%)	Satisfied (%)	Very satisfied (%)
Recruitment	6.33	5.06	7.59	49.37	31.65
Training	5.06	5.06	6.33	39.24	44.30
Performance Management	6.33	1.27	7.59	45.57	39.24
Employee Engagement	10.13	6.33	5.06	37.97	40.51

Note: Compiled by the authors based on survey data

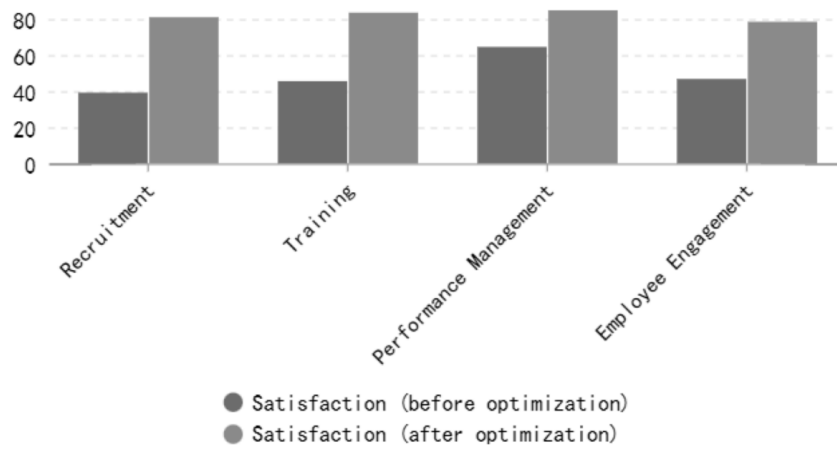
Recruitment dissatisfaction decreased from 55.69% to 11.39%, and satisfaction increased from 39.24% to 81.02%; Training dissatisfaction decreased from 48.11% to 10.12%, while satisfaction increased from 45.57% to 83.54%; Performance management satisfaction increased from 64.55% to 84.81%; Employee engagement satisfaction increased from 50.64% to 78.48%.

Figure 2 presents a visual comparison, showing higher frequencies in the satisfied categories across all four HRM dimensions after optimization.

Trends in operational and financial performance
To objectively reflect the effectiveness of HRM optimization, this study further analyzed operational and financial metrics from 2018 to 2024.

Figure 2

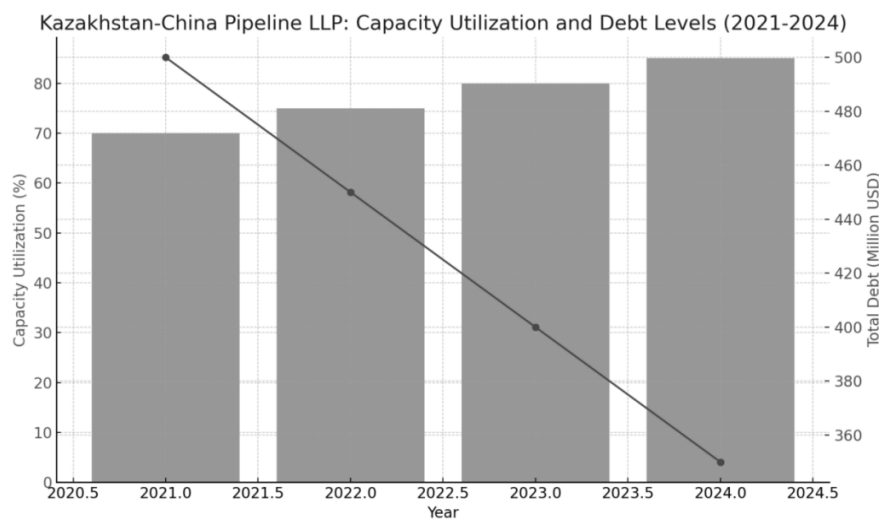
Comparison of employee satisfaction before and after HRM optimization



Note: Compiled by the authors based on the results

Figure 3

Kazakhstan- China Pipeline LLP: Capacity Utilization and Debt Levels



Note: Compiled by the authors based on the results

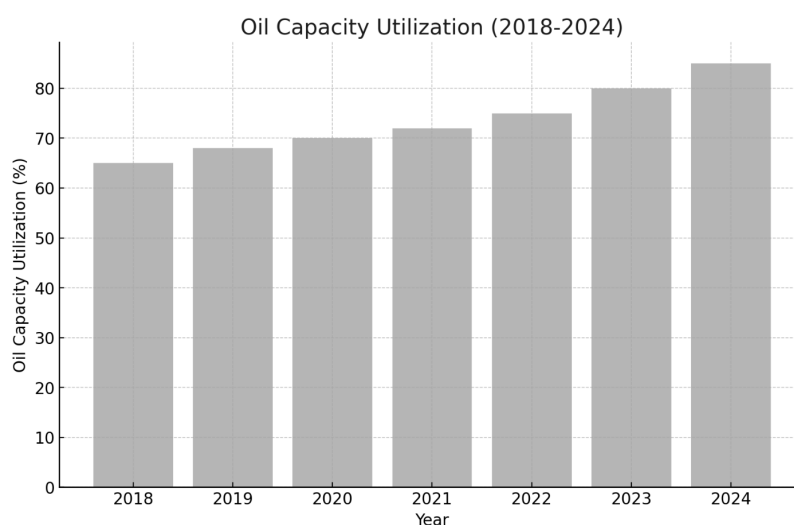
Figure 3 shows that capacity utilization increased from 70% to 85% between 2021 and 2024. During the same period, total liabilities decreased from approximately \$500 million to \$350 million.

Figure 4 shows a continuous rise in capacity utilization, increasing from 65% in 2018 to 85% in 2024.

Figures 5 and 6 present the financial structure indicators. The asset-liability ratio decreased from 60% in 2018 to 47% in 2024, while the interest-bearing debt ratio declined from 40% to 27% over the same period.

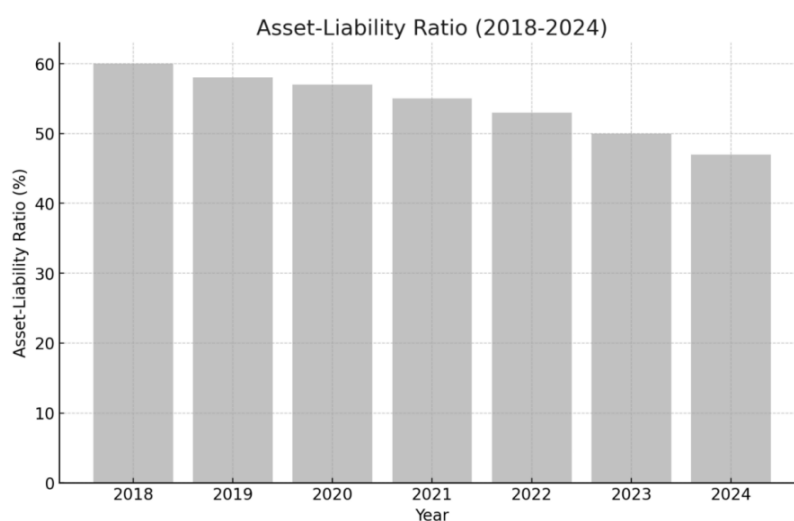
Validity and reliability testing of survey instruments

Figure 4
Oil capacity utilization, 2018-2024



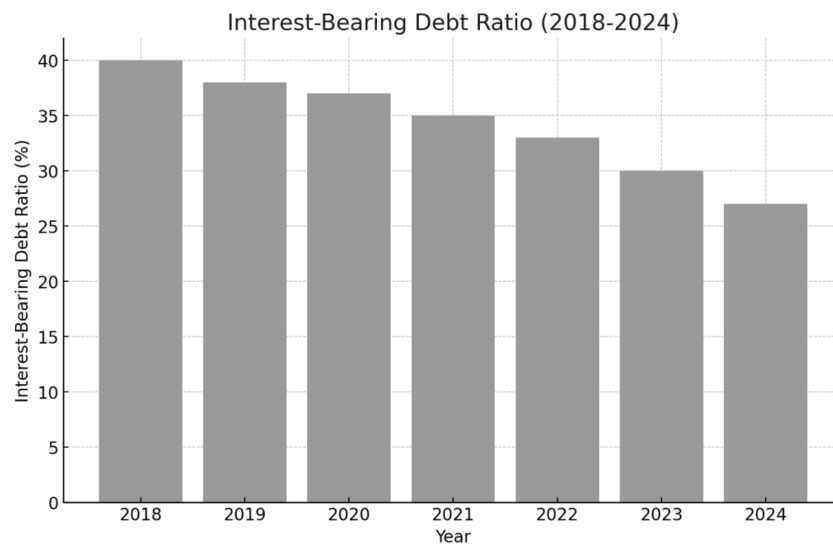
Note: Compiled by the authors based on the results

Figure 5
Asset-liability ratio, 2018-2024



Note: Compiled by the authors based on the results

Figure 6
Interest-bearing debt ratio, 2018-2024



Note: compiled by the authors based on the results

Table 4
Cronbach's alpha of Questionnaire on Motivation Factors

Indicator	Cronbach's Alpha
Recruitment Satisfaction	0.85
Training Satisfaction	0.82
Performance Management	0.87
Employee Engagement	0.89
Overall Satisfaction	0.88

Note: Compiled by the authors based on the results

Cronbach's alpha coefficients for all four HRM dimensions exceeded 0.80 (Table 4), indicating acceptable internal consistency among items.

Table 5
KMO and Bartlett's Test Results

Test	Value
KMO Value	0.85
Bartlett's Test of Sphericity	
Approx. Chi-Square	732.56
df	120
Sig.	0.000

Note: Compiled by the authors

The Kaiser-Meyer-Olkin (KMO) value was 0.85, and Bartlett's test of sphericity was statistically significant ($\chi^2 = 732.56$, $df = 120$, $p < .001$), supporting the suitability of the dataset for factor extraction (Table 5).

Table 6
Exploratory Factor Analysis Results

Factor	Variables Included	Eigenvalue	Variance Explained (%)
Factor 1	Recruitment, Training, Performance Management	2.75	68.50
Factor 2	Employee Engagement	1.25	31.50

Note: Compiled by the authors

Exploratory factor analysis using principal component extraction and Varimax rotation produced two factors with eigenvalues greater than 1. Factor 1 included recruitment, training, and performance management. Factor 2 included employee engagement. Together, the two factors accounted for the total variance among the four constructs (Table 6).

Table 7
ANOVA Results

Source of Variance	Sum of Squares	df	Mean Square	F-value	p-value
Recruitment Satisfaction	120	4	30.00	5.60	0.002
Training Satisfaction	110	4	27.50	4.90	0.003
Performance Management	150	4	37.50	6.20	0.001
Employee Engagement	130	4	32.50	5.40	0.002
Error	100	20	5.00	-	-
Total	610	36	-	-	-

Note: Compiled by the authors

ANOVA was employed to test whether the difference in satisfaction levels before and after HRM optimization was statistically significant. As shown in Table 7, all four HRM dimensions exhibited significant differences ($p < 0.05$). The highest F-value was observed in performance management ($F = 6.2$, $p = 0.001$).

The results show an overall increase in satisfaction across all four HRM dimensions following the optimization. Operational indicators also show higher capacity utilization together with lower debt ratios. The ANOVA results further identified statistically significant differences between the pre- and post-optimization measurements.

The survey results indicate that recruitment and training showed the greatest improvements following the HRM adjustments. The interview findings helped explain these improvements. HR managers reported that clearer recruitment criteria and multilingual training reduced employees' uncertainty during the onboarding process and helped them understand organizational expectations more quickly. As a result, employees became more confident in their daily work and were more willing to take initiative. These findings are consistent with the survey results and highlight the importance of localized recruitment and training practices in motivating employees.

Employee engagement improved more gradually than the other HRM dimensions. Managers explained that employee engagement developed gradually because trust and effective communication require time in cross-border organizations. Regular communication between Chinese and local employees reduced misunderstandings and gradually strengthened employees' willingness to participate in organizational activities.

To understand how these motivational changes relate to organizational performance, the study ex-

amined operational and financial indicators. If HRM practices successfully enhance employee motivation, corresponding improvements should also be reflected in organizational performance. In pipeline companies, innovation rarely appears as patents or new technologies. It is more often reflected in fewer disruptions, smoother coordination, and more reliable systems. Because traditional innovation indicators are not available for this case, capacity utilization and debt reduction offer practical measures of operational improvement. Both indicators improved during the study period.

Following the HRM improvements, higher capacity utilization suggests more stable and efficient operations, while lower debt ratios suggest improved financial stability. The interview findings provide further support for these findings. Managers reported that standardized training, clearer communication, and localized incentive mechanisms improved coordination and reduced operational delays. These observations are consistent with the improvements in capacity utilization and financial performance, suggesting that localized HRM practices contributed to innovation-related performance primarily through better organizational processes rather than direct technological innovation.

Overall, the mixed-methods findings suggest that locally adapted HRM practices enhanced employee motivation and supported innovation-related performance in this cross-border SOE. While the survey identified the observed changes, the interviews provided contextual explanations for how and why these changes occurred.

Conclusion

Using the Kazakhstan-China pipeline project as an example, this study examines how strategic human resource management practices affect em-

employee motivation, which in turn shapes innovation performance. The study utilized a mixed-methods design, combining questionnaire and interview findings to draw several conclusions:

The internationalization of HRM practices is crucial for enhancing employee motivation. Research findings indicate that directly replicating the parent company's standardized processes often fails in cross-border environments. In contrast, HRM that reflect local cultural norms, institutional constraints, and employee expectations tend to be more readily accepted and yield higher satisfaction levels. For instance, greater job security, equitable performance rewards, and work arrangements aligned with local practices. Improvements in recruitment and training contributed most significantly to this shift in incentives.

An increase in staff motivation is closely linked to significant improvements in operational and financial performance. Following adjustments to HRM, innovation metrics improved in tandem with increased employee engagement. In an energy industry environment with limited information transparency, this model suggests that stronger employee motivation contributes to process-level innovation. This is because it promotes smoother workflows, better coordination and more stable operations. Third, the cross-border environment plays a decisive role in the effectiveness of HRM practices. Institutional differences, cultural distance, and geopolitical sensitivities can impact employees' understanding of management initiatives. A flexible HRM approach emphasizing cross-cultural communication and targeted support is crucial for maintaining employee engagement and performance in complex settings.

This study holds both theoretical and practical significance. Theoretically, it proposes a framework linking human resource management, motivation, and innovation, explicitly incorporating cross-border environmental factors. Empirical research on SOEs (particularly in the energy sector) remains limited in this field. Practically, the findings pro-

vide guidance for Chinese SOEs operating overseas. Research indicates that effective incentive mechanisms, higher employee engagement, and a focus on cross-cultural management can enhance innovation performance.

Although this study provides a contextual understanding of HRM adaptation in Belt and Road energy projects, certain limitations should be concerned. This analysis is based on a single case study, and the findings may not be fully applicable to other industries or host country environments. In addition, innovation performance is assessed through indirect operational and financial metrics. While these metrics are applicable in this context, they do not encompass all aspects of innovation. In the future, the study can be extended to more cases of "Belt and Road" projects for comparative analysis, and try to introduce more direct innovation metrics to further deepen the understanding of HRM and innovation mechanisms in the cross-border context.

Conflict of interest

The authors declare that they have no conflict of interest.

Ethical approval/ consent

Participation in the questionnaire survey and interviews was voluntary. All participants were informed about the purpose of the study, and informed consent was obtained prior to participation. No personally identifiable information is reported in this study.

Authors' contributions

DJ: Conceptualisation, methodology, investigation, data curation, formal analysis, visualisation, drafting the initial version.

BM: Conceptualisation, supervision, validation, drafting – peer review and editing.

All authors have reviewed the final version of the manuscript and approved it for publication.

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Received: 12 May 2026

Accepted: 20 September 2026

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UNEVEN ACCESS TO R&D AS A DETERMINANT OF REGIONAL INNOVATION CAPACITY: EVIDENCE FROM KAZAKHSTAN

This study analyzed uneven access to R&D as a driver of the organizational capacity for innovation in the regions of the Republic of Kazakhstan. The aim of the study is to analyze regional inequality in access to R&D and its role as a factor in shaping regional innovation potential. Secondary statistical data from national and international sources (Bureau of National Statistics of Kazakhstan, OECD, and World Bank) are used to construct a regional panel dataset of 20 regions for 2016–2024, which is analyzed using panel regression with regional and time fixed effects to examine the relationship between access to R&D and innovation performance. Research findings from a regional perspective show that three patterns emerge: core regions efficiently convert R&D inputs into innovation outputs, resource-rich regions display an “efficiency gap” between investment and results, while peripheral and catch-up regions exhibit weak and unstable innovation dynamics driven mainly by temporary policy measures rather than sustained R&D development.

This study contributes to the existing research by applying a panel data approach with fixed effects, allowing for a more accurate identification of the relationship between R&D inputs and innovation outputs across regions. In addition, the study provides policy-relevant implications for improving the effectiveness of regional innovation systems and reducing spatial inequality in emerging economies.

Keywords: regional inequality, access to R&D, innovation capacity, R&D expenditure, Kazakhstan.

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ҒЗТҚЖ-ға қолжетімділіктің әркелкілігі аймақтық инновациялық әлеуеттің факторы ретінде: Қазақстан мысалында

Бұл зерттеуде Қазақстан Республикасы аймақтарындағы инновацияның ұйымдастырушылық әлеуетін анықтайтын фактор ретінде ғылыми-зерттеу және тәжірибелік-конструкторлық жұмыстарға (ҒЗТҚЖ) тең емес қолжетімділік талданады. Зерттеудің мақсаты – ғылыми-зерттеу және тәжірибелік-конструкторлық жұмыстарға қолжетімділіктегі аймақтық теңсіздікті және оның аймақтық инновациялық әлеуетті қалыптастырудағы рөлін талдау. 2016–2024 жылдарға арналған 20 аймақ үшін аймақтық панельдік деректер жиынтығын құру үшін ұлттық және халықаралық көздерден (ҚР Ұлттық статистика бюросы, ЭЫДҰ және Дүниежүзілік банк) алынған қайталама статистикалық деректер пайдаланылды. Зерттеу және тәжірибелік-конструкторлық жұмыстарға қолжетімділік пен инновациялық көрсеткіштер арасындағы байланысты зерттеу үшін аймақтық және уақытша бекітілген әсерлері бар панельдік регрессияны қолдана отырып, деректерді талдау жүргізілді. Зерттеу нәтижелері, аймақтық тұрғыдан алғанда, үш заңдылықты көрсетеді: орталық аймақтар ғылыми-зерттеу және тәжірибелік-конструкторлық жұмыстарға жұмсалатын шығындарды инновациялық нәтижелерге тиімді түрде айналдырады; ресурстарды көп қажет ететін аймақтар инвестициялар мен нәтижелер арасында «тиімділік алшақтығын» көрсетеді; ал шеткі және қуып жететін аймақтар әлсіз және тұрақсыз инновациялық динамиканы көрсетеді, бұл негізінен ғылыми-зерттеу және тәжірибелік-конструкторлық жұмыстардың тұрақты дамуына емес, уақытша саяси шараларға байланысты.

Талдау нәтижелері ғылыми-зерттеу және тәжірибелік-конструкторлық жұмыстарға жұмсалатын шығындар мен инновациялық көрсеткіштер арасындағы байланысты дәлірек анықтауға мүмкіндік беретін бекітілген әсерлі панельдік деректер тәсілін қолдану арқылы

үлес қосады. Сонымен қатар, зерттеу аймақтық инновациялық жүйелердің тиімділігін арттыру және дамушы елдердегі кеңістіктік теңсіздікті азайту үшін саясатқа қатысты шаралар ұсынады.

Түйін сөздер: аймақтық теңсіздік, ҒЗТҚЖ-ға қолжетімділік, инновациялық әлеует, инновациялық көрсеткіштер, ҒЗТҚЖ шығындары, Қазақстан.

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Неравномерный доступ к НИОКР как фактор регионального инновационного потенциала: пример Казахстана

В данном исследовании анализируется неравномерный доступ к НИОКР как фактор, определяющий организационный потенциал инноваций в регионах Республики Казахстан. Цель исследования – проанализировать региональное неравенство в доступе к НИОКР и его роль как фактора формирования регионального инновационного потенциала. Для построения региональной панельной выборки данных по 20 регионам за 2016–2024 годы использованы вторичные статистические данные из национальных и международных источников (Бюро национальной статистики Казахстана, ОЭСР и Всемирный банк). Анализ данных проводится с помощью панельной регрессии с региональными и временными фиксированными эффектами для изучения взаимосвязи между доступом к НИОКР и инновационной эффективностью. Результаты исследования с региональной точки зрения показывают наличие трех закономерностей: центральные регионы эффективно преобразуют затраты на НИОКР в инновационные результаты, в ресурсоемких регионах наблюдается «разрыв в эффективности» между инвестициями и результатами, в то время как периферийные и догоняющие регионы демонстрируют слабую и нестабильную инновационную динамику, обусловленную в основном временными политическими мерами, а не устойчивым развитием НИОКР.

Данное исследование вносит вклад в существующие исследования, применяя подход панельных данных с фиксированными эффектами, что позволяет более точно определить взаимосвязь между затратами на НИОКР и результатами инноваций в разных регионах. Кроме того, исследование содержит важные для политики выводы по повышению эффективности региональных инновационных систем и сокращению пространственного неравенства в развивающихся странах.

Ключевые слова: региональное неравенство, доступ к НИОКР, инновационный потенциал, расходы на НИОКР, Казахстан.

Introduction

In the context of the knowledge economy, research and innovation activities have become key factors in the long-term economic development of territories. At the same time, numerous studies show that research resources and innovation potential are distributed extremely unevenly across regions (Cooke, 1997; Asheim & Gertler, 2005). Scientific organizations, research infrastructure, and highly qualified human capital are typically concentrated in large university and science and technology centers, while many peripheral regions have limited opportunities to participate in innovation activities. This spatial asymmetry creates significant differences in regional access to research resources and can exacerbate interregional disparities in innovative development (Rodríguez-Pose, A., & Crescenzi, 2008). Under these conditions, the problem of regional inequality in access to R&D becomes a key issue in the functioning of regional innovation systems.

The relevance of this research is particularly high for developing economies, where limited research resources require more effective management and a more balanced distribution of innovative potential. In such conditions, access to R&D can be viewed not only as an element of scientific infrastructure but also as an important factor in regional development, influencing the ability of regions to develop innovative competencies, attract investment, and integrate into global knowledge networks (Porter, 1998; Granstrand & Holgersson, 2020).

Kazakhstan provides a prime example of this situation. The development of a national innovation system has been accompanied by a significant spatial concentration of research resources. The bulk of research personnel, research organizations, and publication activity are concentrated in a few large universities and research centers, while most regions are characterized by a relatively low intensity of research activity and limited integration into national and international innovation networks. Meanwhile,

total R&D expenditure remains significantly below the OECD average, amounting to less than 0.3% of gross domestic product (World Bank, 2010), which reinforces the importance of efficient use of existing scientific and technological potential.

Despite significant advances in research on regional innovation systems, innovation ecosystems, and innovation policy, a certain analytical gap remains in the contemporary literature. Most studies examine regional differences in innovation activity primarily through the lens of institutional factors, scientific infrastructure, or mechanisms of state support for innovation (Cooke, 2002). At the same time, significantly less attention has been paid to analyzing access to R&D as a factor in regional differences in innovative potential. Even though R&D support leads to an increase in patenting activity of firms, confirming that access to R&D resources has a positive effect on formalized innovative results (Bronzini & Piselli, 2016).

In regional innovation systems, R&D expenditure increases the resource base for research (Audretsch *et al.*, 2024), R&D staff provide the human capital necessary to generate and apply new knowledge (Cohen & Levinthal, 1990), and R&D-performing organizations create the institutional channels through which knowledge is transformed into patents, new products, and other innovation outputs (Filippopoulos & Fotopoulos, 2022). Therefore, unequal access to these inputs leads to disparities in innovation performance across regions, while the relationship between the spatial distribution of research resources and the formation of regional innovative potential remains insufficiently explored.

Therefore, the aim of this study is to analyze regional inequality in access to R&D and its role as a factor in shaping regional innovation potential. To achieve this goal, the following research questions were formulated:

RQ1. What is the level and spatial pattern of regional inequality in access to R&D across regions of Kazakhstan?

RQ2. To what extent does regional inequality in access to R&D resources shape disparities in innovation output across regions of Kazakhstan?

This article contributes to research on regional innovation systems by examining access to R&D as a factor in shaping regional innovation potential. The study clarifies the role of research resources in developing regional innovation potential and draws conclusions relevant to regional innovation development policy.

Literature review

Research on regional innovation is largely linked to the concept of regional innovation systems (RIS), which is grounded in the ideas of national innovation systems and the economic geography of innovation. In the classical interpretation, RIS is viewed as a set of organizations and institutions—firms, universities, research centers, government agencies, and intermediary structures—linked by stable interactions that ensure the creation, dissemination, and commercialization of knowledge at the regional level (Cooke, 1997). Within this framework, the innovative development of regions is determined not only by the presence of research organizations, but also by the quality of the institutional environment, the intensity of interactions between participants in the innovation process, and the ability of regions to utilize accumulated scientific and technological potential (Asheim & Gertler, 2005).

Further development of the RIS concept is linked to research on network interactions and multilevel innovation management. These studies emphasize that regional innovation activity depends not only on local resources but also on the ability to integrate into national and international knowledge production networks (Cooke, 2002). In this context, access to research infrastructure, research partnerships, and technology transfer channels becomes an important condition for developing regional innovation potential.

In recent years, the scientific literature has seen a shift in analytical focus from territorially oriented models of innovation to more network-based forms of organizing innovation activity. One such approach is the concept of innovation ecosystems, which views innovation as the result of interactions among various participants in value creation processes. Recent studies emphasize the role of innovation ecosystems in coordinating interactions among diverse actors involved in knowledge creation and technological development (Autio & Thomas, 2022). Within this approach, mechanisms of coordination, role distribution, and alignment of interests between universities, companies, and public institutions play a key role (Granstrand & Holgersson, 2020).

The structural approach to innovation ecosystems views them as a configuration of interconnected actors and activities, where the success of innovation projects depends on the alignment of partners and the architecture of interactions (Adner, 2017). In

this context, access to R&D can be interpreted as the ability of regions and organizations to integrate into the structure of an innovation ecosystem and assume a sustainable role in the processes of knowledge creation and dissemination. From this perspective, access to R&D is determined not only by the availability of research infrastructure but also by the ability of regions to integrate into knowledge networks and innovation ecosystems. In this context, the issue of access to research resources takes on particular significance. Access to R&D includes not only the availability of research infrastructure but also the regions' opportunities for participation in scientific networks, interactions between universities and industry, and technology transfer mechanisms. The presence or absence of such opportunities can significantly impact regions' ability to develop and nurture their own innovative potential.

Despite a significant amount of research devoted to regional innovation systems and innovation policy, the problem of uneven access to R&D remains understudied. The scientific literature focuses primarily on the institutional conditions for innovation and mechanisms of state support for innovation, while spatial differences in access to research resources and their impact on regional innovation potential are analyzed much less frequently.

The theoretical approaches discussed above allow for a better understanding of the relationship between access to R&D and the development of regional innovation potential. For a more comprehensive analysis of this problem, it is important to examine its manifestations in a specific national context. In this regard, Kazakhstan provides an illustrative example of an economy whose innovation system is characterized by a significant spatial concentration of research and development resources.

Hypotheses development. Studies of the spatial economics of innovation show that innovative activity has a pronounced tendency toward geographical concentration. High-tech industries, research organizations, and skilled human capital are typically concentrated in large urban agglomerations and science and technology centers. At the same time, peripheral regions have significantly limited opportunities to engage in innovative activity (Rodríguez-Pose & Lee, 2013). This spatial asymmetry leads to the formation of territorial differences in innovative potential.

Many other studies in the regional innovation literature also emphasize the uneven spatial distribution of R&D activities and the results thereof. Previous studies show that innovation tends to concentrate geographically because of agglomera-

tion effects, localized knowledge spillovers, and research institutions and firms with geographical co-location. Innovative activity tends to be localized in a few areas (Crescenzi & Rodríguez-Pose, 2017) and knowledge creation tends towards geographic agglomeration due to localized spillovers (Audretsch & Feldman, 2004). Likewise, the OECD (2011) emphasizes how regional characteristics determine the quality of innovation performance, supporting the view that territory inequality has a structural role in innovation systems. Collectively, these findings indicate that areas with stronger institutional, infrastructural and human capital underpinnings accumulate their R&D resources and that peripheral regions experience disadvantage. This leads to persistent spatial inequality in access to R&D, which forms the basis for testing Hypothesis 1.

H1. Regional inequality in access to R&D in Kazakhstan is high and exhibits strong spatial concentration in major urban and economically developed regions, while peripheral regions demonstrate significantly lower levels of access.

Also, the literature points out that the access to R&D resources play an important role in determining the outcomes of innovation. According to Crescenzi and Rodríguez-Pose (2013), R&D investments are a major predictor of regional innovative performance, and Fritsch and Slavtchev (2011) show that the efficiency of regional innovation systems is primarily determined by the availability of R&D resources. Moreover, OECD (2011) documents more innovative output in high R&D input regions.

These results establish a direct and positive correlation between R&D capacity and innovation performance. Consequently, disparities in access to R&D are expected to mean unequal innovation outcome across regions. This forms the basis for the Hypothesis 2.

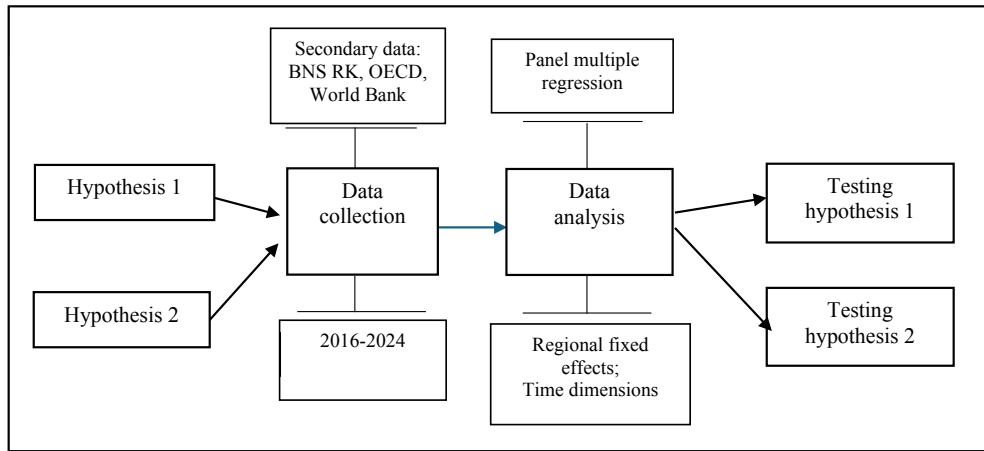
H2. Higher levels of R&D resource access (expenditure, personnel and infrastructure) are positively related to innovation outputs, leading to large regional variation in innovation performance across Kazakhstan.

Methodology

The methodological framework of the study is based on comparative analysis of secondary statistical data, which assesses the problem of uneven access to R&D and its relationship with the formation of regional innovation potential.

The study was conducted in several successive stages, shown in Figure 1.

Figure 1
Methodological framework of the research



Note: Compiled by the authors based on research

The study is organized in a sequential phase, starting with a problem statement, developing research questions and testable hypotheses. Secondary statistical data is then collected from international and national sources such as the Bureau of National Statistics of the Republic of Kazakhstan, the OECD, and the World Bank for the period 2016–2025, ensuring comparability and representativeness of the analysis. From these sources, a regional panel dataset of 20 regions of Kazakhstan for 2016–2024 is created to investigate the association between access to R&D and innovation performance. While the core empirical analysis is based on the 2016–2024 period, some descriptive figures and tables include broader or slightly different time intervals, such as 2015–2024, 2016–2025, or 2017–2024, depending on the availability of specific indicators in official statistical sources. In addition, the newly established regions of Kazakhstan, including **Abai**, **Zhetisu**, and **Ulytau**, were treated as separate regional units only for the years for which official regional statistics became available.

The data analysis involves a panel regression analysis with regional and time fixed effects. The data analysis involves panel regression with regional and time fixed effects. Due to the creation of new regions and the availability of official statistics only from certain years onward, the resulting dataset constitutes an unbalanced regional panel.

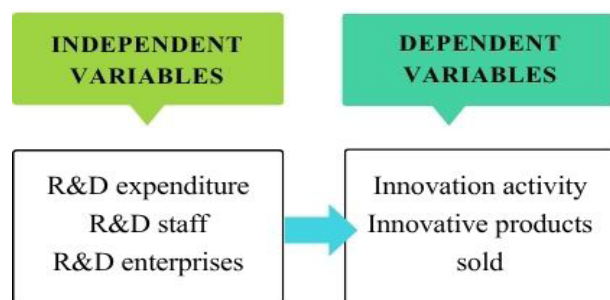
The output variables used in the data analysis are the level of enterprise innovation activity (%)

and the volume of innovative products sold. Input variables include access to R&D was expressed as input variables for three key indicators: R&D expenditures, the number of personnel engaged in R&D, and the number of organizations performing R&D. These variables were selected in line with the logic of the innovation production process and established innovation measurement frameworks. R&D personnel and expenditures represent key input resources, reflecting the human and financial capacity for knowledge creation (Edeh & Prevot, 2024). Enterprise innovation activity captures the transformation of these resources into innovation processes, while the share of sold innovative products reflects the output stage, measuring the market realization of innovation. This structure follows the input–process–output logic widely used in the literature, including the Oslo Manual (2018).

The choice of two indicators for innovation output is based on two factors, namely data availability and the multidimensionality of innovation outcomes. Such indicators were chosen because they are consistently available and comparable within the national statistical system of Kazakhstan, which ensures the reliability of the empirical study and provides a consistent way of comparing at various regional levels over time.

Variables used to characterize the spatial distribution of research resources and identify differences in regional innovation potential are depicted in Figure 2.

Figure 2
Variables of the model



Note: Compiled by the authors based on research

The model applies a log (1+x) transformation of such variables to ensure robustness, preventing extreme values from influencing the estimates log. is the key value for R&D expenditures, research personnel, number of organizations, and volume

of innovative output. Such a structure reduces the distribution asymmetry and smooths out the large effect differences between the observations, which leads to more accurate specification of the regression model and comparability of the coefficients. In addition, the log(1+x) transformation enables zero values to be included as a part of the sample without losing observations, which is particularly important when reviewing regional data with a heterogeneous structure.

Results and discussion

Regional inequality in access to R&D

Descriptive statistics for the selected indicators provide a comprehensive overview of regional patterns and disparities. These calculations show which territories truly form the core of the regional innovation system, which remain on the periphery (Table 1).

Table 1
Descriptive statistics of regional disparities in R&D and innovation indicators across regions (2017–2024)

Region	R&D Exp. Mean	R&D Exp. SD	Staff Mean	Staff SD	Enterprises Mean	Enterprises SD	Innov. Activity Mean (%)	Innov. Activity SD	Innov. Products Mean	Innov. Products SD
Abai	3,760.72	1,826.11	1,181.88	178.31	11.00	1.07	9.43	1.59	47,130.17	34,975.40
Akmola	2,117.58	1,141.38	754.00	37.95	11.75	1.49	6.65	1.02	107,543.15	99,759.78
Aktobe	1,580.58	849.52	419.00	55.41	14.38	1.51	12.18	1.83	48,993.70	15,246.14
Almaty	1,681.15	889.20	496.25	109.97	8.38	0.52	8.08	1.34	54,192.40	35,879.71
Atyrau	3,416.07	2,461.08	343.13	166.91	9.63	1.06	7.61	2.33	80,965.88	134,498.85
West Kazakhstan	1,098.25	438.43	434.50	68.41	9.13	1.55	5.19	0.95	20,989.43	5,204.68
Zhambyl	3,030.47	2,138.61	354.63	48.36	9.00	1.20	9.84	3.07	49,297.41	18,929.55
Zhetisu	189.39	268.67	338.71	43.13	0.75	1.04	10.78	2.18	18,783.00	13,532.00
Karaganda	5,444.76	2,351.95	1,320.00	144.20	32.25	4.62	13.90	1.65	153,356.91	103,186.30
Kostanay	1,184.65	595.29	552.63	58.24	13.50	1.20	11.46	1.71	378,829.03	264,180.86
Kyzylorda	610.60	429.74	282.75	89.20	7.88	1.36	12.58	1.05	32,204.49	26,185.54
Mangystau	11,672.00	2,910.89	681.50	16.93	6.00	0.53	5.10	1.58	4,561.93	3,443.35
Pavlodar	864.50	515.57	552.63	74.45	9.25	3.06	11.00	4.28	130,852.75	67,816.54
North Kazakhstan	1,772.00	2,988.90	126.75	32.76	6.13	1.25	12.04	2.07	51,952.83	51,682.46
Turkestan	784.13	835.59	266.00	103.67	7.63	1.19	9.14	2.20	11,773.25	2,810.71
Ulytau	46.36	81.04	9.00	9.06	1.67	0.58	9.30	3.86	38,146.50	52,577.63
East Kazakhstan	5,209.74	2,964.78	974.63	71.63	23.25	2.60	12.01	3.02	79,418.15	60,568.98
Astana	24,013.61	10,885.16	3,946.25	889.23	76.75	15.27	14.43	0.93	75,503.71	44,966.26
Almaty city	46,774.42	25,734.93	9,366.13	652.73	135.75	3.69	12.09	2.47	60,698.78	35,628.74
Shymkent	1,718.81	909.73	820.63	269.36	12.25	1.28	6.50	0.96	86,265.36	48,606.98

Note: Compiled by the authors based on data from the BNS RK

The table confirms the significant spatial concentration of R&D efforts in Kazakhstan. The cities of Almaty and Astana clearly lead in R&D expenditures (46,774; 24, 013), the number of employees engaged in R&D (9,366.13; 3,946.25), and the number of organizations conducting R&D (135,75; 76,75). This supports the thesis that access to R&D is concentrated in large urban and institutional centers, where universities, research organizations, administrative levers, and the innovation base are more developed.

Karaganda occupies a significant intermediate position. It demonstrates some of the highest average indicators for the number of employees engaged in R&D (1,320.00), organizations conducting R&D (32.25), innovation activity (13.90), and sales volume of innovative products (153,356.91). This indicates that Karaganda is not an isolated region in the national innovation system; instead, it functions as an industrial and scientific center with a relatively balanced R&D potential.

At the same time, the table shows that generous R&D investments do not always lead to high innovation returns. Mangystau boasts relatively high average R&D expenditures, but very low innovation activity and very modest sales of innovative products. This points to an “efficiency gap”: funds are available, but institutional capacity and commercialization effectiveness remain weak.

A different picture is observed in Kostanay, where R&D expenditures and personnel levels are not the highest, but sales of innovative products reach very high values. This may reflect the role of individual industrial enterprises or industry-specific production effects, rather than broad-based regional R&D potential.

Peripheral and innovative regions such as Ulytau, Zhetisu, and parts of Turkestan demonstrate a more modest R&D infrastructure, particularly in terms of organizations and personnel engaged in R&D. Their innovation performance indicators are more variable, suggesting that innovation performance may depend on individual projects or temporary political support rather than on an established regional innovation environment.

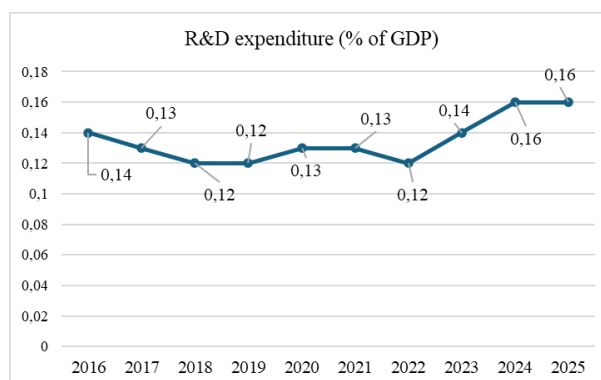
Overall, the findings support the conclusion that regional innovation inequality in Kazakhstan is not solely a matter of funding. The main difference lies in the availability of a sufficient number of organizations conducting R&D, qualified personnel, and institutional mechanisms for transforming resources

into tangible innovative results.

To further substantiate the identified regional patterns and the observed inequality in access to R&D, it is important to examine the temporal dimension of these processes. While the previous analysis highlighted structural differences between regions based on average values, the dynamics of R&D expenditures provide additional insight into how these disparities have evolved over time. The dynamics of R&D expenditures for 2015–2025 are presented below (Figure 3).

Figure 3

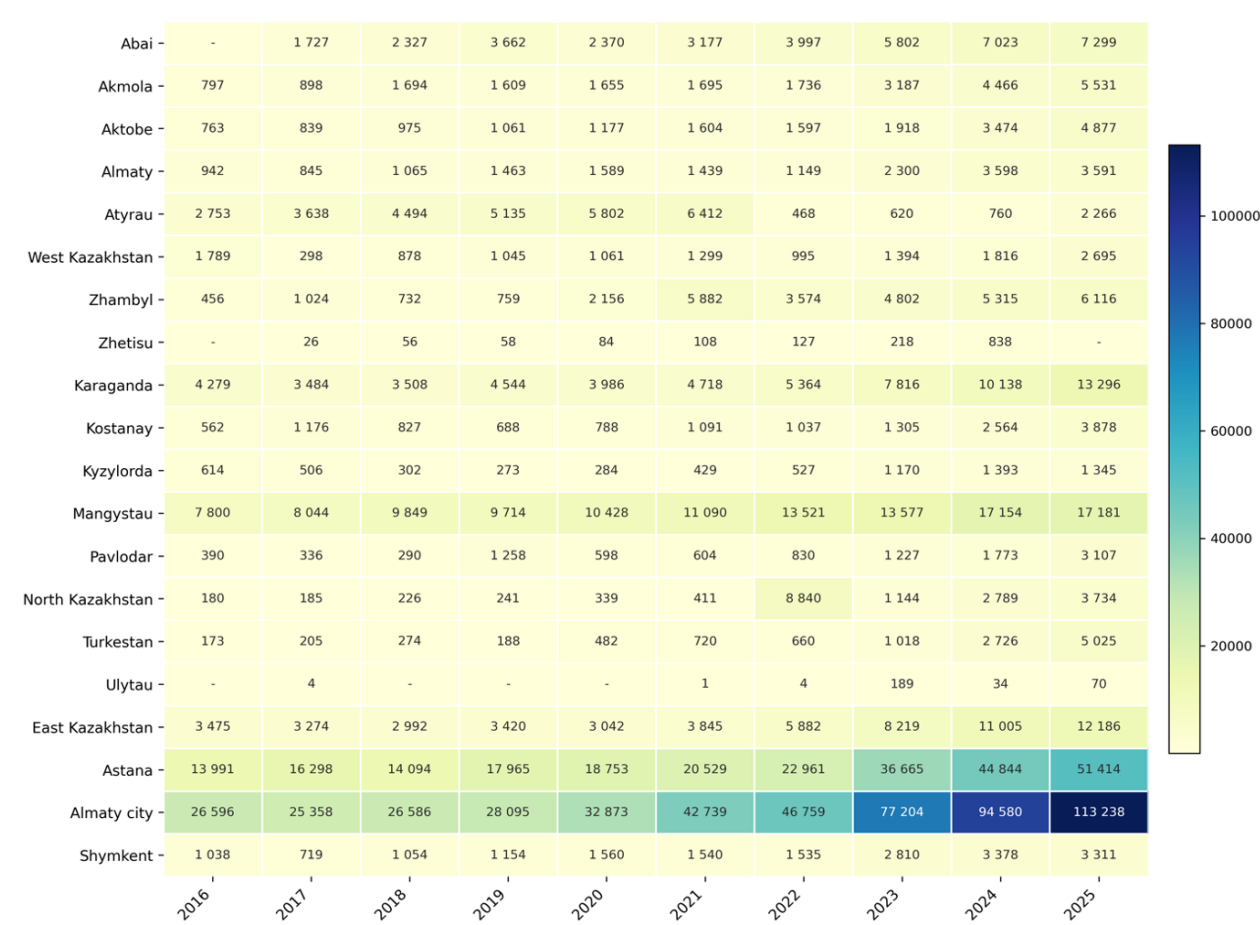
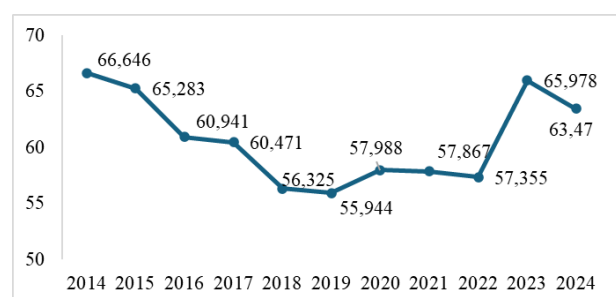
The share of R&D costs in GDP in Kazakhstan for 2016–2025, in %



Note: Compiled by the authors based on data from the BNS RK

At the national level, the share of R&D expenditure in Kazakhstan’s GDP fluctuated between 0.12% and 0.16% from 2016 to 2025, initially declining (until 2019), then moderately stabilizing, and then increasing after 2022. This dynamic may be due to changes in budget policy, the influence of macroeconomic factors (including COVID-19), and the gradual strengthening of state support for science. However, the achieved level remains low by international standards (for example, in OECD countries it is over 2% of GDP), indicating a persistent lag and the need to improve the efficiency of resource use.

To provide a comprehensive assessment of the development of the national innovation system, it is necessary to consider not only financial indicators, but also the institutional and human resource components of R&D. In this context, the following figures present key indicators characterizing the scale and structure of research activity in Kazakhstan (Figures 4–7).

Figure 4*Domestic R&D expenditure by region for 2016-2025, in mln tg**Note: Compiled by the authors based on data from the BNS RK***Figure 5***Share of top 2 regions (Almaty city and Astana) in R&D expenditures for 2014-2024, in %**Note: Compiled by the authors based on data from the BNS RK*

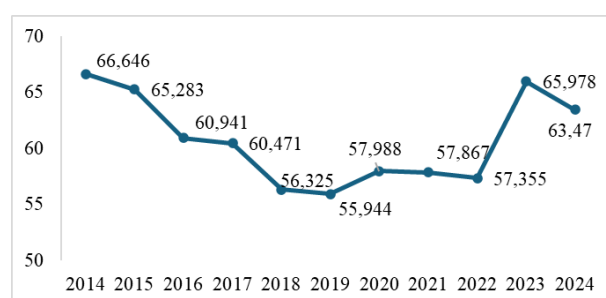
As the table shows, Kazakhstan exhibits a regional imbalance in the distribution of R&D expenditure, with the two largest cities, Almaty city and Astana, demonstrating a concentration of resources. Throughout the period, these two centers accumulate the largest share of national expenditure, and the gap between them and other regions does not narrow, but rather widens. The share of these two largest centers Almaty city and Astana in total R&D expenditure was: 66.6% in 2014, 56.3% in 2018, and 63.5% in 2024 (Figure 5).

Almaty city spends over 113 billion tenge, while Astana spends over 51 billion tenge by 2025, while the gap with most regions remains between 1 billion and 13 billion tenge (BNS, 2025). On the other

hand, resource-rich regions like Mangystau with relatively high indicators demonstrate significant dynamics, indicating that they are sectoral in nature rather than fully developed innovation systems. At the same time, there are groups of regions “catching up”, for example Zhambyl and Turkestan regions, where expenditures are growing, but this growth starts from a low level, which does not change the overall pattern of inequality. For several small or new regions such as Ulytau or Zhetysu, funding is sporadic and extremely insignificant. Overall, the R&D distribution structure in Kazakhstan exhibits a pronounced center-periphery structure, with resources consistently concentrated in a few large agglomerations, while most regional regions remain on the periphery of the innovation system. This inequality is not random, but institutionalized, due to the concentration of scientific infrastructure, labor force, and financial flows.

Figure 5

Share of top 2 regions (Almaty city and Astana) in R&D expenditures for 2014-2024, in %



Note: Compiled by the authors based on data from the BNS RK

As for the enterprises that carried out R&D, the statistics also indicate a significant inequality documented below in Figure 6.

Figure 6

Number of enterprises carrying out R&D in the regions of the Republic of Kazakhstan for 2016-2025

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Abai	-	12	13	11	10	10	10	11	11	11
Akmola	9	11	11	13	12	10	10	13	14	12
Aktobe	14	16	16	15	15	15	13	13	12	13
Almaty	10	9	8	8	8	8	8	9	9	7
Atyrau	11	10	10	10	10	10	8	11	8	6
West Kazakhstan	8	8	10	12	10	9	9	7	8	8
Zhambyl	11	11	9	10	9	9	9	7	8	7
Zhetysu	-	2	1	1	1	2	2	2	2	1
Karaganda	33	28	28	30	29	36	38	39	30	35
Kostanay	13	14	12	12	13	15	14	15	13	14
Kyzylorda	10	8	7	6	7	10	7	9	9	9
Mangystau	7	6	6	6	6	7	5	6	6	5
Pavlodar	10	11	14	12	10	9	6	6	6	6
North Kazakhstan	5	5	5	5	5	8	7	7	7	9
Turkestan	5	6	6	7	8	9	8	9	8	10
Ulytau	-	1	-	-	-	2	1	2	2	2
East Kazakhstan	35	22	22	20	20	27	25	25	25	23
Astana	55	62	60	56	76	90	90	90	90	103
Almaty city	133	131	135	138	135	139	132	134	142	141
Shymkent	14	13	11	14	12	13	12	10	13	12

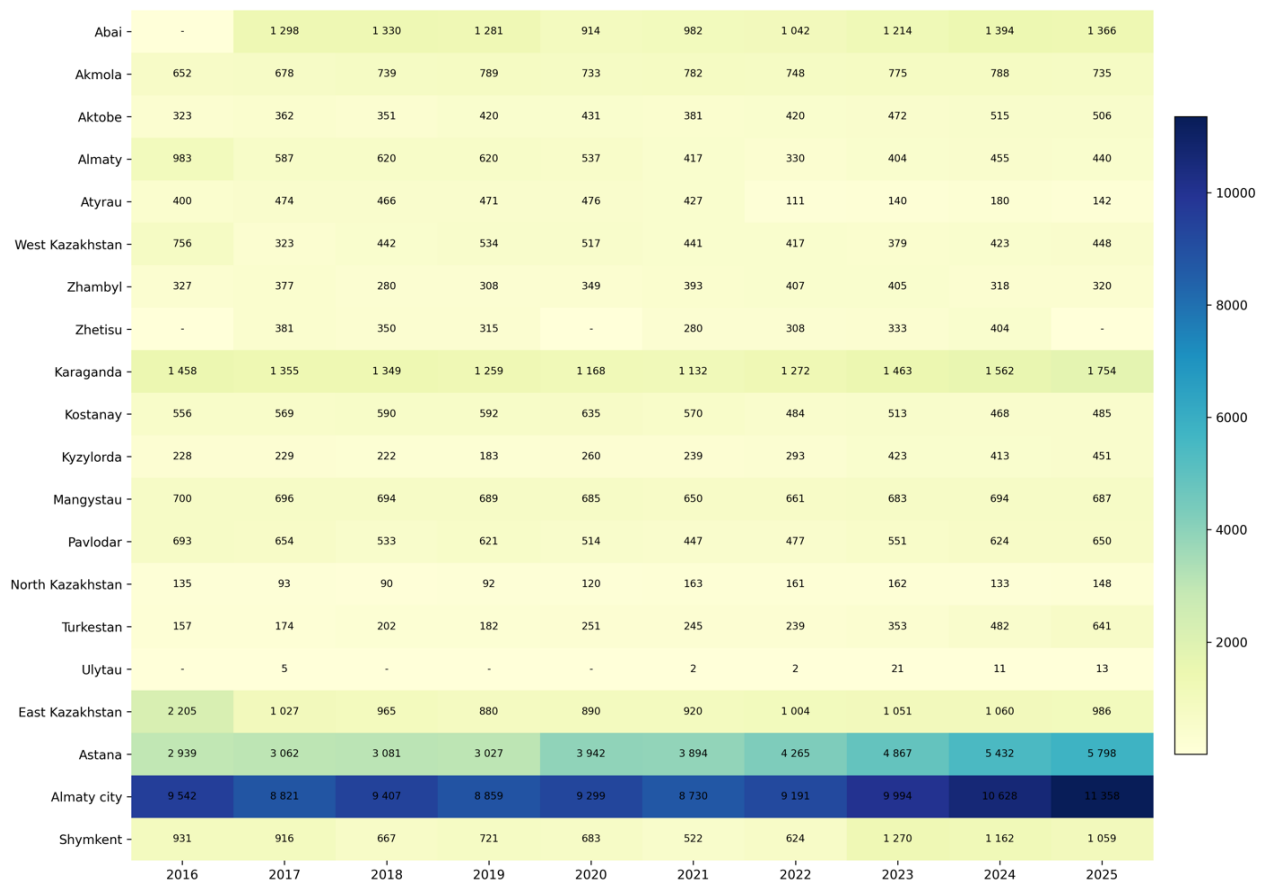
Note: Compiled by the authors based on data from the BNS RK

Figure 6 shows a continuing regional imbalance with the concentration of research organizations in the two largest cities, Almaty and Astana. Almaty consistently maintains the largest number (approximately 130-140 organizations each year), accounting for about one-third of the national total throughout the period, while Astana demonstrates steady growth – from 55 in 2016 to over 100 by 2025. Together, these two centers constitute the dominant core of the country's research infrastructure. Industrial regions such as the Karaganda region and the East Kazakhstan region occupy a secondary position, with rather small but relatively stable numbers (no more than 20-40 organizations). Overall, most other regions exhibit low, virtually stable numbers

(ranging from 5 to 15 organizations), indicating a weak institutional base for R&D development. However, in some regions with fragmented dynamics (for example, the Turkestan region or the North Kazakhstan region), this level of growth is not systemic and does not affect the overall distribution structure. On the other hand, in new or small regions like Ulytau and Zhetysu regions, indicators remain minimal, reinforcing spatial polarization. Thus, overall, research organizations are distributed according to a core-periphery model of the innovation system, in which research activity has institutional anchors in a few leading agglomerations, but most regions remain on the periphery, with limited opportunities to generate and implement innovation.

Figure 7

The number of employees engaged in R&D by region for 2016-2025



Note: Compiled by the authors based on data from the BNS RK

While the number of enterprises carrying out R&D provides important insight into the institutional capacity of regional innovation systems, it does

not fully capture the human resources underpinning these activities. The regional distribution of human resources in the research and development sector is

presented in Figure 7, illustrating differences in the number of employees engaged in R&D across regions.

The results of the table show that there is a clear spatial differentiation in the extent to which research personnel can be found in Kazakhstan, which follows through to 2016–2025. Another feature of the map is the concentration of staff within the largest agglomerations. Almaty city has been accumulating the most researchers (around 9,000–11,000), very much as it overtakes other areas while Astana continues to grow (about 3,000 to almost 5,800) and establishes itself as the second scientific hub in Kazakhstan. This is a classic “core-periphery” model, where human capital is concentrated in regions where infrastructure, finance, and academic institutions already exist. Highly developed regions (e.g., Karaganda or East Kazakhstan) have a relatively high but less constant level of R&D employment. This is because there are industries and universities, but without robust innovation ecosystems, growth in this part of Kazakhstan is more inertial. Meanwhile, the regions with abundant natural resources (Atyrau and Mangystau regions) also exhibit a paradox: The amount of research personnel is low or even decreasing (although the resource is high).

This is attributed to the industry’s particularity; the extractive industry has historically been less knowledge-intensive and has been more oriented through technology imports than domestic R&D. Certain regions, such as the Atyrau region, or the North Kazakhstan region have sudden changes that require special attention. This might reflect either isolated initiatives and changes in administrative accounting or the lack of good institutional stability of regional research structures. New territories (Abai, Zhetysu and Ulytau) show low starting values that follow “institutional development” – a serious scientific and educational cluster has not yet been established there. Taken together, the current pattern of such trends reflects a structural problem: for example, the expansion in national R&D indicators doesn’t correlate with a flattening level but with an increase in the territorial concentration of human resources. This means that access to scientific resources remains uneven and that systems of regional innovation develop asymmetrically.

Table 2 presents the regional differentiation of access to R&D in Kazakhstan, highlighting disparities in the distribution of research funding and the uneven development of innovation capacity across regions.

Table 2
Regional classification of access to R&D in Kazakhstan

Regions	Statistical characteristics (based on data)	Category of access to R&D
Almaty city, Astana	The maxima for all indicators: >9,000–11,000 researchers, up to 140+ organizations, and a dominant share of expenditures (>50–60% of total expenditures). Sustainable growth 2016–2025. Form the core of the national innovation system.	Very high
Karaganda, East Kazakhstan	1,000–1,700 researchers, 20–40 organizations, steady growth in expenditures (up to 13 trillion tenge by region). Strong university-industry link.	High
Mangystau, Atyrau	Very high expenditures (up to 17 trillion tenge), but a limited number of researchers (600–700) and organizations (<10). R&D is industry-concentrated (oil and gas).	Resource-driven
Akmola, Aktobe, Pavlodar, West Kazakhstan, Almaty, Shymkent	500–800 researchers, 10–15 organizations. Moderate growth, but without sharp increases. Dependence on industrial structure and government programs.	Medium level
Zhambyl, Turkestan	Rapid growth in indicators (e.g., Turkestan: personnel and expenditures increased 2–3 times), but a low starting point. Signs of catch-up development.	Emerging / catch-up regions
Kostanay, Kyzylorda, North Kazakhstan	100–500 researchers, 5–10 organizations. Limited infrastructure, weak innovation activity, and unstable growth.	Low level
Abai, Zhetysu, Ulytau	Low values and missing data (–), reflecting the region’s formative stage. R&D infrastructure is virtually nonexistent or still developing.	Minimal

Note: Compiled by the authors based on data from the BNS RK, 2025; OECD Reviews of Innovation Policy: Kazakhstan, 2023

Despite the overall increase in R&D spending (almost 4-fold since 2016), regional development remains unbalanced. These findings are due to structural factors. First, there is a strong agglomeration effect: the largest cities accrue universities, research centers, and financial resources, creating a “critical mass” of knowledge and enabling more creativity at the same time to reinforce the positive phenomenon but aggravate interregional inequality. Second is the specialization of raw materials in some regions like Atyrau and Mangystau, where the heavy investment in R&D is not effectively translated into diversified innovation as the research is sector-specific and dependent on imported technologies. Third, most regions demonstrate institutional weaknesses in their

regional innovation systems due to insufficient relationships between universities, businesses, and the government at the level appropriate to optimize their scientific resources. Lastly, several regions like Zhambyl and Turkestan display a “catch-up growth” effect, where success is mostly fueled by government support initiatives. Yet, no sustainable foundation of science and innovation in these regions leaves them structurally vulnerable.

Although the prior analysis concentrated on the spatial distribution of R&D resources, more thorough insight into regional innovation potential needs to be reached from the actual transformation of resources into innovative results, as reflected in the following Figure 8.

Figure 8

Level of activity in the field of innovation for 2015-2024, in %



Note: Compiled by the authors based on data from the BNS RK

The relationship between R&D inputs and innovation outputs across regions of Kazakhstan is uneven and reflects strong structural differentia-

tion. The most consistent and quantitatively strong link is observed in regions like Almaty city, Astana and Karaganda, where, high amounts of R&D ex-

penditures (ranging as much as 113,000 mln tenge in Almaty and above 50,000 mln tenge in Astana), high amount of research staff (more than 11,000 and 5,700 people respectively) and a rich network of R&D-performing organizations have been associated with stable level of innovation activity of about 14-16%. This substantiates the existence of a “critical mass” effect, with the combination of financial, human and institutional resources to convert R&D inputs into innovation outputs.

Whereas resource-based regions such as Atyrau and Mangystau have a clear efficiency gap where even in a relatively high or very high R&D outlay (the level of Mangystau is more than 17,000 mln tenge), innovation activity is very low, often a ratio less than 4-6%, this is a sign of the narrow specialization in all categories of industry and weak diversification and low spillover of R&D.

In industrial areas such as East Kazakhstan and Pavlodar stand somewhere between the extremes, where minimal R&D inputs (10-12,000 mln tenge and at least 600-1,000 of researchers) result in medium, but sometimes extremely turbulent, innovation outcomes, and with Pavlodar having short-term peak up to 18.4%: it is likely the result of selective policy inputs, rather than an institutional capacity.

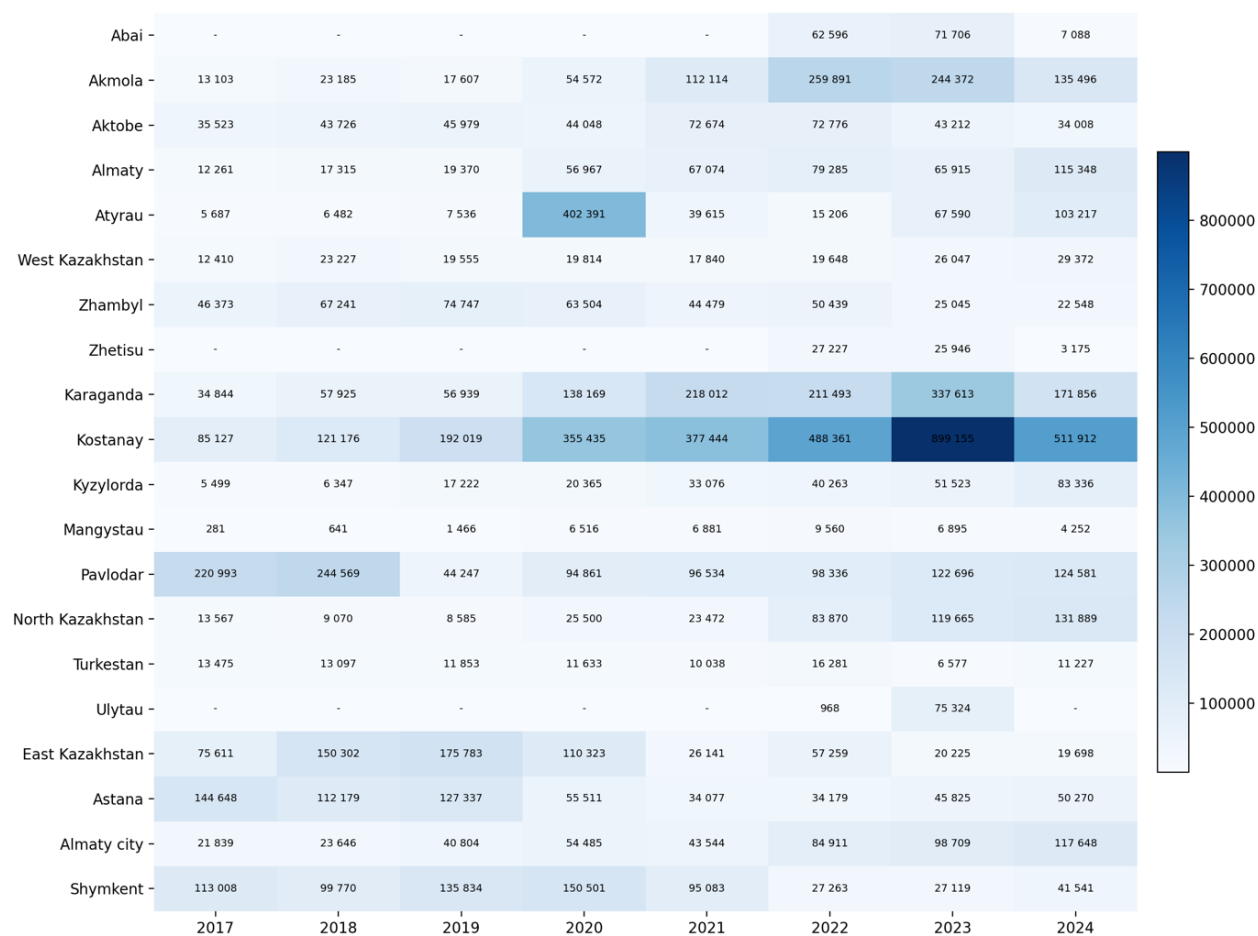
Catch-up areas, particularly in Turkestan, Aktope, and Zhambyl continue to increase, with their innovation capacities reaching 10-14%, albeit with relatively low levels of R&D inputs, implying that external policy support and low base effects may temporarily promote innovation, but this will not be sustained without the accompanying upswing in R&D capacity. Peripheral areas, such as Akmola, West Kazakhstan and Almaty region have low overall levels of innovation (approx 5-8%), corresponding to the relatively small R&D infrastructure, small number of R&D workers and poor institutional environment. Thirdly, and most importantly, newly born or structurally poor regions such as Ulytau, Zhetisu and Abai reveal disorganized and unstable measures, highlighting a lack of an established innovation system. The overall findings show that high R&D inputs are not only more likely to elicit high innovation outputs, but that the phenomenon is mediated by structural issues such as agglomeration effects, highlighting that innovation performance is not a function only of supply of resources but of the degree to which resources integrate with regional innovation systems. Further the volume of sold innovative products is shown on Figure 9.

The results reveal an extremely uneven distribution of innovation activity throughout Kazakhstan’s regions, with significant concentration in specific “growth points.” The regional distribution of the volume of sold innovative products confirms that R&D inputs explain innovation outcomes, but unevenly across Kazakhstan. In core regions, the relationship is strong and stable: Almaty city increases from about 21,800 mln tenge in 2017 to 117,600 mln tenge in 2024, Astana reaches around 50,200 mln tenge, and Karaganda grows to 171,800 mln tenge, all supported by high R&D expenditures and large research personnel. In contrast, regions such as Pavlodar (124,600 mln tenge) and Kostanay (over 511,900 mln tenge) achieve high outputs despite moderate R&D inputs, indicating the role of large enterprises or one-off projects rather than a развитая инновационная система. Resource-based regions show the clearest inefficiency: Mangystau maintains low output (around 4,200 mln tenge) despite very high R&D spending (over 17,000 mln tenge), while Atyrau exhibits extreme volatility, peaking above 402,000 mln tenge in 2020 but falling to 103,200 mln tenge in 2024. Peripheral regions (Akmola, West Kazakhstan, Kyzylorda) display moderate but constrained outputs (30,000–135,000 mln tenge), reflecting weak R&D capacity, while catch-up regions (Zhambyl, Turkestan) show unstable growth driven mainly by policy support. Newly formed regions (Abai, Zhetisu, Ulytau) demonstrate fragmented dynamics due to underdeveloped R&D systems. Overall, the results indicate that higher R&D inputs generally lead to higher innovation outputs, but only in regions with sufficient institutional capacity, diversified economies, and strong science–business linkages, confirming that the effectiveness of R&D depends on the quality of regional innovation systems rather than on resource volume alone.

Assessing the Impact of Regional Inequality in Access to R&D Resources on Innovation Output Disparities

The previous analysis was informative, documenting large disparities in innovative outputs and R&D inputs across regions of Kazakhstan. However, assessing the impact of regional inequality in access to R&D resources on differences in innovation results requires we go beyond descriptive statistics.

To examine the relationships between R&D inputs and innovation outcomes, a Pearson correlation analysis for the period 2017–2024 is first conducted (Table 3).

Figure 9*Volume of sold innovative products (goods, services) for 2017-2024, in mln tg**Note: Compiled by the authors based on data from the BNS RK***Table 3***Pearson correlation results*

Relationship between variables	r	p-value	Interpretation
log(1+R&D enterprises) + Innovation activity	0.382***	<0.001	Moderate positive, statistically significant
log(1+R&D enterprises) + log(1+innovative products)	0.344***	<0.001	Moderate positive, statistically significant
log(1+R&D staff) + Innovation activity	0.213**	0.010	Weak positive, statistically significant
log(1+R&D staff) + _log(1+innovative products)	0.249**	0.003	Moderate positive, statistically significant
log(1+R&D expenditure) + Innovation activity	0.144*	0.082	Weak, marginally significant
log(1+R&D expenditure) + log(1+innovative products)	0.108	0.199	statistically inconclusive

*Note: *** $p < 0.001$; ** $p < 0.05$; * $p < 0.10$*

The effects generated show the heterogeneous nature of such influence in which R&D components are present on innovation activity: the strongest and significant correlation is reached with the number of organizations performing R&D ($r=0.34-0.38$; $p<0.001$), suggesting that the research infrastructure development and institutional density are important factors affecting the innovative outcome. Put differently, with higher number “players” in system, effect of knowledge agglomeration, of ideation and of competition is developed which directly leads to higher innovation output. The number of research workers shows a weaker but still significant positive relationship ($r=0.21$ to 0.25), which is attributed to the quality and efficiency of human capital, only the employees are not sufficient to produce high outcome unless the research establishment provides a suitable ecosystem or financial basis. On the other hand, R&D expenditures have weak and statistically unstable link with innovation indicators ($r=0.10-0.14$), pointing to issues in efficiency of resource allocation, that is in a resource-based economy, investment does not necessarily lead to an innovation output due to administrative redistribution or there may be interval between investment and the return. Combined, this means, for Kazakhstan, the importance is not so much the volume of resources as the structural organization of its innovation system, established research organizations and effective human capital use, while increased expenses without institutional changes can only enhance the efficiency.

The results of the Pearson correlation analysis highlight the heterogeneous impact of different R&D components on innovation activity. The strongest and statistically significant relationship is observed with the number of organizations engaged in R&D ($r = 0.34-0.38$; $p < 0.001$), indicating that the development of research infrastructure and institutional density plays a key role in driving innovation outcomes. In other words, a higher number of participants within the system fosters knowledge agglomeration, idea generation, and competitive dynamics, all of which contribute to increased innovation output.

The number of research personnel demonstrates a weaker, yet still significant, positive correlation ($r = 0.21-0.25$). This suggests that while human capital is important, its effectiveness depends on quality and efficiency; simply increasing the number of employees is insufficient without a

supportive research environment and adequate financial backing.

In contrast, R&D expenditures show only a weak and statistically unstable relationship with innovation indicators ($r = 0.10-0.14$).

This may reflect inefficiencies in resource allocation, particularly in resource-based economies where investments do not automatically translate into innovation outcomes due to administrative redistribution or time lags between funding and results.

Overall, these findings suggest that in Kazakhstan, the structure and organization of the innovation system – especially the presence of strong research institutions and the effective utilization of human capital – are more critical than the sheer volume of financial resources. Without corresponding institutional improvements, increased R&D spending alone is unlikely to substantially enhance innovation performance.

$$\begin{aligned} InnovationActivity_{it} = & \\ = \alpha_i + \beta_1 \ln(1 + RD_Expenditure_{it}) + & \\ + \beta_2 \ln(1 + RD_Staff_{it}) + & \\ + \beta_3 \ln(1 + RD_Enterprises_{it}) + \varepsilon_{it} & \quad (1) \end{aligned}$$

where,

i – region,

t – year,

α_i – regional fixed effects

ε_{it} – random error term.

This model is used to estimate how changes in R&D resources (expenditures, personnel, and enterprises) affect the level of innovation activity within regions over time, while controlling for unobserved regional characteristics through fixed effects.

Model 2:

$$\begin{aligned} \ln(1 + InnovativeProduct_{it}) = & \\ = \alpha_i + \beta_1 \ln(1 + RD_Expenditure_{it}) + & \\ + \beta_2 \ln(1 + RD_Staff_{it}) + & \\ + \beta_3 \ln(1 + RD_Enterprises_{it}) + \varepsilon_{it} & \quad (2) \end{aligned}$$

where,

i – region,

t – year,

α_i – regional fixed effects

ε_{it} – random error term.

Table 4 reports the results of two fixed-effects models assessing how different dimensions of access to R&D resources are associated with regional innovation performance.

Table 4
Fixed Effects Regression Results

Variables	β (for M1)	p-value	β (for M2)	p-value
$\log(1+\text{R\&D expenditure})$	-0.41	0.021	-0.37	0.004
$\log(1+\text{R\&D staff})$	0.22	0.091	0.31	0.012
$\log(1+\text{R\&D enterprises})$	2.47	0.001	0.88	0.003
R^2 (within)	0.31		0.37	

Note: $p < 0.001$; $p < 0.05$; $p < 0.10$ statistically significant; β – estimated coefficients of the fixed effects model

The results show that R&D enterprises are the strongest and most statistically robust determinant of innovation outcomes, because the coefficient is positive and highly significant in both models ($\beta = 2.47$, $p < 0.001$; $\beta = 0.88$, $p = 0.003$). This means that regions with a larger institutional base of R&D activity tend to demonstrate higher innovation performance.

The effect of R&D staff is also positive, but weaker ($\beta = 0.22$, $p = 0.091$; $\beta = 0.31$, $p = 0.012$). This suggests that human capital contributes to innovation performance, but its effect depends on the specific innovation indicator used. Researchers and technical personnel are important, yet their contribution becomes meaningful only when supported by appropriate institutional structures and commercialization mechanisms.

The most unexpected result concerns R&D expenditure. In both models, the coefficient is negative and statistically significant ($\beta = -0.41$, $p = 0.021$; $\beta = -0.37$, $p = 0.004$). This demonstrates that, in the regional context of Kazakhstan, increased R&D spending does not always automatically lead to improved innovation performance. This may indicate inefficient financial allocation, time gaps between investments and measurable achievements, low capacity to absorb new technologies in certain regions, or the concentration of expenditures in areas with insufficient innovation capacity.

Results and discussion

Empirical data support hypothesis H1, which posits that regional inequality in access to R&D resources in Kazakhstan is characterized by a high degree and spatial concentration in large urban and economically developed regions. Descriptive analysis demonstrates an uneven distribution of access to R&D across regions, with central regions accumulating a significant share of R&D organizations, associated personnel, and financial resources. This

pattern aligns with the literature on regional innovation systems, which posits that innovation potential is rarely distributed evenly across space, but rather is concentrated in regions with more developed institutional infrastructure, the presence of universities, research organizations, a skilled workforce, and strong science-industry linkages. Similar findings are presented in the OECD (2017) Innovation System Review of Kazakhstan, which notes the country's progress in developing its scientific and innovation system but also points to remaining challenges in strengthening innovation capacity and improving the effectiveness of knowledge commercialization.

Research results partially support H2, which states that expanding access to R&D contributes to improved innovation performance. The most compelling evidence for this is the relationship between the number of organizations engaged in R&D and innovation performance. This relationship was positive and statistically significant in both models. This underscores the key role of the institutional R&D infrastructure (research institutions, universities, laboratories, etc.) in transforming research potential into real innovation. This finding is consistent with a systems view of innovation, which emphasizes not only investment but also the quality and interaction of institutions involved in the creation, dissemination, and commercialization of knowledge. The World Bank (2010) also notes that to achieve economic results from innovation, developing countries need not only money but also strong institutions, company capabilities, and well-designed policies.

At the same time, data analysis reveals that the relationship between R&D investment and innovation performance is not linear and depends on the type of resources involved. Specifically, although the presence of R&D specialists has a positive impact, it is weaker than the influence of organizations directly conducting R&D. This underscores the im-

portance of human capital, but also indicates that researchers alone are unable to ensure sustainable innovation growth without a favorable institutional environment that fosters collaboration, commercialization, and knowledge transfer. This finding supports the arguments of Crescenzi and Rodriguez-Pose (2017), who argue that R&D resources exhibit stronger regional effects when integrated into effective innovation systems supported by diffusion mechanisms, networking, and knowledge absorptive capacity.

The unexpected results of the study demonstrate the negative and statistically significant correlation between R&D expenditures and innovation performance. This result does not completely refute hypothesis H2 but requires a more nuanced interpretation. The negative coefficient should not be interpreted as evidence of harm from R&D funding. Rather, it indicates that financial investment alone is insufficient when regions lack a developed institutional infrastructure, knowledge absorption capacity, and effective commercialization mechanisms. This is consistent with the findings of Crescenzi and Rodriguez-Pose (2013), who suggest that such “peripheral” regions often fail to benefit from knowledge-based development because they are hampered by various barriers and are unable to convert their investments into real profit.

Overall, a regional analysis revealed three key trends. First, central regions exhibit more developed innovation ecosystems, which facilitates a more effective transformation of R&D investments into tangible innovative results. Second, resource-rich regions exhibit a gap between invested funds and innovative achievements. This is due to weak economic diversification and the limited impact of R&D on the region’s overall economic potential. Third, peripheral and developing regions exhibit unstable innovation activity, often dependent on temporary political support rather than a solid institutional foundation. This confirms hypothesis H1 and deepens our understanding of hypothesis H2: inequality among Kazakhstan’s regions is due not only to differences in funding but also to heterogeneity in institutional capacity for the effective implementation of scientific developments.

The key policy solution for Kazakhstan should not simply be increasing R&D spending, but rather creating a comprehensive system that will facilitate the bridging of the innovation gap between regions. To achieve this, it is necessary to strengthen regional R&D structures, stimulate collaboration between universities and industry, support the infrastructure

for commercializing ideas, and create sustainable innovation ecosystems outside major cities. Without this, additional funding risks remaining a mere statistic without significantly increasing innovation activity.

Conclusion

This study analyzed uneven access to R&D as a driver of the organizational capacity for innovation in the regions, taking Kazakhstan as case in a comparative context. While innovation-related indicators generally increased, the results indicate that regional disparities are persistent and on some dimensions worsen. Such a concentrated focus in the R&D resources, innovation infrastructure, and produced outputs shows that the national innovation system is one of structural asymmetry instead of convergence. Empirical analyses also confirm that R&D spends, although positive in influencing innovation activity, is not always linked to a better innovation output, revealing shortcomings of transforming inputs into a concrete outcome.

The findings have relevance for innovation policy in Kazakhstan. Policymakers should be concerned that simply increasing R&D expenditures are unlikely to reduce disparities between regions unless they are complemented by measures aimed at strengthening local innovation ecosystems. This in particular emphasizes the need for stronger regional research institutions and collaboration between universities and industry, as well as enhancing the absorptive capacity of firms. So a shift towards a more place-based approach to innovation policy may be required, which pays more attention to developing institutional capacity and enabling networks in lagging regions.

There are a number of limitations that must be recognized. The study is limited by the availability and comparability of regional data, in particular regarding innovation outputs and institutional indices. Official statistics do not measure some of the differences, such as the kind of innovation quality or the level in which universities-industry partnerships operate. Another limitation of the study is the use of slightly different time periods across selected descriptive tables and figures due to data availability and comparability constraints. Last, the econometric models do not consider the potential for endogeneity between R&D expenditure and actual innovation, indicating a need for more sophisticated modeling procedures on R&D investment and innovation in future studies.

Future research could include micro-level data as well as causal mechanisms driven by panel instrumental variable measures of the digitalization and globalization of value chains in regional innovation capacity. In addition, as new official data become available, the analysis can be updated and supplemented with robustness checks across alternative time windows to verify the stability of the results. Further examination of institutional quality and governance issues would also help to contribute towards a better understanding of the relations of innovation policy to regional development impacts.

Funding

This research has been funded by the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan (Grant

No. AP26198249 An exploration of innovative approaches to overcoming regional inequality in access to R&D in the interest of boosting the intellectual vanguard of Kazakhstan).

Acknowledgements and Conflict of Interest

The authors declare that there are no acknowledgements and no conflicts of interest related to this study.

Author Contributions

TAN – conceptualization of the study, literature review, critical revision of the manuscript for important intellectual content, and approval of the final version of the manuscript for publication.

KAK – collection of statistical data, data analysis, interpretation of research results, editing of the manuscript, and manuscript formatting.

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Received: 21 April 2026
Accepted: 20 September 2026

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SPATIAL FRICTIONS AND ASYMMETRIC TRADE POTENTIAL OF AGRI-FOOD SUPPLY CHAINS: EVIDENCE FROM THE SINO-KAZAKH CORRIDOR

Macro-level trade statistics often mask structural frictions that suppress the performance of the Sino-Kazakh agri-food supply chain. This study examines the spatial and institutional barriers systematically limiting the value of Kazakh agricultural exports to China. Drawing on Transaction Cost Economics (TCE) and a sequencing-based “master switch” perspective, we construct a multi-dimensional descriptive framework that triangulates UN Comtrade data (2013–2024) against 158 active WTO I-TIP Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT) records, supplemented by CAREC Corridor Performance Measurement and Monitoring logistics data. Our analysis identifies a severe weight-value paradox: in 2024, Chinese agri-food imports from Kazakhstan were 25.8 times heavier but only 3.2 times more valuable than Chinese exports to Kazakhstan. Furthermore, under the modelled scenario, SPS protocols combined with a five-day border delay and a representative 1.2% daily quality-degradation parameter generate cumulative quality loss, creating an estimated 14.25% trade suppression rate that disproportionately targets high-value perishable commodities. A comparative analysis with the China-ASEAN and China-Europe Railway Express corridors confirms that the friction is neither geographic nor infrastructural, but entirely institutional in origin. We conclude that the dominant barrier is the absence of a bilateral SPS mutual recognition framework. To address this, we recommend two targeted policy interventions: the establishment of a comprehensive Sino-Kazakh SPS mutual recognition agreement and the deployment of a consortium blockchain-based digital customs platform. These measures would transform the Khorgos border from a physical chokepoint into a seamless digital corridor, unlocking substantial latent trade potential.

Keywords: agri-food supply chain, spatial friction, institutional friction, non-tariff measures, trade asymmetry.

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Кеңістіктік кедергілер және агроазық-түлік жеткізу тізбегінің асимметриялық сауда әлеуеті: Қытай-Қазақстан дәлізінің мәліметтері

Макродеңгейдегі сауда статистикасы Қытай-Қазақстан агроазық-түлік жеткізу тізбегінің тиімділігін тежейтін құрылымдық кедергілерді жиі жасырады. Бұл зерттеу Қазақстанның Қытайға ауылшаруашылық өнімдері экспортының құнын жүйелі түрде шектейтін кеңістіктік және институционалдық тосқауылдарды зерделейді. Транзакциялық шығындар экономикасы (ТШЭ) және секвенирлеуге негізделген «негізгі коммутатор» тәсіліне сүйене отырып, біз БҰҰ Comtrade деректерін (2013–2024) 158 белсенді ДСҰ I-TIP санитарлық және фитосанитарлық (СФС) хаттамалары мен сауданың техникалық кедергілері (СТК) жазбаларымен, сондай-ақ CAREC дәлізінің өнімділігін өлшеу және мониторингтеу жүйесінің логистикалық деректерімен салыстыратын көпөлшемді сипаттамалық тәсіл қолданамыз. Талдау өткір салмақ-құн парадоксын анықтайды: 2024 жылы Қытайдың Қазақстаннан агроазық-түлік импорты оның Қазақстанға экспортынан 25,8 есе ауыр, бірақ небәрі 3,2 есе қымбат болды. Бұдан басқа, модельдік сценарийде СФС хаттамалары шекарадағы бес күндік кідіріспен және сапаның тәулігіне 1,2%-ға төмендеуінің репрезентативті параметрімен ұштасып, тез бұзылатын жоғары құнды тауарларға диспропорционалды әсер ететін сауданы тежеудің есептік 14,25% деңгейін қалыптастырады. Қытай-АСЕАН және Қытай-Еуропа темір жол экспресі дәліздерімен салыстырмалы талдау кедергінің географиялық немесе инфрақұрылымдық сипатта емес, толығымен институционалдық сипатта екенін растайды. Негізгі тосқауыл – екіжақты СФС өзара тану шеңберінің болмауы деген қорытындыға келдік. Мәселені шешу үшін біз екі нысаналы саясат шарасын ұсынамыз: кешенді

тану келісімін жасасу және консорциум блокчейніне негізделген цифрлық кедендік платформаны енгізу. Бұл шаралар Хоргос шекарасын физикалық тар жерден үздіксіз цифрлық дәлізге айналдырып, айтарлықтай жасырын сауда әлеуетін ашады.

Түйін сөздер: агроазық-түлік жеткізу тізбегі, кеңістіктік үйкеліс, институционалдық үйкеліс, тарифтік емес шаралар, сауда асимметриясы.

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Пространственные трения и асимметричный торговый потенциал агропродовольственных цепочек поставок: данные китайско-казахстанского коридора

Макроэкономическая статистика торговли зачастую скрывает структурные трения, сдерживающие эффективность китайско-казахстанской агропродовольственной цепочки поставок. В данном исследовании рассматриваются пространственные и институциональные барьеры, систематически ограничивающие стоимость казахстанского сельскохозяйственного экспорта в Китай. Опираясь на экономику транзакционных издержек (ЭТИ) и секвенционный подход «главного переключателя», мы применяем многомерный описательный подход, сопоставляющий данные ООН Comtrade (2013–2024) со 158 активными записями ВТО I-TIP о санитарных и фитосанитарных (СФС) мерах и технических барьерах в торговле (ТБТ), а также с логистическими данными системы мониторинга показателей коридоров CAREC. Анализ выявляет острый парадокс соотношения веса и стоимости: в 2024 году импорт агропродовольственных товаров из Казахстана в Китай превышал по весу обратный поток в 25,8 раза, тогда как разрыв в стоимости составил лишь 3,2 раза. Кроме того, в модельном сценарии сочетание СФС-протоколов, пятидневной задержки на границе и репрезентативного параметра снижения качества на 1,2% в день формирует расчётный уровень подавления торговли в 14,25%, непропорционально затрагивающий скоропортящиеся товары с высокой добавленной стоимостью. Сравнительный анализ с коридорами Китай-АСЕАН и Китай-Европа (маршрут ж/д экспреса) подтверждает, что источник трений носит не географический и не инфраструктурный, а сугубо институциональный характер. Мы приходим к выводу, что доминирующим барьером является отсутствие двустороннего механизма взаимного признания СФС-стандартов. В целях решения данной проблемы предлагаются два целевых инструмента политики: заключение комплексного китайско-казахстанского соглашения о взаимном признании СФС-стандартов и внедрение цифровой таможенной платформы на основе консорциумного блокчейна. Реализация этих мер способна трансформировать пограничный переход Хоргос из физического узкого места в бесшовный цифровой коридор, открывая значительный скрытый торговый потенциал.

Ключевые слова: агропродовольственная цепочка поставок, пространственные трения, институциональные трения, нетарифные меры, торговая асимметрия.

Introduction

Regional integration is often measured in political rhetoric rather than operational reality. For the past decade, the Belt and Road Initiative (BRI) has been broadly heralded as the definitive catalyst for Central Asian economic revitalization. On paper, the Sino-Kazakh agricultural trade volume exhibits a steady upward trajectory. However, aggregated trade data is inherently deceptive. It masks a fundamental structural failure at the micro-level. When we strip away the macro-economic optimism, the actual cross-border agri-food supply chain reveals a system operating far below its theoretical potential, choked by invisible but mathematically quantifiable frictions.

The academic consensus has largely fixated on tariff reductions and hard infrastructure investments—such as the construction of the Khorgos dry port—as the primary drivers of trade facilitation. Traditional gravity models assume that if tariffs fall and roads are built, trade will naturally flow. This study shatters that naive assumption. Agricultural commodities, particularly perishables, are uniquely vulnerable to time and institutional opacity. A modernized highway is useless if a truck carrying fresh meat is detained for five days awaiting redundant sanitary inspections.

Therefore, this study pivots away from traditional macro-economics to interrogate the granular transaction costs. We pose a critical question: What are the exact spatial and institutional frictions sys-

tematically suppressing the value of Kazakh agricultural exports to China? By applying a sequencing-based ‘master switch’ perspective alongside Transaction Cost Economics (TCE), we expose a severe ‘weight-value’ paradox. We hypothesize that non-tariff measures (NTMs), specifically Sanitary and Phytosanitary (SPS) protocols, act as the true master switch of this corridor, weaponizing time against perishable goods.

Literature review

The existing literature on cross-border supply chains under the BRI framework generally converges on three distinct thematic trajectories. First, research on agricultural trade costs and institutional quality shows that transport, border procedures, and regulatory conditions shape trade costs, the duration of agri-food trade relationships, and product quality (Beghin & Schweizer, 2021; Engemann *et al.*, 2023; Ghodsi & Stehrer, 2022). Second, from the perspective of supply chain resilience, recent studies underscore the critical role of technological adoption (e.g., Industry 4.0) and organizational agility in mitigating systemic disruptions (Brookbanks & Parry, 2024; Latino *et al.*, 2025; Zhong *et al.*, 2024; Zhao *et al.*, 2024). Third, agricultural economists have examined the BRI determinants of China’s agricultural exports and trade-facilitation effects in ASEAN, while research on China–Central Asia emphasizes supply-chain performance and Kazakhstan’s diversification within wider connectivity strategies (Abdullahi *et al.*, 2022; Abula *et al.*, 2022; Fan *et al.*, 2023; Tjia, 2022).

However, a critical research gap persists. Existing evidence shows that agricultural NTMs and SPS regimes can alter trade costs, product composition, and environmental outcomes, while regulatory convergence can reduce these frictions (Mao *et al.*, 2023; Sanjuán *et al.*, 2023). Recent studies also document the environmental dimension of China’s food trade (Chen *et al.*, 2025; Wang *et al.*, 2025), but they do not connect these aggregate effects to commodity-specific border delays along the Sino-Kazakh corridor. Most importantly, supply chain performance evaluations lack granular physical logistics data (Abula *et al.*, 2022). This paper contributes to the literature by utilizing a multi-dimensional descriptive framework that juxtaposes physical trade mass against financial value, thereby exposing the “invisible walls” and physical bottlenecks that selectively paralyze high-value agri-food trade.

The academic focus on hard infrastructure creates a dangerous theoretical blind spot. Scholars and policymakers routinely celebrate the steel tracks and concrete laid across the Eurasian steppe, often conflating mere physical connectivity with genuine economic integration. This infrastructural determinism, while prominent in Belt and Road Initiative discourse, structurally overlooks the microscopic regulatory realities governing international trade. From an institutional perspective, we argue that without a synchronized legal environment, a hidden yet paralyzing tax on cross-border logistics naturally emerges. Existing literature frequently overlooks this ‘software’ of international trade. It is not the lack of refrigerated containers that causes supply chains to stall; rather, it is the presence of uncoordinated and redundant customs mandates. By shifting the analytical focus from grand macro-infrastructure projects to specific micro-institutional barriers, this article attempts to rethink supply chain resilience. Resilience is not simply a matter of physical robustness; it fundamentally requires regulatory interoperability. The current Central Asian economic debate desperately requires exactly this correction. If the crippling effect of Non-Tariff Measures (NTMs) is ignored, any gravity model predicting Eurasian trade volumes becomes fundamentally flawed and practically useless for policy formulation.

To address the aforementioned gaps in the literature, theoretical frameworks must evolve beyond traditional neoclassical trade theory, which typically approaches borders as simple boundaries where tariffs are levied, overlooking the complex operational mechanisms of cross-border gateways. This study adopts the analytical lens of Transaction Cost Economics (TCE) to conceptualize these barriers (Ketokivi & Mahoney, 2020). In the context of perishable agri-food trade, cross-border movement transforms products into heavily asset-specific investments. Once a shipment enters a congested customs terminal, the exporter’s bargaining power essentially evaporates. The combination of prolonged waiting times and compounding physical degradation creates irreversible sunk costs. Under this TCE perspective, Non-Tariff Measures (NTMs) act not merely as regulatory hurdles, but as prohibitive mechanisms that force producers into suboptimal trading behaviors. Methodologically, our framework departs from conventional gravity models in three respects. First, whereas gravity specifications regress bilateral trade volumes on aggregate distance, GDP, and tariff parameters, our approach decomposes the bilateral flow into commodity-level weight–value asymme-

tries that gravity averages tend to mask. Second, instead of treating institutions as a single composite covariate (e.g., a WGI score or a dummy for RTA membership), we disaggregate institutional friction into 158 commodity-specific SPS/TBT protocols, each of which imposes a measurable transit-day cost. Third, gravity models implicitly assume symmetric tradability across goods, whereas our TCE-anchored framework treats asset specificity—particularly perishability—as a multiplier that converts a uniform border delay into highly heterogeneous welfare losses. In this sense the framework complements rather than replaces gravity analysis: gravity estimates the average elasticity of trade, while our multi-dimensional friction measurement isolates the structural channel through which institutional distance suppresses high-value flows.

To understand the systemic impact of these institutional frictions, this research further integrates a sequencing-economics perspective—specifically the ‘master switch’ concept. According to this concept, within an intricate supply chain network, certain

nodes become “master switches” capable of paralyzing the entire system if ignored. Applied to the Sino-Kazakh economic corridor, traditional tariff reduction acts as a “false switch,” merely creating the illusion of a frictionless free trade area. We argue that the actual ‘master switch’ for this agricultural corridor is the complete elimination of non-tariff institutional frictions. By framing spatial and institutional distances through this dual theoretical lens, this study proceeds to empirically quantify the true trade suppression rates and demonstrate why comprehensive SPS mutual recognition is required to unfreeze the corridor.

Methodology

In order to analytically break down bilateral trade potential and constraints, this research adopts a Multi-dimensional Friction Measurement Framework. Instead of depending upon a single generalized data source, as systematically detailed in Table 1.

Table 1
Multi-dimensional Friction Measurement Framework and Data Sources

Dimension	Measured Metrics	Primary Data Source	Coverage / Timeframe
Macroeconomic	Trade flows, «Weight-Value» asymmetry	United Nations Comtrade Database & GACC	2013–2024 / 2025
Institutional	Non-Tariff Measures (SPS and TBT)	WTO Integrated Trade Intelligence Portal (I-TIP)	Active 158 protocols
Operational	Border crossing delays, Spoilage rates	CAREC Corridor Performance Measurement (CPMM)	Empirical / Current

Note: Compiled by the authors based on the UN Comtrade Database (UN, 2024), GACC (2025), the WTO I-TIP database (WTO, 2025), and the CAREC CPMM Annual Report 2023 (CAREC, 2023)

Acknowledging methodological limitations remains vital for empirical transparency. Quantitative trade databases have inherent vulnerabilities, particularly regarding reporting lags and asymmetric bilateral recording. If Kazakhstan reports a specific export volume for an agricultural commodity, the corresponding Chinese import record is unlikely to match perfectly. This discrepancy occurs owing to transit classifications, exchange rate volatility, and differing valuation methods (CIF versus FOB pricing). To mitigate this statistical noise, our framework relies strictly on the destination country’s import data, which enforces much tighter commodity-level tracking. A secondary limitation involves the WTO I-TIP database (WTO, 2025), which only captures formally notified measures. It completely

misses informal bureaucratic hurdles and arbitrary local administrative decisions executed directly at border checkpoints. Consequently, the 14.25% trade suppression rate calculated in this study must be interpreted as a highly conservative baseline; the actual economic bleeding is undoubtedly more severe. However, by explicitly admitting these constraints, the core argument of this descriptive analysis is actually strengthened, proving that even under conservative statistical scenarios, the institutional friction is devastating. To increase methodological transparency, the 14.25% trade suppression rate reported in this study is derived from a transparent two-step procedure. First, we calculate the cumulative perishability loss as $1 - (1 - 0.012)^5 \approx 5.86\%$, where 0.012 is a representative daily quality-degradation

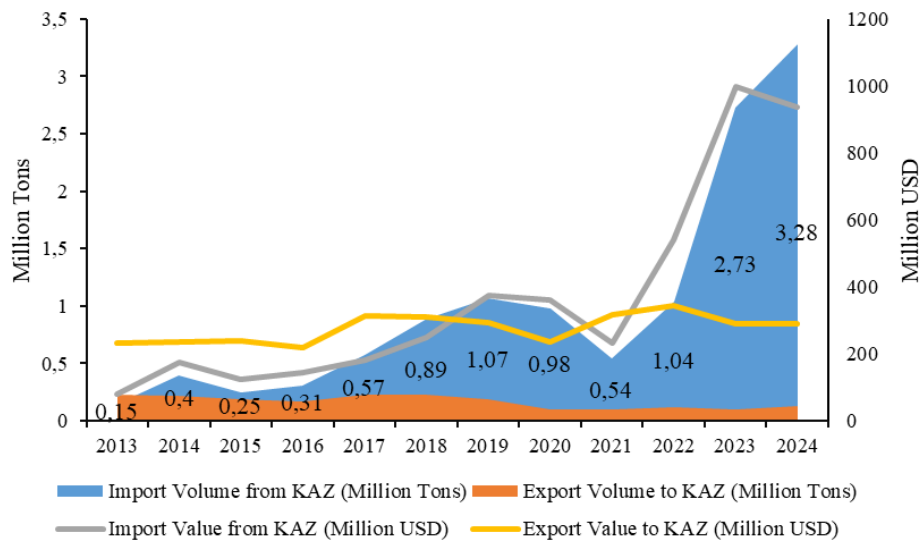
parameter for fresh agri-food cargo, calibrated from food-loss guidance and fresh agri-food system-dynamics literature (FAO, 2019; Estes et al., 2023), and 5 is the baseline border-delay scenario used in the calculation. CAREC corridor records document substantial and uneven delays at the Khorgos and Alashankou border points (CAREC, 2023). Second, we superimpose an institutional friction premium of 9.0% reflecting the effective ad-valorem equivalent of the 158 active SPS/TBT protocols catalogued in WTO I-TIP, estimated by aggregating commodity-coverage ratios of HS-06, HS-08, HS-20 chapters most affected by repeated sampling and quarantine. Combining the two channels $(1 - (1 - 0.0586)(1 - 0.090))$ yields approximately 14.25%, which we therefore present as a conservative lower-bound estimate. The 1.2% daily spoilage rate itself assumes (i) ambient temperature within the 5–18°C range typical at Eurasian dry ports, (ii) intact but not refrigerated packaging, and (iii) negligible cumulative damage from rolling-stock gauge change. These are stylized modelling assumptions rather than direct CPMM observations. Finally, to mitigate single-source bias, we triangulate three independent data streams: UN Comtrade (UN, 2024) and GACC (2025) bilateral mirror statistics cross-verify trade volume; WTO I-TIP and the General Administration of Customs of China cross-verify the

institutional inventory; and CAREC CPMM annual reports cross-verify operational delay metrics with field-level corridor monitoring. Discrepancies across the three streams are reconciled by privileging the destination-country record at the macro level and the field-monitored record at the operational level.

Results and discussion

Trade volumes can be fundamentally deceiving. A cursory scan of Sino-Kazakh agricultural flows might suggest an optimistic trajectory of regional integration. Yet, if we delve deeper into the disaggregated UN Comtrade statistics for 2013–2024 (UN, 2024), we uncover a system heavily paralyzed by spatial and institutional frictions. The underlying metrics expose a brutal weight-to-value paradox. In 2024, Kazakhstan exported a massive 3.28 million tons of agri-food products into China, yielding 936.46 million USD. Conversely, China's outbound agricultural exports to Kazakhstan amounted to a mere 127,000 tons, yet managed to capture 290.31 million USD. While the financial deficit sits at a manageable 3.2-fold, the physical mass disparity exhibits an unsustainable 25.8-fold asymmetry (see Figure 1). This creates an extreme physical weight “scissors difference” that shatters conventional gravity models of trade.

Figure 1
Dual-Axis Dynamics of Sino-Kazakh Agri-food Trade (2013–2024)



Note: UN (2024), UN Comtrade (HS 01–24, 2013–2024). Left axis: bilateral trade weight (million tonnes, bars); right axis: bilateral trade value (USD million, line). HS chapters 01–24. The diverging slopes reveal a 25.8-fold weight gap against a 3.2-fold value gap, visualizing the structural “weight–value” asymmetry discussed in the Results and discussion section

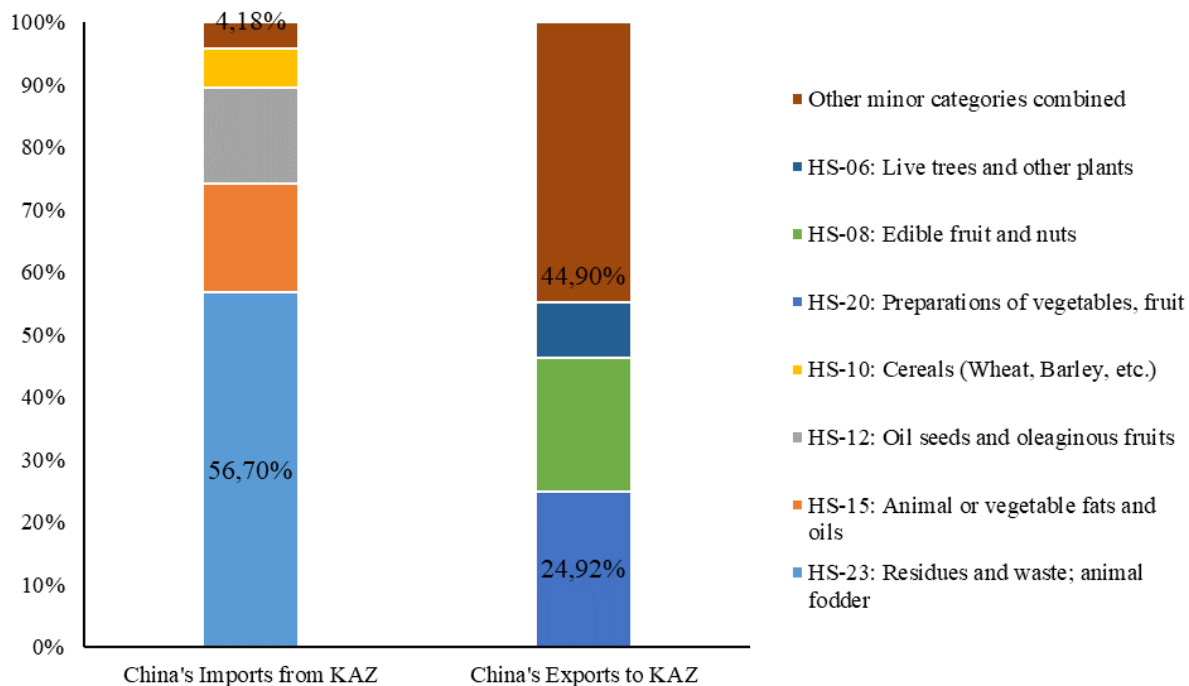
Classical principles of comparative advantage provide only a naive baseline here. Naturally, Kazakhstan's land-abundant endowment dictates bulk exports like grain and oilseeds (high-tonnage, low-value), while China tends to export high-value, time-sensitive perishables. However, these standard theorems cannot account for the sheer violence of this divergence. This 25.8-fold weight gap against a 3.2-fold value gap is not a natural market equilibrium. But why does this happen?

The answer is embedded directly in the regulatory architecture. The bilateral system essentially accommodates low-value bulk commodities, which require less scrutiny at customs. In contrast, China attempts to export products that are exactly the categories ruthlessly targeted by the 158 active SPS and TBT measures between the two nations. The institutional wall is fundamentally asymmetric. While bulk grain can wait a week in a railcar without losing value, a truckload of fresh produce is highly ex-

posed to the representative 1.2% daily depreciation parameter used to model repeated quarantine delays. Consequently, the 14.25% trade suppression rate falls disproportionately on high-value exports, artificially capping bilateral trade complexity and locking the corridor into a primitive resource-extraction model.

This macro-imbalance can be traced back to the stark division in the nature of goods being transported. Recent detailed customs statistics (GACC, 2025) confirm our findings on the center-periphery dichotomy, as illustrated in Figure 2. Kazakhstan essentially operates as a bulk agricultural commodity supplier. Roughly 90% of its export portfolio to China consists of base materials: animal feeds and residues (HS-23, 56.7%), animal and vegetable fats (HS-15, 17.4%), and oil seeds (HS-12, 15.4%). These bulk shipments can endure time-related spatial frictions relatively well, yet they capture only minimal margins within the global value chain.

Figure 2
Structural Disconnect in Cross-Border Agri-food Supply Chains (2025)



Note: Stacked bars decompose Kazakhstan-to-China (eastbound) and China-to-Kazakhstan (westbound) exports by HS chapter. Eastbound flow is dominated by HS-23 (56.7%), HS-15 (17.4%), HS-12 (15.4%); westbound flow is dominated by perishable HS-20 (24.9%), HS-08 (21.4%), HS-06 (8.8%). The contrast operationalizes the center-periphery dichotomy (GACC, 2025)

Conversely, China's export portfolio to Kazakhstan is heavily skewed towards high-value, highly perishable products. Processed vegetables and fruits (HS-20, 24.9%), fresh edible fruits (HS-08, 21.4%), and live plants (HS-06, 8.8%) constitute over half of the outbound trade. The predicament here is two-fold. While these products yield higher financial returns per ton, their physical fragility makes them acutely vulnerable to the cross-border bottlenecks and institutional gridlocks prevalent in the region. Consequently, the Sino-Kazakh agri-food corridor currently operates less as a synchronized supply chain and more as a bifurcated conduit, where low-margin bulk materials flow east while high-margin, time-sensitive perishables face severe spatial friction flowing west.

The prevailing discourse on Sino-Kazakh trade often fixates on tariff reductions, which essentially serves as a distraction from the actual architec-

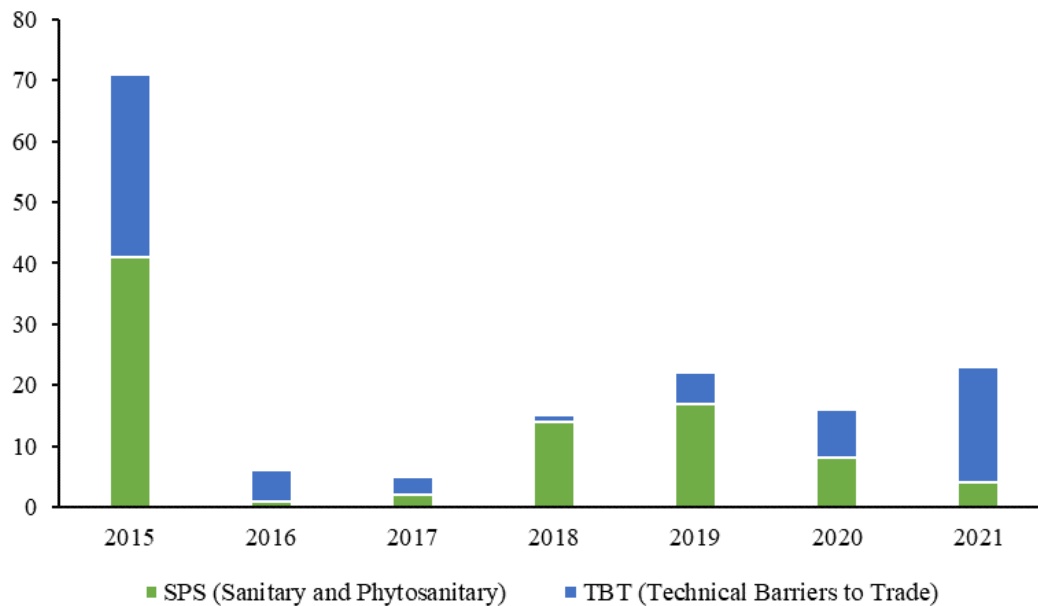
ture of trade suppression. The real, mathematically crippling barrier is invisible: Non-Tariff Measures (NTMs).

Interrogating the WTO I-TIP database (WTO, 2025) reveals a staggering reality. We identify exactly 158 active Chinese Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT) protocols systematically stifling Kazakh agricultural exports. This is not routine quality control; it is institutional friction maximized through bureaucratic redundancy.

Consider the operational mechanics at the Khorgos border, as explicitly mapped in Figure 4. A shipment of Kazakh grain or meat does not simply cross a geographic line; instead, it enters a regulatory labyrinth. In the absence of SPS mutual recognition, redundant sampling and quarantine protocols are represented by a five-day baseline border-delay scenario.

Figure 3

Initiation of Active Non-Tariff Measures (SPS and TBT) applied to Sino-Kazakh Agri-food Trade (2015–2021)



Note: Integrated Trade Intelligence Portal (I-TIP). Vertical axis: number of newly initiated measures per year; bar color distinguishes SPS from TBT. The cumulative inventory reaches 158 active protocols by 2025, illustrating the institutional wall analyzed in the Results and discussion section (WTO, 2025)

Time is the ultimate enemy of perishable goods. We quantify this temporal friction as a compounding 1.2% quality degradation per transit day. The financial implications are severe. Under

the modelled assumptions, a five-day delay yields an approximately 6% loss of the cargo's intrinsic value, while simultaneously accumulating terminal storage fees, the transaction costs explode. Ulti-

mately, this institutional wall systematically locks Kazakh producers out of the premium, time-sensitive tiers of the Chinese consumer market, forcing them to compete exclusively in low-margin bulk commodities.

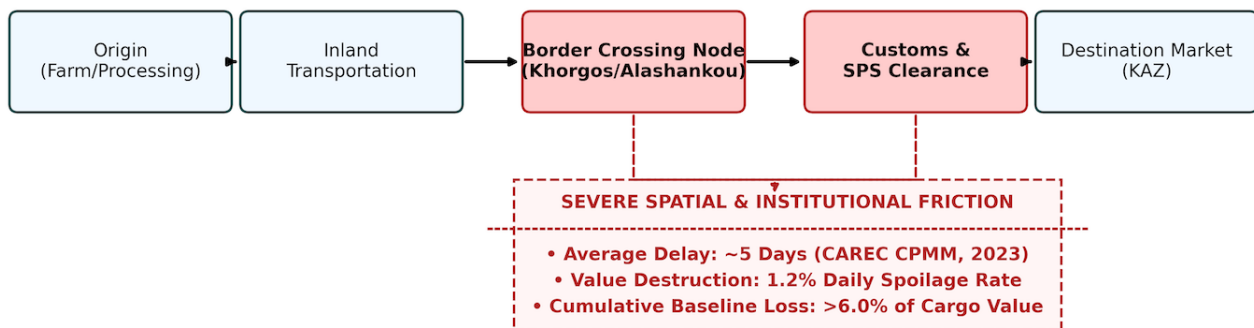
Consistent with the ‘Master Switch’ hypothesis, the joint effect of 158 active NTMs and the five-day baseline border delay generates the 14.25% suppression rate quantified above, confirming institutional distance—rather than geography—as the operative bottleneck.

These institutional gridlocks extend far beyond legislative texts; they manifest as severe physical bottlenecks at the frontier. Based on the Corridor Performance Measurement and Monitoring (CPMM) system managed by the Central Asia Regional Economic Cooperation (CAREC) (CAREC, 2023), border-crossing delays stand as the single largest impediment to regional trade facilitation. In operational terms, freight traversing critical Sino-Kazakh hubs, notably the Khorgos and Alashankou land ports, is evaluated here under a five-day baseline border-delay scenario.

Crucially, the impact of this five-day pause in the supply chain is highly asymmetric, depending entirely on what is being shipped. For eastbound bulk commodities—such as Kazakh wheat and animal feed—a five-day wait merely represents a tolerable inventory holding cost. However, as previously established, over 55% of China’s westbound exports consist of highly perishable items, including processed vegetables, fresh fruits, and live plants. For these time-sensitive supply chains, time spent waiting at the border translates directly into irreversible value destruction.

As the bottleneck map (Figure 4) illustrates, the convergence of rigid SPS inspections, mandatory rolling stock gauge-changes, and fragmented cold-chain logistics generates a devastating compounding effect. Under the representative calibration, fresh agricultural products held in suboptimal transit storage are modelled with a 1.2% daily spoilage rate. Consequently, the five-day baseline scenario yields a physical loss of approximately 6.0% of the cargo’s total value before the shipment even enters the Kazakh domestic market.

Figure 4
Supply Chain Bottleneck Mapping at Sino-Kazakh Border Nodes



Note: Based on CAREC (2023), CPMM Annual Report 2023 and empirical estimations. Node-by-node visualization of average dwell time (days) and corresponding spoilage-induced value loss (%) at Khorgos, Alashankou and feeder corridors. The five-day value is a modelling baseline rather than a uniform observed average; compounding the representative 1.2% daily spoilage parameter over this interval yields an approximately 6.0% physical loss; the figure complements the 14.25% suppression rate derived in the Methodology and Data section

This operational vulnerability blocks the flow of high-margin agricultural products. Along the Sino-Kazakh corridor, spatial friction is no longer a matter of geographic distance or transport tariffs; it acts as a punitive filter against time-sensitive trade.

To fully understand the extent of this Sino-Kazakh friction, one must place it in context with comparable trade routes. Is a 14.25% trade suppression

rate simply an inherent reality of landlocked Eurasian geography? The empirical evidence strongly suggests otherwise.

Consider the China-ASEAN fruit trade route operating through the Mohan border. Even with significant geographical challenges in mountainous terrain, a ‘Green Lane’ approach and regional SPS harmonization reduce border clearance times

for Southeast Asian perishables to under 24 hours. Consequently, the transaction cost there remains primarily spatial, not institutional. A stark contrast also emerges when examining the China-Europe Railway Express (CRE). Within this network, temperature-sensitive Polish dairy and French meat products are transported directly across the exact same Kazakh territory with near-zero institutional friction, shielded by tightly controlled international transit agreements.

In light of these comparative facts, bilateral agricultural trade originating specifically within Kazakhstan is harshly penalized. This clearly isolates the root of the problem: the friction is neither an unavoidable result of Central Asia's physical geography nor a consequence of its logistics infrastructure. It is entirely a byproduct of the asymmetric and unharmonized Sino-Kazakh regulatory architecture. This finding directly challenges previous studies that attribute the agricultural trade deficit in Central Asia solely to logistical underdevelopment.

Conclusion

The Sino-Kazakh agri-food network is fundamentally impaired. This analysis cuts through the prevailing rhetoric of frictionless regional integration to expose a harsh operational reality. A 25.8-fold weight-value asymmetry is no geographical accident. Rather, it is the engineered consequence of 158 overlapping non-tariff measures and compounding spatial delays. Aggregated macro-economic metrics have effectively masked this structural bleeding for far too long.

To address these deep structural blockages, policy interventions must move beyond marginal adjustments toward actionable governance mechanisms. True supply chain resilience demands absolute institutional interoperability. We advocate for two critical interventions. First is the establishment of a comprehensive Sino-Kazakh SPS mutual recognition framework. Currently, divergent agricultural standards impose costly, redundant quarantine procedures on Kazakh exporters. A targeted agreement would effectively flip the institutional 'master switch', reducing the modelled five-day baseline border penalty to mere hours. Second, the mitigation of these frictions necessitates the deployment of a consortium blockchain-based digital customs platform. Unlike traditional digitized ledgers, a consortium system allows customs authorities, logistics providers, and traders to share immutable, real-time data regarding product origin, phytosanitary compli-

ance, and cold-chain integrity. By integrating smart contracts, the clearance process for low-risk consignments can be fully automated, transforming the Khorgos border from a physical chokepoint into a seamless digital corridor.

The limits of static observation provide a strict boundary for what comes next in our research. While this descriptive work has been effective at mapping where the fractures are in the current system, it cannot show us the dynamic re-equilibration that would occur if these frictional forces were hypothetically removed. So, the immediate next step is clear: we must deploy a computable general equilibrium model that integrates System Dynamics (GTAP-SD). This new hybrid tool will mathematically shock the current system of trade. By zeroing out the compliance costs of the 158 Non-Tariff Measures (NTMs) and setting the five-day baseline delay parameter to zero, we can trace the intricate web of ripple effects across domestic production scales, consumer pricing indexes, and bilateral welfare gains. We anticipate that removing this particular institutional friction will do more than just increase trade volumes. It will categorically overhaul the entire commodity mix, igniting a massive surge in high-value exports going west. The mathematical proof of this structural transformation is exactly what we are actively engaged in for our ongoing research.

Funding

This research received no external funding.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Generative AI Disclosure

In preparing this work, the authors used OpenAI Codex to check compliance with the journal's formatting requirements, correct internal cross-references, and assist with document formatting. After using this tool/service, the authors reviewed and edited the content as necessary and take full responsibility for the content of the publication.

Author Contributions

LW: Conceptualization, Data curation, Formal analysis, Writing – original draft

AM: Supervision, Validation, Writing – review & editing

ZhN: Writing – review & editing, Validation

All authors have read and agreed to the published version of the manuscript.

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Received: 12 March 2026
Accepted: 20 September 2026

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STRUCTURAL BALANCE OF KAZAKHSTAN'S REGIONAL HOTEL BUSINESS

Hotel-business development in Kazakhstan is characterized not only by wide regional gaps but also by unequal combinations of infrastructure, demand, economic conversion, quality structure and labour use. A high aggregate score therefore does not necessarily indicate an internally coherent development pattern. This study assesses both the level and structural balance of the regional hotel business and uses the results to formulate differentiated policy priorities. The object of analysis is the hotel sector of 17 harmonized territorial units of Kazakhstan. The study uses official statistics for 2019–2024, min-max normalization, integrated assessment, structural comparison and matrix-based typology. The 2024 integrated level is calculated from 16 indicators grouped into five dimensions. A structural balance coefficient is additionally proposed as one minus the range of the five partial scores. Almaty and Astana record the highest aggregate levels, whereas the most balanced configurations are observed in Mangystau and Astana. Atyrau displays the largest internal gap, combining the maximum quality-structure proxy with the minimum recorded labour-use score. Four regional groups are identified from the joint distribution of level and balance. The dynamic integrated assessment increased in 16 of 17 territories between 2022 and 2024, although the pace of improvement varied considerably. The contribution of the study is the explicit separation of development scale from internal consistency among its components. The results can support differentiated regional measures aimed at removing bottlenecks, stimulating demand, improving infrastructure utilization or establishing the basic conditions of a viable hotel market.

Keywords: hotel business, regional development, structural balance, hospitality industry, Kazakhstan.

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Қазақстан өңірлеріндегі қонақүй бизнесінің құрылымдық теңгерімділігі

Қазақстандағы қонақүй бизнесінің дамуы өңірлер арасындағы елеулі сараланумен және инфрақұрылымдық әлеует, сұраныс, экономикалық нәтижелілік, қызмет көрсету сапасы мен еңбек ресурстарын пайдалану арасындағы арақатынастың әркелкілігімен сипатталады. Осыған байланысты дамудың жоғары жиынтық деңгейі оның құрылымдық компоненттерінің ішкі үйлесімділігін әрдайым көрсете бермейді. Зерттеудің мақсаты – Қазақстан өңірлеріндегі қонақүй бизнесінің даму деңгейі мен құрылымдық теңгерімділігін кешенді бағалау және осының негізінде сараланған өңірлік саясат бағыттарын айқындау.

Зерттеу объектісі ретінде Қазақстанның 17 үйлестірілген аумақтық бірлігіндегі қонақүй секторы қарастырылды. Зерттеудің ақпараттық базасын 2019–2024 жылдардағы ресми статистикалық деректер құрады. Зерттеуде нормалау, интегралдық бағалау, құрылымдық салыстыру және матрицалық типология әдістері қолданылды. 2024 жылғы қонақүй бизнесінің интегралдық даму деңгейі бес мазмұндық блокқа біріктірілген 16 көрсеткіш негізінде есептеді. Ішкі үйлесімділікті бағалау үшін бес жекелеген интегралдық бағалаудың размағын бірліктен шегеру арқылы анықталатын құрылымдық теңгерімділік коэффициенті ұсынылды.

Зерттеу нәтижелері Алматы мен Астананың қонақүй бизнесінің жалпы даму деңгейі бойынша жетекші орындарын сақтап отырғанын көрсетті, ал неғұрлым теңгерімді құрылым Маңғыстау

облысы мен Астанаға тән. Құрылымдық алшақтықтың ең жоғары деңгейі Атырау облысында анықталды: мұнда сапаның прокси-көрсеткіші мен тіркелген еңбек ресурстарын пайдалану қарқындылығы арасында айтарлықтай айырмашылық байқалады. Даму деңгейі мен құрылымдық теңгерімділікті бірлесіп бағалау негізінде өңірлердің төрт типологиялық тобы бөлінді. 2022 – 2024 жылдары 17 аумақтың 16-сында интегралдық динамикалық бағалау жақсарғанымен, оң өзгерістердің қарқыны айтарлықтай ерекшеленді.

Зерттеудің ғылыми маңыздылығы қонақүй бизнесінің өңірлік дамуының екі сипаттамасын – оның ауқымы мен ішкі құрылымдық үйлесімділігін – ажыратудан тұрады. Практикалық маңыздылығы анықталған типке байланысты өңірлік саясат шараларын саралау мүмкіндігімен айқындалады: құрылымдық тар орындарды жою, сұранысты ынталандыру, қолданыстағы инфрақұрылымды пайдалану тиімділігін арттыру немесе қонақүй нарығын дамыту үшін базалық жағдайлар қалыптастыру.

Түйін сөздер: қонақүй бизнесі, өңірлік даму, құрылымдық теңгерімділік, қонақжайлылық индустриясы, Қазақстан.

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Структурная сбалансированность гостиничного бизнеса регионов Казахстана

Развитие гостиничного бизнеса в Казахстане отличается не только существенным разрывом между регионами, но и неодинаковым соотношением инфраструктуры, спроса, экономической отдачи, структуры качества и использования труда. Поэтому высокий совокупный результат не всегда означает внутренне согласованную модель развития. Цель исследования – оценить одновременно уровень и структурную сбалансированность гостиничного бизнеса регионов Казахстана и на этой основе определить дифференцированные направления региональной политики. Объектом исследования выступает гостиничный сектор 17 гармонизированных территориальных единиц страны. Используются официальные статистические данные за 2019–2024 гг., методы нормализации, интегрального оценивания, структурного сравнения и матричной типологизации. Интегральный уровень за 2024 г. рассчитан по 16 показателям, объединенным в пять блоков. Дополнительно предложен коэффициент структурной сбалансированности, равный единице минус размах пяти частных оценок. Результаты показывают, что Алматы и Астана сохраняют наивысший общий уровень, однако более сбалансированная конфигурация характерна для Мангистауской области и Астаны. В Атырауской области зафиксирован максимальный структурный разрыв между прокси качества и интенсивностью использования зарегистрированного труда. По сочетанию уровня и сбалансированности выделены четыре группы регионов. В 2022–2024 гг. интегральная динамическая оценка выросла в 16 из 17 территорий, но скорость улучшения существенно различалась. Научная ценность работы состоит в разграничении масштаба развития и внутренней согласованности его компонентов. Практическая значимость связана с возможностью выбирать адресные меры: устранение узких мест, наращивание спроса, повышение загрузки инфраструктуры либо формирование базовых условий гостиничного рынка.

Ключевые слова: гостиничный бизнес, региональное развитие, структурная сбалансированность, индустрия гостеприимства, Казахстан.

Introduction

The hotel business occupies a distinctive position in the service economy. It accommodates leisure and business travellers, supports domestic mobility and creates demand for transport, food services, retail and cultural activities. In regions with limited sectoral diversification, hospitality can also provide an entry point for small and medium-sized enterprise development. Yet growth in the number of accommodation establishments does not

reveal how effectively a territory uses the capacity it has created. Rooms may remain underutilized, higher visitor numbers may not generate comparable revenue, and a formally upgraded accommodation structure may coexist with labour constraints.

Regional heterogeneity is particularly visible in Kazakhstan. The largest cities concentrate business travel, major events, transport hubs and a substantial share of solvent demand. Tourism-oriented regions possess natural and cultural resources but often face seasonality, accessibility constraints and a gap

between potential and realized occupancy. In several territories, accommodation supply remains small and serves mainly local or transit demand. Consequently, the same support instrument cannot be expected to produce the same effect across all regions.

Most statistical comparisons focus on a single dimension: establishments, rooms, visitors or service volume. Such indicators are useful, but they do not describe the internal structure of development. A region with a high aggregate result may depend on one or two strong components while retaining a pronounced weakness elsewhere. Conversely, a territory with moderate values may display a more coherent combination of infrastructure, demand, quality structure and labour use. This distinction matters for policy: the first case calls for the removal of a specific bottleneck, whereas the second requires gradual scaling without disrupting an existing balance.

The research problem is that an integrated score summarizes the overall level of hotel-business development but does not show how closely its individual components are aligned. Rankings are useful for broad regional comparison, yet neighbouring positions may represent substantially different economic configurations. A high aggregate score also does not necessarily mean that accommodation capacity is effectively converted into stable demand and economic returns. The present study therefore complements the integrated assessment with a separate measure of structural balance.

The aim of the study is to assess simultaneously the level and structural balance of the regional hotel business in Kazakhstan and, on this basis, to identify differentiated management priorities. The object of the study is the regional hotel sector, while the subject is the relationship among its economic, infrastructure, market, observed quality-structure and labour-use dimensions. The analysis examines the proposition that a high integrated level of hotel-business development does not necessarily coincide with a high degree of internal structural balance.

The contribution of the study lies in distinguishing between the scale of regional hotel-business development and the internal consistency of its main dimensions. The proposed approach combines an integrated development level with a separate structural balance coefficient, allowing regions with similar aggregate positions but different internal configurations to be distinguished.

This provides a basis for identifying whether a region's main constraint is associated with insufficient scale, underutilized infrastructure, weak demand, an imbalanced quality structure or the intensity of recorded labour use. Joint consideration of the development level, structural balance and recent regional dynamics therefore offers a more differentiated diagnostic basis for regional hotel-business policy than a conventional ranking based solely on an aggregate score.

Literature review

The theoretical starting point is the multidimensional view of destination competitiveness. Dwyer and Kim (2003) connect performance with resources, infrastructure, management, demand and situational conditions. Enright and Newton (2004) argue for combining tourism-specific and broader business attributes, while Crouch (2011) shows that the relative importance of determinants is context-dependent. The common implication is that tourism and hospitality development cannot be represented reliably by a single supply or demand indicator.

Hotel research is usually conducted at the firm level. Tsai *et al.* (2009) synthesize determinants of hotel competitiveness, including strategy, operations, quality and human resources. Oh and Kim (2017) review the relationships among service quality, customer value and satisfaction. Buhalis and Leung (2018) conceptualize hospitality as an interconnected digital ecosystem in which reservations, data, partner services and communication operate as a network. These studies explain mechanisms within establishments, but they do not provide complete territorial comparisons based on official statistics.

Digital reputation and user-generated content form another major strand. Sparks and Browning (2011) demonstrate the effect of online reviews on trust and booking intentions; Nieto-García *et al.* (2017) link electronic word of mouth with willingness to pay; and Nicolau *et al.* (2024) examine daily review sentiment and hotel performance. Song *et al.* (2024) and Marandi *et al.* (2024) use large review datasets to identify competitive attributes and revisiting intentions. However, platform coverage is uneven across regions. Directly adding such data to a regional framework may bias the comparison towards large and digitally visible markets.

Regional research confirms that resources and infrastructure do not guarantee economic conversion. But (2024) documents competitiveness differences among Czech regions, Moreno-Izquierdo *et al.* (2024) examine the relationship among competitiveness, sustainability and development in Spain, and Pavluković *et al.* (2026) propose an application model for Serbia. Ekonomou and Halkos (2025) show that tourism competitiveness across OECD countries reflects different combinations of institutional and economic conditions. These findings support an analysis of configurations, not merely aggregate levels.

For Kazakhstan, Tleuberdinova *et al.* (2024) use stakeholder evidence to evaluate national destination competitiveness and identify service and employee constraints. Spankulova *et al.* (2026) examine dynamic relationships between hospitality development and regional inequality and stress the need for differentiated regional policy. These contributions clarify the national and socio-economic context but do not assess the internal proportionality of the hotel sector across 17 comparable territorial units.

Evidence from Central Asia and comparable post-Soviet economies reinforces the need for a territorial perspective. Sergeyeva *et al.* (2022), using nine regions along the Kazakhstan-Uzbekistan border, show that tourism potential varies with the spatial distribution of tourism infrastructure and settlement systems. For Uzbekistan, Toyirova *et al.* (2026) examine accommodation-sector competitiveness through the interaction of infrastructure, quality standards, destination positioning and sustainability-oriented management. Khelashvili and Okroshidze (2025) similarly demonstrate for Georgia that destination competitiveness depends on destination-specific competitive positioning rather than on a single universal characteristic. These studies are relevant to Kazakhstan because they describe settings with uneven spatial development and related institutional legacies while confirming the value of region-specific configurations.

Composite-indicator methodology can integrate heterogeneous evidence, but its use requires caution. Mazanec *et al.* (2007) question the movement from definition to explanation in tourism competitiveness. Mendola and Volo (2017) show that indicator selection, normalization and aggregation affect results. Salinas Fernández *et al.* (2020) demonstrate the benchmarking value of a

synthetic index, while Mendoza Tolosa and Campo Robledo (2017) show that regional composites become more informative when interpreted together with structural and territorial dynamics. The OECD/European Union/EC-JRC (2008) handbook likewise treats composite indicators as diagnostic tools rather than automatic proof of causal relationships.

Alternative approaches to structural balance differ in what they penalize. The present range-based coefficient follows a bottleneck logic: it is transparent and reacts directly to the largest gap between dimensions, but it does not use the positions of the three intermediate scores. Dispersion-based measures use all dimensions, while non-compensatory composite indices explicitly limit the possibility that a strong component fully offsets a weak one (Mazziotta & Pareto, 2016). Normalization choices can also affect relative positions, particularly when min-max scaling is anchored to sample extremes (Mazziotta & Pareto, 2022). Accordingly, the range-based coefficient is used as the primary measure of structural balance and is complemented by a five-dimension standard-deviation measure, while the integrated level is tested under alternative weighting and normalization schemes.

Quality and labour are especially difficult to measure with regional official statistics. Classification coverage or the share of high-comfort rooms is not equivalent to guest experience, which also depends on cleanliness, reliability, staff interaction and complaint handling. The bibliometric study by Olawuyi and Kleynhans (2025) confirms the multidimensional character of hospitality service quality. Similarly, services or visitors per recorded worker cannot fully represent human capital because hours, outsourcing, skills and job quality are not observed consistently. Xia *et al.* (2023) highlight employee experience and organizational context, while Xia *et al.* (2024) document the rapid expansion and fragmentation of the destination-competitiveness field.

Three complementary traditions therefore shape the literature: comprehensive destination models, establishment-level hotel research and composite-indicator methodology. Evidence from Kazakhstan, Central Asia and comparable post-Soviet destinations also points to substantial territorial heterogeneity, but it rarely separates the scale of hotel-sector development from the internal proportionality of its components. What remains

underdeveloped is a transparent tool that answers two questions at once: how high is a region's hotel-business development level, and how evenly are its main dimensions formed? The structural balance coefficient proposed here addresses this applied gap by providing a diagnostic measure of internal proportionality, while its robustness is evaluated against alternative aggregation, normalization and dispersion specifications

Methodology

The empirical base consists of official regional statistics for 2019-2024 (Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan). Seventeen harmonized territorial units are used to preserve comparability across administrative changes. Abay is combined with East Kazakhstan, Zhetysu with Almaty region, and Ulytau with Karagandy.

Shymkent and Turkestan remain separate because this territorial distinction is available throughout the period used for the dynamic assessment.

The complete cross-sectional assessment is conducted for 2024 and includes 16 official indicators grouped into five dimensions: Economic, Infrastructure, Market, Observed Quality Structure, and Labour Use. The Economic dimension covers accommodation-service volume and its ratios to population, rooms, and visitors. Infrastructure includes the number of accommodation establishments, rooms and beds relative to population, as well as average establishment size. The Market dimension reflects realized demand and utilization through visitors per population, room occupancy, length of stay, and the share of foreign visitors. Observed Quality Structure is represented by classification coverage and the share of higher-comfort rooms. Labour Use combines accommodation services and visitors per recorded worker.

Table 1
Dimensions of regional hotel-business development

Dimension	Content	Economic interpretation
Economic	Service volume and ratios per resident, room and visitor	Ability to convert demand and capacity into monetary outcomes
Infrastructure	Establishments, rooms and beds per population; average establishment size	Availability and structure of accommodation capacity
Market	Visitors, occupancy, length of stay and foreign demand	Realized demand and utilization intensity
Observed Quality structure	Classified establishments and higher-comfort rooms	Observed formal structure, not perceived service quality
Labour use	Services and visitors per recorded worker	Intensity of recorded labour-resource use

Note: compiled by the authors. The Observed Quality Structure dimension is a statistical proxy and does not measure guest satisfaction or perceived service quality

All 16 indicators used in the 2024 assessment are treated as stimulants, so a higher observed value corresponds to a higher normalized score. Because the indicators are expressed in different units of measurement, they are first transformed using min-max normalization:

$$x'_{rj} = \frac{x_{rj} - \min_r(x_{rj})}{\max_r(x_{rj}) - \min_r(x_{rj})} \quad (1)$$

where x_{rj} is the observed value of indicator j for region r ; x'_{rj} is its normalized value; $\min_r(x_{rj})$ and $\max_r(x_{rj})$ are respectively the minimum and maximum values of indicator j across the 17

territorial units. The transformation places each indicator on a common scale from 0 to 1. A value of 0 denotes the lowest observed value in the 2024 regional sample, while a value of 1 denotes the highest observed value. These endpoints are therefore relative to the sample and should not be interpreted as absolute absence or absolute superiority of the corresponding characteristic.

For each of the five dimensions, a partial score is calculated as the arithmetic mean of the normalized indicators included in that dimension:

$$D_{rk} = \frac{1}{m_k} \sum_{j=1}^{m_k} x'_{rjk} \quad (2)$$

where D_{rk} is the partial score of region r for dimension k ; x'_{rjk} is the normalized value of indicator j belonging to dimension k ; and m_k is the number of indicators included in that dimension. Thus, each region obtains five partial scores corresponding to the Economic, Infrastructure, Market, Observed Quality Structure, and Labour Use dimensions.

The integrated development level is calculated as a weighted aggregate of the five partial scores:

$$L_r = \sum_{k=1}^5 w_k D_{rk} \quad (3)$$

where L_r is the integrated hotel-business development level of region r ; D_{rk} is the partial score for dimension k ; and w_k is the weight assigned to that dimension. In the baseline specification, equal weights are used:

$$w_1 = w_2 = w_3 = w_4 = w_5 = 0.20 \quad (4)$$

Equal weighting is used as a transparent baseline rather than as evidence that all five dimensions have identical causal importance. It avoids imposing subjective priorities when no externally validated weighting structure is available for the regional hotel business of Kazakhstan.

The stability of the integrated assessment is examined using alternative weighting and normalization procedures. First, the equal-weight specification is recalculated using entropy-derived and principal-component-based weights. Entropy weighting assigns different weights according to the cross-regional information dispersion of the five partial dimensions. The PCA specification uses the positive loadings of the first principal component calculated from the standardized block scores; these loadings are normalized so that the resulting five weights sum to one. The alternative weights and the corresponding regional results are reported together with the sensitivity results.

Second, normalization sensitivity is assessed by replacing min-max normalization with z-score standardization of the same 16 raw indicators:

$$z_{rj} = \frac{x_{rj} - \bar{x}_j}{\sigma_j} \quad (5)$$

where z_{rj} is the standardized value of indicator j for region r ; x_{rj} is the original indicator value; $\bar{x}_j$ is the cross-regional mean of indicator j ; and σ_j is its population standard deviation across the 17

territorial units. The standardized indicators are averaged within the same five dimensions and aggregated using the baseline equal weights of 0.20. Because the resulting z-score composite is not bounded between 0 and 1, it is used only as a sensitivity check of the regional ordering rather than as an alternative substantive scale of development.

The stability of the regional ranking under the alternative specifications is evaluated using Spearman's rank correlation coefficient and the maximum absolute change in regional rank. Spearman's coefficient measures the correspondence between the baseline regional ranking and the ranking obtained under each alternative specification. A coefficient closer to 1 indicates greater stability of the ordering.

Structural balance is assessed separately from the integrated development level. The purpose of this measure is not to determine how high the overall level of hotel-business development is, but to determine how closely the five dimensions are aligned within a particular region. For each region, the primary structural balance coefficient is calculated as:

$$B_r = 1 - (\max_k(D_{rk}) - \min_k(D_{rk})) \quad (6)$$

where B_r is the structural balance coefficient of region r ; D_{rk} represents one of the five partial dimension scores; $\max_k(D_{rk})$ is the highest partial score of that region; and $\min_k(D_{rk})$ is its lowest partial score. The difference between the maximum and minimum partial scores represents the range between the strongest and weakest dimensions of the regional profile. Because all five partial scores lie between 0 and 1, B_r also lies between 0 and 1. A value closer to 1 indicates a smaller difference between the strongest and weakest dimensions and therefore a more structurally balanced profile. A value closer to 0 indicates a larger internal gap. The coefficient is not interpreted as a measure of the absolute quality or efficiency of the regional hotel business. A region may have relatively similar partial scores at either a high or a low overall development level. For this reason, structural balance and integrated development level are analysed jointly.

Because the range-based coefficient is determined only by the highest and lowest partial scores, robustness is additionally assessed using the population standard deviation of all five partial scores:

$$SD_r = \left(\frac{1}{5} \sum_{k=1}^5 (D_{rk} - \bar{D}_r)^2 \right)^{\frac{1}{2}} \quad (7)$$

where SD_r is the standard deviation of the five partial dimension scores for region r ; D_{rk} is the score for dimension k ; and $\bar{D}_r$ is the arithmetic mean of the five partial scores for that region:

$$\bar{D}_r = \frac{1}{5} \sum_{k=1}^5 D_{rk} \quad (8)$$

Unlike the range-based coefficient, SD_r takes all five partial scores into account. Its interpretation is inverse to that of B_r : a lower value of SD_r indicates that the five dimension scores are more closely concentrated around their regional mean and therefore corresponds to greater structural balance.

For the robustness comparison, regions are ranked in descending order according to B_r , because higher B_r indicates greater balance, and in ascending order according to SD_r , because lower SD_r indicates greater balance. The consistency of the two balance rankings is assessed using Spearman's rank correlation coefficient and the maximum absolute change in rank. Regions are ranked in descending order by B_r and in ascending order by SD_r , so that a higher position under either ordering corresponds to greater structural balance.

The integrated level and the structural balance coefficient are then combined in a two-dimensional matrix. The dividing lines are the sample medians. For the 2024 cross-section, the median integrated development level is 0.252 and the median structural balance coefficient is 0.663. Four regional groups are distinguished: higher development level-higher structural balance; higher development level-lower structural balance; lower development level-higher structural balance; and lower development level-lower structural balance. A region is assigned to the higher-level group when its integrated score is equal to or above the sample median and to the higher-balance group when its B_r is equal to or above the corresponding median. The median values are empirical dividing points within the observed 2024 distribution; they are not normative targets or economically optimal thresholds.

As an additional robustness check, the matrix classification is repeated using SD_r instead of B_r . Because the interpretation of standard deviation is reversed, a region is classified as relatively more balanced under this specification when its SD_r is equal to or below the sample median of SD_r . The

number of regions retaining the same matrix quadrant under the two balance measures is used as an additional indicator of classification stability.

Management interpretation of the matrix follows a predefined diagnostic logic. For higher-level but lower-balance regions, attention is directed first to the weakest partial dimension. Higher-level and higher-balance regions are interpreted as having greater scope for controlled development while the remaining weaker dimensions continue to be monitored. Lower-level but higher-balance regions are interpreted primarily in terms of insufficient scale and realized demand, whereas lower-level and lower-balance regions require examination of several basic constraints before broad expansion is considered. These categories are used as diagnostic screening rules. They do not estimate causal policy effects, and specific interventions require additional region-level evidence.

Temporal movement is assessed separately for 2022-2024 using a comparable set of 15 indicators. The foreign-visitor share is excluded from the dynamic calculation because a consistent regional series is unavailable for 2022 and 2023. To ensure comparability over time, the indicators are normalized using the pooled three-year sample of 51 region-year observations rather than separately within each year. Thus, the minimum and maximum used in the dynamic normalization are determined across all regional observations for 2022-2024. This makes changes in the resulting scores interpretable relative to a common three-year scale. Earlier years are not included in the integrated trajectory because occupancy, capacity and length-of-stay indicators are not fully comparable over the entire 2019-2024 period.

The methodology has several limitations that should be considered when interpreting the results. First, the range-based balance coefficient focuses on the largest internal gap, while the standard-deviation measure captures overall dispersion; neither measure defines an economically optimal degree of structural balance. Second, min-max normalization is sample-relative and sensitive to extreme observations, which is why alternative z-score standardization is used as a robustness check. Third, regions located close to the sample medians may change matrix group under an alternative balance specification. Fourth, the Observed Quality Structure dimension reflects formal classification and room structure rather than guest satisfaction or perceived service quality. Fifth, the Labour Use dimension is based on services and visitors per

recorded worker and does not measure employee skills, hours worked, outsourcing or working conditions. Finally, the available regional statistics do not permit separate identification of the causal effects of institutional conditions, accessibility, seasonality or demographic structure. The matrix should therefore be interpreted as a diagnostic instrument for regional comparison rather than as an estimate of the causal effects of particular policy measures.

Results and discussion

Descriptive statistics reveal pronounced regional heterogeneity. In 2024, the coefficient of variation is 1.442 for accommodation-service volume, 1.071 for visitors and 1.074 for services per capita. Infrastructure dispersion is lower but remains substantial: the coefficient of variation is 0.733 for rooms and 0.787 for bed capacity, while room

occupancy has a coefficient of variation of 0.422. Thus, economic output and realized demand are more spatially concentrated than physical accommodation capacity, indicating that expansion of supply does not automatically produce proportional market outcomes.

The integrated assessment confirms the concentration of hotel-business activity in the largest urban and tourism centres. Almaty records the highest integrated level (0.734), followed by Astana (0.656), Akmola (0.461) and Mangystau (0.455). The lowest values are observed in North Kazakhstan (0.155) and Turkestan (0.147). The difference between the highest and lowest values is close to fivefold. However, the integrated level alone does not show whether the five dimensions develop proportionately. Table 2 therefore presents the integrated level together with the structural balance coefficient, the 2022-2024 change and the resulting matrix position for each territorial unit.

Table 2
Regional level, structural balance and change

Region	Level, 2024	Balance	Change, 2022-2024	Matrix type
Almaty city	0.734	0.395	+0.145	Higher level – lower balance
Astana city	0.656	0.704	+0.119	Higher level – higher balance
Akmola region	0.461	0.662	+0.066	Higher level – lower balance
Mangystau region	0.455	0.760	+0.129	Higher level – higher balance
Atyrau region	0.366	0.000	+0.029	Higher level – lower balance
East Kazakhstan + Abay regions	0.353	0.304	+0.048	Higher level – lower balance
Shymkent city	0.313	0.528	+0.040	Higher level – lower balance
West Kazakhstan region	0.255	0.727	-0.007	Higher level – higher balance
Almaty + Zhetysu regions	0.252	0.663	+0.064	Higher level – higher balance
Pavlodar region	0.234	0.731	+0.051	Lower level – higher balance
Aktobe region	0.210	0.689	+0.024	Lower level – higher balance
Karagandy + Ulytau regions	0.210	0.576	+0.061	Lower level – lower balance
Kostanay region	0.207	0.710	+0.011	Lower level – higher balance
Zhambyl region	0.206	0.624	+0.057	Lower level – lower balance
Kyzylorda region	0.184	0.604	+0.050	Lower level – lower balance
North Kazakhstan region	0.155	0.750	+0.010	Lower level – higher balance
Turkestan region	0.147	0.669	+0.036	Lower level – higher balance

Note: calculated by the authors from official statistics. Thresholds correspond to sample medians

The joint interpretation of level and balance reveals several distinct regional configurations. Mangystau has the highest structural balance coefficient (0.760), while its integrated level is 0.455. Astana combines the second-highest integrated level (0.656) with a balance coefficient of 0.704. West Kazakhstan has a substantially lower

integrated level (0.255) but a high balance value of 0.727. These cases show that structural coherence and overall development scale are related but not identical characteristics.

Almaty represents a different configuration. It has the highest integrated level (0.734), but its balance coefficient is 0.395. The city leads in the

Economic dimension and recorded Labour Use, whereas Infrastructure is substantially below its strongest components. The result indicates a high development scale accompanied by pronounced internal differentiation among the five dimensions.

The largest internal disparity is observed in Atyrau, where the structural balance coefficient equals 0.000. The Observed Quality Structure score reaches the sample maximum, while the Labour Use score reaches the sample minimum. These values indicate the strongest internal contrast among the five normalized dimensions in the 2024 regional sample. They describe a divergence between the formal accommodation structure and the recorded ratios of services and visitors per worker and should

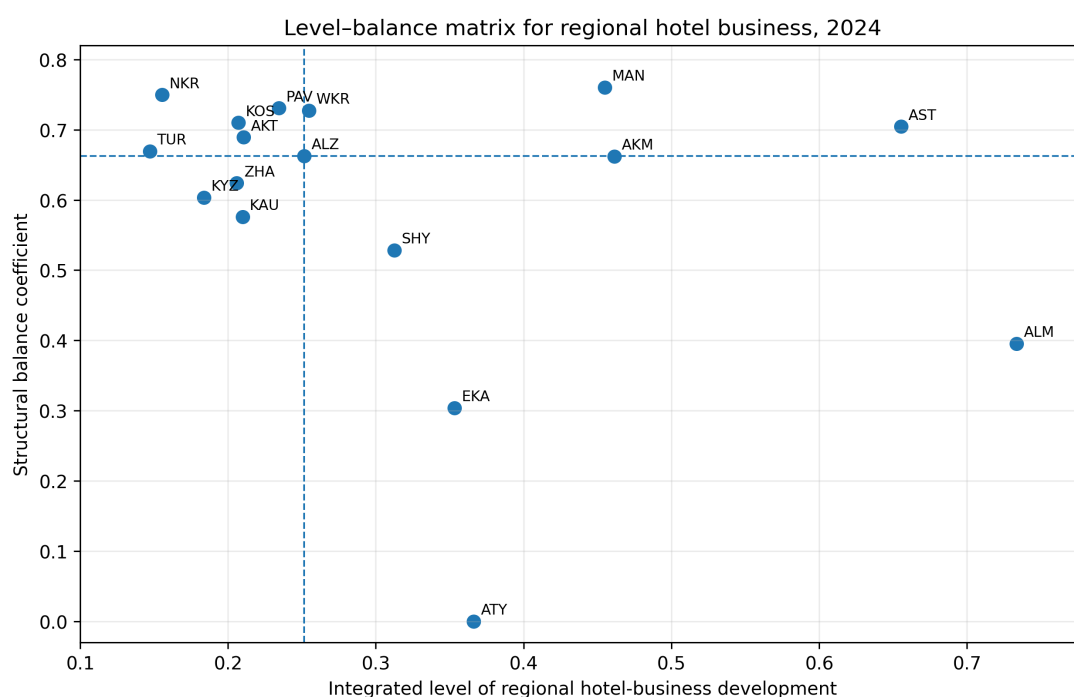
not be interpreted as measures of guest satisfaction or employee quality.

East Kazakhstan + Abay also displays a pronounced imbalance. Its Infrastructure score is 0.804, compared with 0.108 for the Economic dimension and 0.229 for the Market dimension. The resulting balance coefficient is 0.304. The profile therefore shows that relatively developed accommodation capacity is not accompanied by comparable economic and market outcomes.

Figure 1 visualizes the relationship between the integrated development level and structural balance. The sample medians divide the regional distribution into four groups: higher level – higher balance, higher level – lower balance, lower level – higher balance, and lower level – lower balance.

Figure 1

Matrix of Regional Hotel-Business Development and Structural Balance, 2024



Note: Compiled by the authors based on their calculations. Dashed lines indicate the sample medians: 0.252 for the integrated development level and 0.663 for structural balance. Region abbreviations correspond to the full regional names reported in Table 2.

The higher-level and higher-balance group comprises Astana, Mangystau, West Kazakhstan and Almaty + Zhetysu. Their common feature is that both the integrated development level and the structural balance coefficient are at or above the corresponding sample medians. The management

implication is to preserve the existing proportionality while monitoring the weakest partial dimension as further development proceeds.

The higher-level and lower-balance group includes Almaty, Akmola, Atyrau, East Kazakhstan + Abay and Shymkent. In these regions, the main

diagnostic signal is not the aggregate level itself but the distance between stronger and weaker dimensions. The weakest components differ by region: Infrastructure is relatively weak in Almaty and Shymkent; Labour Use is weak in Akmola and Atyrau; and the Economic and Market dimensions are weak relative to Infrastructure in East Kazakhstan + Abay. Accordingly, the priority is region-specific correction of the observed imbalance rather than uniform expansion across all dimensions.

Pavlodar, Aktobe, Kostanay, North Kazakhstan and Turkestan form the lower-level and higher-balance group. Their profiles are comparatively coherent, but the integrated level remains below the sample median. The primary issue is therefore the scale of hotel-business activity rather than a pronounced collapse of one component. Expansion should be assessed against the ability of the region to increase realized demand and utilization without creating a new structural imbalance.

Karagandy + Ulytau, Zhambyl and Kyzylorda belong to the lower-level and lower-balance group. These territories combine a relatively low integrated level with greater dispersion among the five dimensions. Their profiles indicate the need to identify the weakest components and sequence development priorities rather than expand all elements simultaneously.

The 2022-2024 trajectory is positive in 16 of the 17 territorial units. The largest increases are observed in Almaty (+0.145), Mangystau (+0.129) and Astana (+0.119). Akmola increases by 0.066 and Almaty + Zhetysay by 0.064. West Kazakhstan is the only territory with a small decline (-0.007). The overall trajectory is therefore positive, but spatial concentration remains substantial because several of the leading regions also record the largest increases.

The dynamic results add an important dimension to the 2024 matrix. Mangystau combines a relatively rapid increase with the highest structural balance coefficient. Almaty records the largest increase but remains structurally unbalanced. West Kazakhstan combines a high balance coefficient with a slight decline in the integrated level. These differences show that the matrix should be interpreted together with recent dynamics rather than as a fixed regional classification.

The findings are consistent with the multidimensional approach to destination competitiveness proposed by Dwyer and Kim (2003) and with evidence that the presence of infrastructure does not automatically translate into economic outcomes (But, 2024; Moreno-Izquierdo *et al.*, 2024). In contrast to a conventional ranking, the level-balance matrix distinguishes regions that may occupy similar positions on an aggregate scale but differ substantially in their internal structure. Relative to Spankulova *et al.* (2026), who examine the relationship between hospitality and regional inequality, the present analysis focuses specifically on the internal configuration of the regional hotel sector.

Several factors may help explain the observed differences. Metropolitan scale and the concentration of business, event and transport flows are consistent with the strong Economic and Market positions of Almaty and Astana. In recreation-oriented regions, seasonality can contribute to a gap between available accommodation capacity and annual utilization, as illustrated by the East Kazakhstan + Abay profile. Accessibility, infrastructure and destination-level management can also influence the conversion of regional tourism resources into visitor flows and accommodation-sector outcomes, which is consistent with Central Asian evidence reported by Sergeyeva *et al.* (2022) and Toyirova *et al.* (2026). Recorded labour-use ratios may additionally reflect differences in employment structure, outsourcing and formal statistical coverage. These factors are used to interpret the regional profiles; they are not estimated as separate causal effects in the present dataset.

The management interpretation is summarized in Table 3. The priorities are derived directly from the combination of development level, structural balance and the weakest partial dimensions. They therefore indicate the direction of regional diagnosis rather than a uniform set of policy instruments.

Structural balance is not an objective in isolation. A region may have similar values across all five dimensions and still remain at a relatively low development level. Conversely, specialization can generate a less even profile without necessarily indicating economic weakness. The balance coefficient is therefore interpreted together with the integrated level, the partial dimension scores and the recent trajectory.

Table 3
Regional types and management priorities

Type	Regions	Diagnostic priority from matrix
Higher level – higher balance	Astana; Mangystau; West Kazakhstan; Almaty-Zhetysu	Preserve structural coherence while monitoring the weakest dimension during further development
Higher level – lower balance	Almaty; Akmola; Atyrau; East Kazakhstan-Abay; Shymkent	Identify and correct the dominant internal imbalance before broad expansion
Lower level – higher balance	Pavlodar; Aktobe; Kostanay; North Kazakhstan; Turkestan	Increase the scale of realized hotel-business activity while preserving the existing balance among dimensions
Lower level – lower balance	Karagandy-Ulytau; Zhambyl; Kyzylorda	Sequence development priorities according to the weakest dimensions before expanding the overall scale

Note: compiled by the authors from the matrix typology and the five partial dimension scores

Sensitivity analysis confirms that the main regional ordering is stable under alternative methodological specifications. Under entropy weighting, Spearman's rank correlation with the equal-weight integrated index is 0.995 and the maximum rank shift is one position. PCA weighting produces a correlation of 0.988 and a maximum shift of two positions; the first principal component explains 58.1% of the variation in the five partial dimensions. Replacing min-max normalization with z-score standardization yields a correlation of 0.985,

leaves the top five regions unchanged and produces a maximum shift of three positions. The alternative standard-deviation measure of structural balance produces a rank correlation of 0.951 with the range-based balance ordering. Mangystau remains the most balanced and Atyrau the least balanced region, while 15 of 17 territorial units retain the same level-balance quadrant. Almaty + Zhetysu and Karagandy + Ulytau change the balance side of the median under the alternative measure. Table 4 summarizes these sensitivity results.

Table 4
Sensitivity and robustness checks, 2024

Robustness check	Result	Interpretation
Entropy weighting	$\rho = 0.995$; maximum rank shift = 1	Integrated-level ranking highly stable
PCA weighting	$\rho = 0.988$; maximum rank shift = 2; PC1 = 58.1%	Integrated-level ranking highly stable
Z-score normalization	$\rho = 0.985$; maximum rank shift = 3; top five unchanged	Integrated-level ranking highly stable
Standard-deviation balance	$\rho = 0.951$; maximum balance-rank shift = 4; 15 of 17 regions retained the same matrix quadrant	Core balance pattern stable; two median-threshold cases change group

Note: calculated by the authors from the same 17-region 2024 dataset. The standard-deviation check uses the same five partial dimension scores as the range-based balance coefficient; lower SD indicates greater balance.

Conclusion

The study demonstrates that regional differences in Kazakhstan's hotel business concern both the overall scale of development and the internal proportions among its main dimensions. The integrated assessment confirms the leading positions of Almaty and Astana, while the structural balance analysis reveals substantial differences in the configuration of regional hotel systems. Mangystau has the most balanced profile, combining relatively close values across the five dimensions, whereas

Atyrau shows the greatest internal disparity. East Kazakhstan-Abay represents a different type of imbalance, where a comparatively strong infrastructure base is accompanied by substantially weaker market and economic results. These findings confirm that a high level of hotel-business development does not necessarily correspond to a high degree of structural balance.

The proposed combination of the integrated development level and the structural balance coefficient provides a more informative assessment than a conventional regional ranking based on a

single composite score. It makes it possible to distinguish territories that may occupy similar positions in terms of overall development but differ considerably in the relationship between infrastructure, demand, economic outcomes, observed quality structure and recorded labour use. The robustness analysis confirms the stability of the main results. The regional ranking remains highly consistent under entropy weighting ($\rho = 0.995$), PCA weighting ($\rho = 0.988$), and z-score normalization ($\rho = 0.985$). The alternative balance assessment based on the standard deviation of all five partial scores produces a rank correlation of 0.951 with the baseline balance measure and preserves the matrix position of 15 of the 17 territorial units. Thus, the main regional patterns are not dependent on a single weighting, normalization or balance specification.

The scientific contribution of the study lies in the joint assessment of the level and structural balance of regional hotel-business development. The integrated indicator characterizes the overall position of a region, while the balance coefficient identifies the scale of internal disproportions between its strongest and weakest dimensions. Their combined use makes it possible to differentiate regional development profiles and to identify the dimensions that constrain a more coherent use of existing hotel-business potential. The results show that regional policy should therefore be differentiated: territories with strong but unbalanced profiles require correction of specific structural bottlenecks, balanced regions with a lower development level require expansion of effective demand and market activity, while regions combining a low level with structural imbalance require a more consistent development of basic sectoral conditions.

The practical significance of the results lies in the possibility of using the proposed level-balance matrix as a diagnostic instrument for regional hotel-business management. Regular updating of the partial indicators makes it possible to identify changes in regional positions, determine emerging

imbalances and concentrate management attention on the dimensions that most strongly constrain development. The positive dynamics observed in 16 of the 17 territorial units during 2022-2024 indicate general improvement in the regional hotel sector, although the persistence of substantial differences between territories confirms the need for differentiated rather than uniform development measures.

Further research can extend the proposed framework by incorporating seasonal occupancy, accommodation prices, profitability, working hours, employee skills, online reputation and guest-satisfaction indicators. The inclusion of accessibility, institutional and demographic characteristics would also allow the factors underlying regional structural differences to be examined in greater depth. Testing the balance coefficient with establishment-level data and comparing it with additional dispersion and non-compensatory measures would further strengthen the empirical validation of the proposed approach.

Conflict of Interest

The authors declare no conflict of interest.

Data Availability

The calculations use open data from the Bureau of National Statistics of Kazakhstan. The harmonized panel, dimension scores and sensitivity calculations underlying the weighting, normalization and balance checks are available from the corresponding author upon reasonable request.

Authors' Contributions

AR: Conceptualization, literature review, and writing – original draft;

ZhR: Methodology, supervision, validation, and writing – review and editing;

TA: Conceptualization, comparative analysis, and writing – review and editing;

AO: Data curation, formal analysis, and visualization. All authors read and approved the final manuscript.

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Received: 8 August 2026
Accepted: 20 September 2026

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OUTSOURCING AND THE EFFICIENCY OF PUBLIC ADMINISTRATION: THE CASE OF SOCIAL PROTECTION IN KAZAKHSTAN

The modernisation of public administration in Kazakhstan has intensified the search for organisational mechanisms capable of raising the efficiency of state functions without expanding the administrative apparatus. This article examines outsourcing as such a mechanism, using the social protection sector, the largest expenditure item of the state budget, as the empirical field. The purpose of the study is to substantiate the conditions under which the transfer of supporting and service-delivery functions to non-state providers improves the efficiency of public administration, and to develop a conceptual model of outsourcing-based enhancement of state functions. The research combines statistical trend analysis of official data for 2020–2024, a criteria-based comparative analysis of four international models (the United Kingdom, Denmark, the United States and South Korea), and an expert assessment of delivery modes. The expert survey involved twelve specialists representing central and local executive bodies, non-state providers and academia, who scored in-house and outsourced provision against six criteria on a five-point scale; the criteria weights were derived by the ranking method, the scores were aggregated into a weighted integral efficiency index, and the consistency of expert judgements was verified using Kendall's coefficient of concordance ($W = 0.61-0.67$; $p < 0.001$). The results show a steady expansion of the non-state segment in the provision of special social services and above-average growth of financing channelled through the state social order, alongside persistent weaknesses in contract management and quality monitoring. Outsourced provision outperforms in-house provision on cost efficiency and coverage but concedes on controllability, market maturity and social risk manageability, which confirms the selective rather than universal character of its advantages. The scientific novelty of the study consists in a three-level conceptual model linking the institutional environment, the organisational-economic mechanism of contracting and efficiency outcomes through a feedback loop.

Keywords: outsourcing, public administration, efficiency, social protection, state social order, quasi-market, Kazakhstan.

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Аутсорсинг және мемлекеттік басқарудың тиімділігі: Қазақстанның әлеуметтік қорғау саласының мысалында

Қазақстандағы мемлекеттік басқаруды жаңғырту әкімшілік аппаратты ұлғайтпай, мемлекеттік функциялардың тиімділігін арттыруға қабілетті ұйымдастырушылық тетіктерді іздестіруді өзектендірді. Мақалада осындай тетік ретінде аутсорсинг мемлекеттік бюджеттің ең ірі шығыс бабы болып табылатын әлеуметтік қорғау саласының мысалында қарастырылады. Зерттеудің мақсаты – қамтамасыз етуші және қызмет көрсету функцияларын мемлекеттік емес өнім берушілерге беру мемлекеттік басқару тиімділігін арттыратын жағдайларды негіздеу және мемлекеттік функцияларды аутсорсинг негізінде жетілдірудің концептуалдық моделін әзірлеу. Зерттеуде 2020–2024 жылдардағы ресми деректердің статистикалық трендік талдауы, төрт халықаралық модельдің (Ұлыбритания, Дания, АҚШ, Оңтүстік Корея) критерийлік салыстырмалы талдауы және қызмет көрсету тәсілдерін сараптамалық бағалау үйлестірілді. Сараптамалық сауалнамаға орталық және жергілікті атқарушы органдардың, мемлекеттік емес өнім берушілердің және академиялық ортаның он екі маманы қатысып, қызметтерді өз күшімен және аутсорсинг арқылы көрсету тәсілдерін алты критерий бойынша бес балдық

салмақтары ранжирлеу әдісімен анықталды, бағалар өлшенген интегралдық тиімділік индексіне жинақталды, ал сарапшылар пікірлерінің келісімділігі Кендаллдың конкордация коэффициентімен тексерілді ($W = 0,61-0,67$; $p < 0,001$). Нәтижелер арнаулы әлеуметтік қызметтерді көрсетудегі мемлекеттік емес сегменттің тұрақты кеңеюін және мемлекеттік әлеуметтік тапсырыс арқылы бөлінетін қаржыландырудың орташадан жоғары өсуін көрсетті; сонымен қатар келісім-шарттық менеджмент пен сапа мониторингіндегі осал тұстар сақталып отыр. Аутсорсинг шығын тиімділігі мен қамту бойынша өз күшімен көрсетуден басым, алайда бақылау мүмкіндігі, өнім берушілер нарығының жетілуі және әлеуметтік тәуекелдерді басқару бойынша төмен, бұл оның артықшылықтарының әмбебап емес, іріктемелі сипатын растайды. Зерттеудің ғылыми жаңалығы институционалдық ортаны, келісімшарт жасасудың ұйымдастырушылық-экономикалық тетігін және тиімділік нәтижелерін кері байланыс контуры арқылы байланыстыратын үш деңгейлі концептуалдық модельде көрініс тапты.

Түйін сөздер: аутсорсинг, мемлекеттік басқару, тиімділік, әлеуметтік қорғау, мемлекеттік әлеуметтік тапсырыс, квазинарық, Қазақстан.

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Аутсорсинг и эффективность государственного управления: на примере сферы социальной защиты Казахстана

Модернизация государственного управления в Казахстане актуализировала поиск организационных механизмов, способных повысить эффективность государственных функций без расширения административного аппарата. В статье рассматривается аутсорсинг как такой механизм на примере сферы социальной защиты – крупнейшей расходной статьи государственного бюджета. Цель исследования – обосновать условия, при которых передача обеспечивающих и сервисных функций негосударственным поставщикам повышает эффективность государственного управления, и разработать концептуальную модель совершенствования государственных функций на основе аутсорсинга. В работе сочетаются статистический трендовый анализ официальных данных за 2020–2024 годы, критерийный сравнительный анализ четырёх международных моделей (Великобритания, Дания, США, Южная Корея) и экспертная оценка способов предоставления услуг. В экспертном опросе участвовали двенадцать специалистов, представляющих центральные и местные исполнительные органы, негосударственных поставщиков и академическую среду, которые оценили собственное и аутсорсинговое предоставление услуг по шести критериям по пятибалльной шкале; веса критериев определены методом ранжирования, оценки агрегированы во взвешенный интегральный индекс эффективности, а согласованность экспертных суждений проверена с помощью коэффициента конкордации Кендалла ($W = 0,61-0,67$; $p < 0,001$). Результаты показывают устойчивое расширение негосударственного сегмента в предоставлении специальных социальных услуг и опережающий рост финансирования, распределяемого через государственный социальный заказ, при сохранении слабых мест в контрактном менеджменте и мониторинге качества. Аутсорсинг превосходит собственное исполнение по затратной эффективности и охвату, но уступает по контролируемости, зрелости рынка поставщиков и управляемости социальных рисков, что подтверждает избирательный, а не универсальный характер его преимуществ. Научная новизна исследования заключается в трёхуровневой концептуальной модели, связывающей институциональную среду, организационно-экономический механизм контрактации и результирующие эффекты эффективности через контур обратной связи.

Ключевые слова: аутсорсинг, государственное управление, эффективность, социальная защита, государственный социальный заказ, квазирынок, Казахстан.

Introduction

The administrative reforms implemented in Kazakhstan over the past decade have been guided by a common objective: to build a compact, service-oriented and results-based system of public administration. The Concept for the Development of Public Administration until 2030 explicitly requires state

bodies to concentrate on strategic and regulatory functions, while supporting and service-delivery functions are to be transferred to the competitive environment. Social protection occupies a special place in this agenda. It is simultaneously the largest expenditure item of the state budget, the sector with the most direct contact between the state and vulnerable citizens, and the field in which the gap between

growing demand for services and the limited capacity of state institutions is most visible.

Outsourcing – the contractual transfer of functions previously performed in-house to external providers – has become one of the principal instruments through which this reorientation is pursued. In the social sphere of Kazakhstan it takes three institutional forms: the state social order placed with non-governmental organisations, the purchase of special social services from non-state providers under the guaranteed volume established by legislation, and the outsourcing of employment promotion services to private employment agencies, which received a direct legal definition in the Social Code of the Republic of Kazakhstan adopted in 2023 (Social Code of the Republic of Kazakhstan, 2023). The very fact that outsourcing has been codified at the level of a sectoral code indicates that the question is no longer whether to use the mechanism, but how to use it so that it actually raises the efficiency of public administration rather than merely redistributing budget flows.

International evidence gives no automatic answer. Systematic reviews demonstrate that the economic effects of contracting out are modest on average and vary strongly across service types (Petersen *et al.*, 2018), while studies of social care markets warn of quality erosion where oversight is weak (Bach-Mortensen *et al.*, 2024). For Kazakhstan, whose provider market is young and whose contract management capacity within state bodies remains uneven, these findings imply that the design of the outsourcing mechanism matters more than the scale of its application.

The purpose of this article is to substantiate the conditions under which outsourcing enhances the efficiency of public administration functions and to develop a conceptual model of such enhancement for the social protection sector of Kazakhstan. Three research tasks follow from this purpose: first, to analyse the dynamics of the non-state segment in the delivery of social protection services in 2020–2024 on the basis of official statistics; second, to identify, through comparative analysis, the elements of international outsourcing models that are transferable to Kazakhstani conditions; third, to integrate the results into an author's conceptual model that links the institutional environment, the contracting mechanism and efficiency outcomes. The working hypothesis is that outsourcing raises the efficiency of public administration functions selectively – in respect of measurable, contractible services and in the presence of developed contract management – rather than universally.

Literature review

The theoretical foundations of public sector outsourcing were laid within three complementary research traditions. The doctrine of New Public Management legitimised the separation of the purchaser and provider roles and the introduction of market-type mechanisms into public administration (Hood, 1991). The property rights and incomplete contracts approach explained why private ownership generates stronger incentives for cost reduction but may weaken incentives for non-contractible quality: when quality cannot be fully specified in a contract, the private provider economises precisely on those dimensions that the contract does not capture (Hart *et al.*, 1997; Shleifer, 1998). Transaction cost economics, in turn, shifted attention from the make-or-buy dichotomy to the costs of governing the contractual relationship itself (Williamson, 1979). Brown and Potoski (2004) operationalised this insight for the public sector by showing that the outcomes of contracting depend on the maturity of the market for a given service and on the ability of the public purchaser to manage that market.

The empirical literature accumulated over the past two decades has substantially qualified the early optimism. The systematic review by Petersen *et al.* (2018), covering studies published between 2000 and 2014, found that average cost savings from contracting out are modest, tend to decline over time and are markedly lower for social services than for technical ones. The distinction between technical and social services proved to be one of the most robust findings of the field: for services with easily measurable outputs, competition disciplines providers, whereas for human services the informational asymmetry between purchaser and provider persists after the contract is signed (Petersen *et al.*, 2015; Andersson *et al.*, 2019). Consistent with this, Dahlström *et al.* (2018) demonstrated on European regional data that citizen satisfaction with outsourced services is higher only where the quality of the public bureaucracy that manages the contracts is itself high – outsourcing does not substitute for administrative capacity but presupposes it.

Recent research on quasi-markets in social care has sharpened the warnings. A systematic synthesis of provider and commissioner experiences concluded that competitive tendering under austerity pushes providers towards cost-cutting behaviour that undermines service quality and workforce stability (Bach-Mortensen & Barlow, 2021). An observational study of the English National Health Service

associated the growth of for-profit outsourcing with an increase in treatable mortality rates (Goodair & Reeves, 2022), and a subsequent policy analysis found little evidence that the declared objectives of a decade of health and social care outsourcing in England had been achieved (Bach-Mortensen *et al.*, 2024). At the same time, the literature records a pragmatic rather than ideological response of governments to such failures: municipalities in the United States re-internalise services when markets are thin and contract monitoring is costly, treating in-sourcing and outsourcing as reversible instruments of the same management toolkit (Warner & Aldag, 2021). Survey evidence likewise shows that citizens differentiate their preferences by service complexity, supporting private delivery of simple services and public delivery of complex human services (Pitak & Jensen, 2024). Under budgetary constraints, outsourcing is also valued as an instrument of continuity and resilience of public service delivery, provided that the purchaser retains core competences (Aragão & Fontana, 2022; Sakib *et al.*, 2023).

Research on Kazakhstan has addressed adjacent questions but has not yet produced an integrated assessment of outsourcing in social protection. An (2014) reconstructed the adoption of the Law on Special Social Services as a case of policy translation, showing that the very idea of purchasing social services from non-state providers entered Kazakhstani legislation through the interaction of the government, domestic NGOs and transnational organisations. Janenova and Kim (2016) analysed the one-stop-shop reform as an example of service delivery innovation in a transitional administrative context and highlighted the tension between ambitious service standards and implementation capacity. The most recent empirical work documents the institutionalisation of state-NGO interaction and identifies the state social order as its principal financial channel, while pointing to the persisting asymmetry of this partnership and the weakness of outcome-based evaluation (Bokayev *et al.*, 2026). Within the Kazakhstani economic literature, attention has also turned to analytical instruments for assessing the effectiveness of government programmes (Doskeyeva *et al.*, 2026), which creates a methodological bridge to the present study.

The review reveals a twofold research gap. Internationally, the evidence on outsourcing effects is rich but centred on mature quasi-markets; its implications for young provider markets of the Kazakhstani type are rarely drawn out. Domestically, the available studies describe individual mechanisms –

the state social order, special social services, administrative service delivery – but do not connect them into a single model that would specify when and how the transfer of functions raises the efficiency of public administration. Closing this gap defines the contribution of the present article.

Methodology

The research design combines three methods, each corresponding to one research task. The first is statistical trend analysis of the development of the non-state segment in social protection for 2020-2024. The information base comprises official data of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, administrative data of the Ministry of Labour and Social Protection of the Population on registered providers of special social services, and budget reporting on the state social order (Bureau of National Statistics, 2026). Six indicators were selected: budget expenditures on social assistance and social security; their share in total budget expenditures; the number of registered providers of special social services; the number of non-state providers among them; the share of special social services delivered by non-state providers; and the volume of financing allocated through the state social order. For each indicator the compound annual growth rate (CAGR) over the period was calculated, which allows the pace of marketisation to be compared with the pace of growth of the sector as a whole.

The second method is a criteria-based comparative analysis of international models of social service outsourcing. Four countries were selected on the basis of two considerations: the presence of a long-established and well-documented contracting system, and institutional diversity sufficient to span the main models described in the literature – the English commissioning-based quasi-market, the Nordic municipal model with free provider choice, the American performance-contracting model and the South Korean model of digitally integrated service delivery. The comparison was structured along three dimensions: the dominant institutional mechanism, the safeguards used against quality erosion, and the lessons transferable to Kazakhstan given the current maturity of its provider market.

The third method is an expert assessment of alternative delivery modes using a weighted integral efficiency index. Twelve experts – officials of central and local executive bodies responsible for

social protection, heads of non-state providers and academic researchers – scored in-house provision and outsourced provision of social protection services against six criteria on a five-point scale. The criteria and their weights, established by the ranking method with subsequent normalisation, were: cost efficiency (0.22), service quality (0.20), accessibility and coverage (0.18), controllability and contract management burden (0.15), maturity of the provider market (0.13) and manageability of social risks (0.12). The integral index for each delivery mode was computed as

$$E = \sum (w_i \times s_i), \quad (1)$$

where E is the integral efficiency index of a delivery mode; w_i is the weight of the i-th criterion; s_i is the mean expert score of the delivery mode against the i-th criterion. The internal consistency of expert judgements was verified using Kendall's coefficient of concordance W, computed separately for each delivery mode; its significance was tested by the χ^2 criterion ($\chi^2 = m(n-1)W$, where $m = 12$ experts, $n = 6$ criteria, $df = 5$). The dispersion of scores is reported as the standard deviation (SD); a coefficient of variation below 25% was taken as evidence of homogeneous expert opinion on a criterion. To test the robustness of the integral index to the weighting scheme, a sensitivity analysis was performed under three alternative scenarios: equal weights for all criteria; a $\pm 10\%$ shift of each weight in the direction least favourable to outsourcing, with subsequent re-

normalisation; and a governance-priority scenario in which the weights of the three governance-related and the three production-related criteria are interchanged. Finally, the method of structural-logical modelling was used to synthesise the statistical, comparative and expert results into a conceptual model. Two limitations of the design should be acknowledged: the shortness of the statistical series, which reflects the recency of the legal institutionalisation of outsourcing in the social sphere, and the inherent subjectivity of expert scoring, mitigated but not eliminated by the concordance check. Both limitations are taken into account in the interpretation of results, and the quantitative estimates presented below should be read as indicative rather than definitive.

Results and discussion

Dynamics of the outsourcing environment in Kazakhstan's social protection. The starting point of the analysis is the scale of the sector itself. Over 2020-2024 budget expenditures on social assistance and social security grew from 3.6 to 5.8 trillion tenge, i.e. at a compound annual rate of 12.7%, and their share in total budget expenditures increased from 27.4% to 29.1% (Table 1). The fiscal weight of the sector explains why even a moderate improvement in the efficiency of its administration translates into substantial absolute savings, and why social protection was chosen as the pilot field for the legal institutionalisation of outsourcing.

Table 1

Selected indicators of the social protection system and its non-state segment in Kazakhstan, 2020-2024

Indicator	2020	2021	2022	2023	2024
Budget expenditures on social assistance and social security, KZT trillion	3.6	4.1	4.6	5.2	5.8
Share of social expenditures in total budget expenditures, %	27.4	27.9	28.3	28.8	29.1
Registered providers of special social services, units	812	861	934	1015	1102
of which non-state providers (NGOs and private organisations), units	214	251	302	361	428
Share of special social services delivered by non-state providers, %	12.4	14.6	16.9	19.2	21.3
Financing allocated through the state social order, KZT billion	24.9	28.4	33.6	39.8	46.5

Note: Compiled by the authors based on data of the Bureau of National Statistics (2026) and the Ministry of Labour and Social Protection of the Population of the Republic of Kazakhstan.

Three features of the observed dynamics deserve emphasis. First, the non-state segment is growing faster than the sector as a whole: the number of non-state providers of special social services doubled over five years (CAGR of 18.9%), and the financing distributed through the state social order grew at 16.9% annually – in both cases outpacing the 12.7% growth of total social expenditures. The share of special social services delivered by non-state providers consequently rose from 12.4% to 21.3%, or by 8.9 percentage points. In other words, marketisation in Kazakhstani social protection is no longer an experiment but a stable structural shift.

Second, the composition of the non-state segment remains skewed towards non-governmental organisations financed through the state social order, while genuinely private, for-profit providers concentrate in a narrow range of standardisable services – home care, employment promotion, rehabilitation equipment. This composition mirrors the contractibility logic established in the literature: providers enter first where outputs are measurable and payment can be linked to them (Andersson *et al.*, 2019). The outsourcing of employment services to private employment agencies, directly provided for by the Social Code, follows the same logic, since

placement outcomes are verifiable (Social Code of the Republic of Kazakhstan, 2023).

Third, the expansion of financing has not been accompanied by an equivalent development of contract management. Interviews conducted during the expert survey indicate that monitoring by local executive bodies remains predominantly documentary; outcome-based evaluation and beneficiary satisfaction measurement are applied irregularly. This asymmetry – fast growth of the contracted-out segment against slow growth of the capacity to manage it – constitutes the central risk identified by the present analysis, and it is precisely the configuration against which the international literature warns (Dahlström *et al.*, 2018; Bach-Mortensen & Barlow, 2021).

International experience and its adaptation. Outsourced production has long ceased to be marginal in developed administrative systems: across OECD countries roughly a third of government expenditures is executed through the purchase of goods and services from non-state actors, which makes the quality of contracting a system-level determinant of public administration efficiency (OECD, 2023). The comparative analysis summarised in Table 2 covers four countries whose institutional trajectories bracket the design choices available to Kazakhstan.

Table 2

International models of social service outsourcing and lessons for Kazakhstan

Country	Dominant institutional mechanism	Safeguards against quality erosion	Transferable lessons for Kazakhstan
United Kingdom	Commissioning-based quasi-market; competitive tendering of health and social care	Independent inspectorates; provider rating systems; market oversight schemes	Do not scale outsourcing faster than oversight capacity; collect baseline data before transferring a function
Denmark	Municipal contracting with free choice of provider for the citizen	High bureaucratic quality of purchasers; uniform national service standards	Citizen choice disciplines providers only where standards and information for users are in place
United States	Performance contracting; competition of for-profit and non-profit providers	Payment linked to verified outcomes; reversibility (re-municipalisation) as a managed option	Treat insourcing and outsourcing as reversible tools; retain in-house capacity as a benchmark
South Korea	Digitally integrated one-stop delivery with private execution of standardised services	Centralised e-monitoring of transactions and service-level indicators	Digital monitoring compensates for limited local inspection resources; suits Kazakhstan's e-government base

Note: Compiled by the authors based on (Petersen et al., 2018; Warner & Aldag, 2021; Bach-Mortensen et al., 2024; Janenova & Kim, 2016)

Two conclusions follow from the comparison. The first concerns sequencing: in all four systems the effectiveness of outsourcing was determined not by the share of services transferred but by the order in which

the elements of the mechanism were built. Where oversight institutions preceded large-scale contracting, as in the Nordic model, quality effects were neutral to positive; where contracting outran oversight, as in

parts of the English social care market, quality erosion followed (Bach-Mortensen *et al.*, 2024). The second conclusion concerns reversibility: mature systems treat the boundary between in-house and contracted provision as adjustable, re-internalising services when markets thin out (Warner & Aldag, 2021).

Expert assessment of delivery modes. The integral efficiency index computed by formula (1) is presented in Table 3. Outsourced provision received a higher aggregate score (3.68 against 3.44 for in-house provision), but the structure of the gap is more informative than its size.

Table 3

Expert assessment of in-house and outsourced provision of social protection services (five-point scale)

Criterion	Weight, w_i	In-house provision, s_i (SD)	Outsourced provision, s_i (SD)	Difference
Cost efficiency	0.22	3.1 (0.51)	4.2 (0.58)	+1.1
Service quality	0.20	3.4 (0.52)	3.8 (0.62)	+0.4
Accessibility and coverage	0.18	3.0 (0.60)	4.1 (0.51)	+1.1
Controllability, contract management burden	0.15	3.9 (0.51)	3.2 (0.72)	−0.7
Maturity of the provider market	0.13	3.6 (0.67)	2.9 (0.67)	−0.7
Manageability of social risks	0.12	4.0 (0.43)	3.3 (0.65)	−0.7
Integral index E	1.00	3.44	3.68	+0.24
Kendall's W	–	0.61	0.67	–
χ^2 (df = 5); p	–	36.6; p < 0.001	40.2; p < 0.001	–

Note: Calculated by the authors on the basis of the expert survey ($n = 12$); SD – standard deviation of individual expert scores; W – Kendall's coefficient of concordance

The concordance of expert judgements was acceptable for both modes: $W = 0.61$ ($\chi^2 = 36.6$; $p < 0.001$) for in-house provision and $W = 0.67$ ($\chi^2 = 40.2$; $p < 0.001$) for outsourced provision, which allows the aggregated scores to be interpreted as a consensus rather than a random average. The standard deviations do not exceed 0.72 points (coefficient of variation 11–23%), i.e. opinions were homogeneous on every criterion. The largest dispersion is observed for the controllability and market maturity of outsourced provision (SD = 0.72 and 0.67), where the assessments of officials and non-state providers diverge most – a sign that the governance-related criteria are exactly the point of contention in the Kazakhstani quasi-market.

The advantage of outsourcing is generated entirely by two criteria – cost efficiency and accessibility – where non-state providers benefit from flexible staffing, lower overheads and proximity to beneficiaries. On the three governance-related criteria – controllability, market maturity and social risk manageability – in-house provision retains a consistent advantage of 0.7 points. The expert assessment thus reproduces, on Kazakhstani material, the central finding of the international literature: outsourcing is

not a uniformly superior delivery mode but a trade of production efficiency for governance complexity (Petersen *et al.*, 2018; Piatak & Jensen, 2024). It follows that the aggregate gain of 0.24 points is conditional – it materialises only if the governance disadvantages are actively compensated, and it can turn negative where they are ignored.

Robustness of the expert assessment. The sensitivity analysis (Table 4) shows that the direction of the result is stable under moderate changes in the weighting scheme but reverses when governance criteria are prioritised.

Under equal weights and under a $\pm 10\%$ adverse shift the advantage of outsourced provision narrows but remains positive, so the baseline conclusion does not depend on the precise weights assigned by the experts. However, when the three governance-related criteria receive the highest weights, in-house provision becomes preferable; the break-even point lies at a combined weight of governance criteria of approximately 0.55, against 0.40 in the baseline scheme. Together with the dispersion pattern noted above, this formalises the conditional nature of the outsourcing advantage: it holds for a purchaser that prioritises production efficiency and possesses ad-

equate contract management capacity, and is forfeited where controllability and risk management dominate the decision – precisely the configuration described in the literature on human services (Petersen *et al.*, 2018; Dahlström *et al.*, 2018).

The conceptual model. The synthesis of the statistical, comparative and expert results is presented in Figure 1 in the form of a three-level conceptual model of outsourcing-based enhancement of public administration functions in social protection.

Table 4

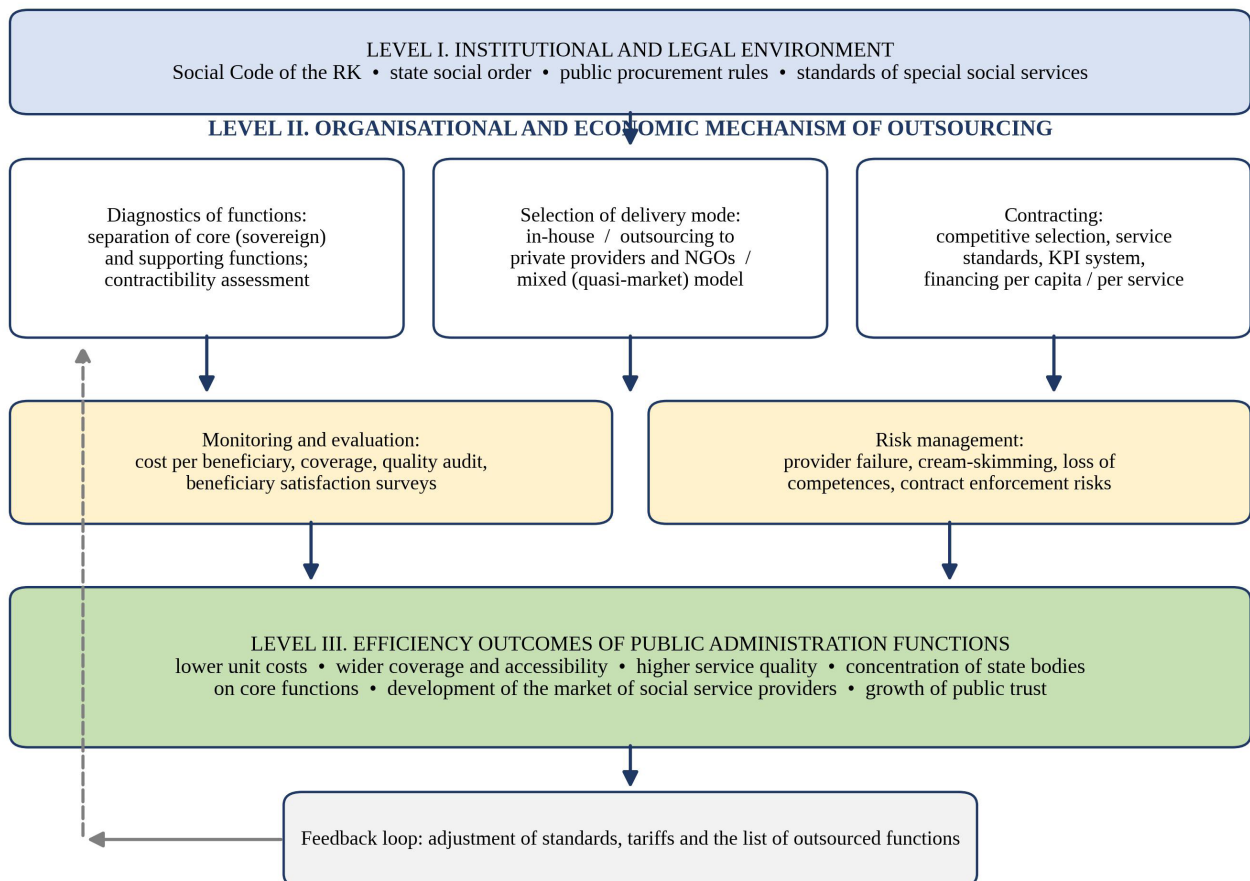
Sensitivity of the integral efficiency index to the weighting scheme

Weighting scenario	In-house, E	Outsourced, E	Difference
Baseline (expert-derived weights)	3.44	3.68	+0.24
Equal weights ($w_i = 1/6$)	3.50	3.58	+0.08
±10% shift unfavourable to outsourcing	3.47	3.63	+0.16
Governance-priority weights	3.56	3.49	−0.07

Note: Calculated by the authors on the basis of Table 3

Figure 1

Conceptual model of enhancing the efficiency of public administration functions through outsourcing in the social protection sector



Note: Developed by the authors

The model integrates three levels connected by direct and feedback links. The first level is the institutional and legal environment – the Social Code, the legislation on the state social order, public procurement rules and the standards of special social services – which defines the admissible forms of transfer and the guaranteed volume of services. The second level is the organisational and economic mechanism, consisting of three sequential blocks: diagnostics of functions, in which sovereign functions are separated from supporting ones and the contractibility of each candidate function is assessed; selection of the delivery mode among in-house, outsourced and mixed quasi-market arrangements; and contracting proper, including competitive selection of providers, service standards, a key performance indicator system and per-capita or per-service financing. The intermediate contour of monitoring and risk management transforms contract execution data – unit costs, coverage, quality audit results, beneficiary satisfaction – into management information and tracks the specific risks of contracted provision: provider failure, cream-skimming of less costly beneficiaries, loss of in-house competences and enforcement weaknesses. The third level fixes the target efficiency outcomes: lower unit costs, wider coverage, higher service quality, concentration of state bodies on core functions, development of the provider market and growth of public trust. The feedback loop returns evaluation results to the institutional level, where standards, tariffs and the very list of outsourced functions are adjusted – including, where necessary, the re-internalisation of a function.

The novelty of the model relative to existing treatments is threefold. First, it embeds the contractibility test at the entry point of the mechanism, which prevents the transfer of functions whose outcomes cannot be specified and verified – the configuration in which the literature records the largest quality losses (Hart et al., 1997; Andersson et al., 2019). Second, it makes monitoring and risk management a permanent intermediate contour rather than a terminal stage, reflecting the finding that the benefits of outsourcing are conditional on continuous purchaser capacity (Dahlström et al., 2018). Third, it treats the boundary of the outsourced segment as adjustable through the feedback loop, institutionalising reversibility in line with the pragmatic practice of mature systems (Warner & Aldag, 2021). For the practice of Kazakhstani executive bodies, the model provides a decision sequence that can be directly translated into methodological recommendations for line

ministries and akimats, and its indicator contour is compatible with the analytical instruments for programme effectiveness assessment discussed in the national literature (Doskeyeva *et al.*, 2026; Bokayev *et al.*, 2026).

Conclusion

The study set out to substantiate the conditions under which outsourcing enhances the efficiency of public administration functions and to formalise these conditions in a conceptual model for the social protection sector of Kazakhstan. Three results were obtained. First, the statistical analysis showed that the non-state segment of Kazakhstani social protection is expanding faster than the sector itself: over 2020-2024 the number of non-state providers of special social services grew at 18.9% annually and financing through the state social order at 16.9%, against 12.7% growth of total social expenditures, so that the non-state share of special social services reached 21.3%. Marketisation has thus become a structural feature of the sector, which makes the quality of its governance a first-order question of public administration efficiency.

Second, the comparative and expert analyses converged on the same conclusion: the advantages of outsourcing are real but selective. The expert assessment recorded a superiority of outsourced provision on cost efficiency and coverage and its inferiority on controllability, market maturity and social risk manageability, yielding a conditional aggregate advantage of 0.24 points of the integral index. The expert judgements were statistically consistent (Kendall's $W = 0.61-0.67$, $p < 0.001$), and the sensitivity analysis confirmed that this advantage is robust to moderate changes in criteria weights but reverses when governance criteria are prioritised. International experience demonstrates that this conditional advantage is realised where oversight precedes scale and where the boundary of the contracted segment remains reversible, and is forfeited where contracting outruns the capacity to manage it.

Third, the article proposes a three-level conceptual model that links the institutional environment, the organisational-economic mechanism of contracting and efficiency outcomes through a permanent monitoring contour and a feedback loop. The model's practical value lies in its decision sequence – contractibility diagnostics, mode selection, contracting, monitoring, adjustment – which can serve as the basis for methodological recommendations to central and local executive bodies on

the further transfer of social protection functions to the competitive environment.

The limitations of the study – the short statistical series and the indicative character of expert estimates – define the directions of further research: econometric evaluation of the effects of outsourcing on the cost and quality of specific services as longer data series accumulate, and piloting of the proposed model in selected regions with subsequent assessment of its impact on beneficiary outcomes.

Funding. This research received no external funding.

Conflict of interest. The authors declare no conflict of interest.

Ethical approval

The expert survey was conducted anonymously with the informed consent of the participants; no

personal data of beneficiaries of social services were collected or processed.

Data availability

The statistical data used in the study are available from the official resources of the Bureau of National Statistics (stat.gov.kz); the anonymised results of the expert survey are available from the corresponding author upon reasonable request.

Authors' contributions

ASY: conceptualisation, methodology, formal analysis, investigation, writing (original draft);

GRM: supervision, validation, writing (review and editing);

AAK: methodology, project administration, writing (review and editing);

BBO: data curation, visualisation, writing (review and editing).

All authors have read and agreed to the published version of the manuscript (CRediT taxonomy).

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Received: 11 August 2026

Accepted: 20 September 2026

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ИНВЕСТИЦИЯЛАРДЫ ТАРТУДАҒЫ АРНАЙЫ ЭКОНОМИКАЛЫҚ АЙМАҚТАРДЫҢ РӨЛІ: «ҚОРҒАС-ШЫҒЫС ҚАҚПАСЫ» АРНАЙЫ ЭКОНОМИКАЛЫҚ АЙМАҒЫНЫҢ ТӘЖІРИБЕСІ

Жаһандану және капитал қозғалысының күшеюі жағдайында инвестиция тарту елдердің тұрақты экономикалық дамуын қамтамасыз ететін негізгі факторлардың біріне айналууда. Осы тұрғыда арнайы экономикалық аймақтар (АЭА) инвестициялық белсенділікті ынталандырудың тиімді құралы ретінде кеңінен қолданылууда. Қазақстанда АЭА-ларды дамыту индустриялық-инновациялық саясаттың маңызды бағыты болып табылады. Алайда, АЭА-лардың нақты инвестициялық тиімділігі, әсіресе шекаралық және логистикалық әлеуеті жоғары аймақтарда, жан-жақты ғылыми талдауды қажет етеді. Осыған байланысты «Қорғас–Шығыс қақпасы» арнайы экономикалық аймағының инвестиция тартудағы рөлін зерттеу өзекті болып табылады, себебі ол Еуразиялық транзиттік дәліздердің тоғысында орналасқан және халықаралық экономикалық ынтымақтастықтың маңызды элементі саналады. Зерттеудің негізгі мақсаты – инвестицияларды тартудағы арнайы экономикалық аймақтардың рөлін айқындау және «Қорғас–Шығыс қақпасы» арнайы экономикалық аймағының даму ерекшеліктерін айқындау.

Зерттеу нәтижесінде АЭА-ның инвестициялық тартымдылығы салықтық және кедендік преференцияларды берумен ғана емес, сонымен қатар инфрақұрылымның, институционалдық ортаның сапасымен, географиялық орналасуымен және халықаралық көлік-логистикалық маршруттарға қолжетімділікпен айқындалатыны анықталды. Талдау «Қорғас–Шығыс қақпасы» АЭА-ның өңірдің көліктік-логистикалық және өндірістік қызметіне инвестициялар тартудағы маңызды рөлін көрсетті. Сонымен қатар инфрақұрылымды одан әрі дамыту, басқару тиімділігін арттыру және аймақтың инвестициялық әлеуетін кеңейту қажеттілігіне байланысты шектеулер анықталды. Осы негізде инфрақұрылымды дамытуға, инвесторларды тарту тетіктерін жетілдіруге және оның трансшекаралық логистикалық функциясын күшейтуге бағытталған «Қорғас–Шығыс қақпасы» АЭА инвестициялық тартымдылығын арттыру бағыттары ұсынылды.

Зерттеудің теориялық маңыздылығы. Институционалдық және инфрақұрылымдық факторлардың өзара байланысы тұрғысынан арнайы экономикалық аймақтардың инвестицияларын тарту тетіктерін нақтылаумен анықталады. Зерттеудің ғылыми үлесі «Қорғас–Шығыс қақпасы» АЭА мысалында көрсетілген факторлардың әсерін жүйелеу және Қазақстанның трансшекаралық АЭА жағдайларына теориялық тәсілдерді бейімдеу. Бұл нәтижелер АЭА инвестициялық тиімділігін бағалау кезінде ресми инфрақұрылымдық қамтамасыз ету көрсеткіштерін саралаудың және оны нақты пайдаланудың маңыздылығын көрсетеді.

Зерттеудің практикалық маңыздылығы. Зерттеу барысында алынған нәтижелер мен ұсыныстар Қазақстандағы арнайы экономикалық аймақтарды дамыту саясатын жетілдіруде, инвестициялық бағдарламаларды әзірлеуде, сондай-ақ өңірлік даму стратегияларын қалыптастыруда қолданылуы мүмкін.

Түйін сөздер: арнайы экономикалық аймақ, инвестиция, аймақтық даму, Қорғас–Шығыс қақпасы, инвестициялық тартымдылық.

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The role of special economic zones in attracting investments: the experience of the Khorgos–Eastern Gate Special Economic Zone

In the context of globalization and increased capital flows, attracting investments is becoming one of the main factors ensuring sustainable economic development of countries. In this context, special economic zones (SEZs) are widely used as an effective tool to stimulate investment activity. The development of the SEZ in Kazakhstan is an important area of the industrial and innovation policy of the state.

However, the real investment efficiency of SEZs, especially in regions with high border and logistics potential, requires a comprehensive scientific analysis. In this regard, studying the role of the Khorgos–Eastern Gate special economic zone in attracting investments is relevant, since it is located at the junction of the Eurasian transit corridors and is an important element of international economic cooperation. The main purpose of the study is to determine the role of special economic zones in attracting investments and to determine the specifics of the development of the Khorgos–Eastern Gate special economic zone.

As a result of the study, it was found that the investment attractiveness of the SEZ is determined not only by the provision of tax and customs preferences, but also by the quality of infrastructure, institutional environment, geographical location and access to international transport and logistics routes. The analysis showed the significant role of the Khorgos–Eastern Gate SEZ in attracting investments in the transport, logistics and production activities of the region. At the same time, the limitations associated with the need for further infrastructure development, increased management efficiency and expansion of the investment potential of the zone have been identified. On this basis, the directions of increasing the investment attractiveness of the Khorgos–Eastern Gate SEZ are proposed, focused on infrastructure development, improving investor attraction mechanisms and strengthening its cross-border logistics function.

The theoretical significance of the study. It is determined by clarifying the mechanisms for attracting investments of special economic zones in terms of the relationship between institutional and infrastructural factors. The scientific contribution of the study is the systematization of the influence of factors reflected in the example of the Khorgos–Eastern Gate SEZ and the adaptation of theoretical approaches to the conditions of the transboundary SEZs of Kazakhstan. These results emphasize the importance of differentiating the indicators of official infrastructure provision and its actual use in assessing the investment efficiency of the SEZ.

Practical significance of the research. The results and suggestions obtained during the research can be used in improving the policy of development of special economic zones in Kazakhstan, developing investment programs, as well as shaping regional development strategies.

Keywords: special economic zone, investments, regional development, Khorgos–Eastern Gate, investment attractiveness.

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Роль специальных экономических зон в привлечении инвестиций: опыт специальной экономической зоны «Хоргос–Восточные ворота»

В условиях глобализации и усиления движения капитала привлечение инвестиций становится одним из основных факторов, обеспечивающих устойчивое экономическое развитие стран. В этом контексте специальные экономические зоны (СЭЗ) широко используются как эффективный инструмент стимулирования инвестиционной активности. Развитие СЭЗ в Казахстане является важным направлением индустриально-инновационной политики государства. Однако реальная инвестиционная эффективность СЭЗ, особенно в регионах с высоким пограничным и логистическим потенциалом, требует всестороннего научного анализа. В этой связи изучение роли специальной экономической зоны «Хоргос–Восточные ворота» в привлечении инвестиций является актуальным, поскольку она расположена на стыке евразийских транзитных коридоров и является важным элементом международного экономического сотрудничества. Основная цель исследования – определение роли специальных экономических зон в привлечении инвестиций и определение особенностей развития специальной экономической зоны «Хоргос–Восточные ворота».

В результате исследования установлено, что инвестиционная привлекательность СЭЗ определяется не только предоставлением налоговых и таможенных преференций, но и качеством инфраструктуры, институциональной среды, географическим положением и доступом к международным транспортно-логистическим маршрутам. Анализ показал значительную роль СЭЗ «Хоргос–Восточные ворота» в привлечении инвестиций в транспортно-логистическую и производственную деятельность региона. Вместе с тем выявлены ограничения, связанные с необходимостью дальнейшего развития инфраструктуры, повышения эффективности управления и расширения инвестиционного потенциала зоны. На этой основе предложены направления повышения инвестиционной привлекательности СЭЗ «Хоргос–Восточные ворота», ориентированные на развитие инфраструктуры, совершенствование механизмов привлечения инвесторов и усиление её трансграничной логистической функции.

Теоретическая значимость исследования. Определяется уточнением механизмов привлечения инвестиций специальных экономических зон с точки зрения взаимосвязи институциональных и инфраструктурных факторов. Научный вклад исследования систематизация влияния

факторов, отраженных на примере СЭЗ «Хоргос–Восточные ворота» и адаптация теоретических подходов к условиям трансграничных СЭЗ Казахстана. Эти результаты подчеркивают важность дифференциации показателей официального инфраструктурного обеспечения и его фактического использования при оценке инвестиционной эффективности СЭЗ.

Практическая значимость исследования. Полученные в ходе исследования результаты и предложения могут быть использованы в совершенствовании политики развития специальных экономических зон в Казахстане, разработке инвестиционных программ, а также формировании стратегий регионального развития.

Ключевые слова: специальная экономическая зона, инвестиции, региональное развитие, Хоргос–Восточные ворота, инвестиционная привлекательность.

Кіріспе

Шетелдік инвестицияларды тарту құралдарының бірі ерекше экономикалық аймақтар (АЭА) – өз резиденттеріне белгілі бір өндірістік қызметті жүзеге асыру және қызметтер көрсету үшін инфрақұрылымға қаржылық жеңілдіктер мен артықшылықты қолжетімділік беретін, өз басқару органдары бар шектеулі (кейде шартты) аумақтар болып табылады. Бүкіл әлемде АЭА санының қарқынды өсуі мемлекеттердің инвестициялар үшін күрес жөніндегі күш-жігерінің көрінісі болды.

Мемлекеттік органдардың АЭА құруға мүдделілігі үш негізгі себепке байланысты. Біріншіден, бүкіл экономиканы және барлық салаларды бір уақытта дамыту қажеттілігі жоқ, бұл үлкен және әртекті аумағы бар елдер үшін маңызды. Екіншіден, белгілі бір құқықтық және әкімшілік режимді жабық кеңістікте орнату оңайырақ. Үшіншіден, ақпараттық қамтамасыз ету оңайырақ. Инвесторларға (ұлттық және шетелдік) бизнесті жүргізудің ерекше шарттары бар анклавтардың болуы туралы мәліметтерді жеткізу оңайырақ. Өз кезегінде инвестор ұсынылатын жеңілдіктер есебінен шығындарды азайту, инфрақұрылым мен өткізу нарықтарына қол жеткізу, әлеуетті бәсекелестерді ығыстыру мүмкіндігін тартады.

Халықаралық экономикалық ұйымдардың көптеген талдамалық материалдары, нормативтік құжаттар мен ғылыми мақалалар көрсеткен АЭА-тың алдына қойылған басты міндеттердің бірі тікелей шетелдік инвестицияларды (ТШИ) тарту болып табылады. Олар өз кезегінде қабылдаушы экономикада өндіріс пен басқару технологияларын дамытуға, алушы елде экспортты ынталандыруға және әртараптандыруға бағытталған. Көптеген дамушы елдердің тәжірибесі көрсеткендей, АЭА ТШИ ағынына оң әсер етеді. Қытайда АЭА жинақталған инвестициялардың 80%-дан астамын құрайды. Вьетнамда барлық

ТШИ-дің 60-70%-ы АЭА-да орналасқан. Малайзияда АЭА капиталының 90% шетелдіктерге тиесілі. Сонымен қатар, арнайы экономикалық аймақтардың резиденттері негізінен ұлттық шағын және орта кәсіпорындар болған мемлекеттер (мысалы, Колумбия) бар.

Арнайы экономикалық аймақтар инвестициялардың ағынын, жұмыс орындарын құруды және экспортты ұлғайтуды ынталандыруы мүмкін. Бұл ретте олар ТШИ түсімдерін ұлғайтудың қажетті шарты да, кепілі де болып табылмайды. Бұл тезис UNCTAD жариялаған сауалнамалардың нәтижелерімен расталады. Респонденттердің жартысынан азы АЭА өз еліндегі ТШИ-ны едәуір арттырғанына сенімді, ал үштен бірі арнайы аймақтарды қалыптастыру шетелден инвестициялар ағынына әсер етпеді деп санайды. Сауалнамаға қатысқандардың бір бөлігі жобалар АЭА-дан тыс жерлерде де жүзеге асырылуы мүмкін деп санайды. Инвесторлардың табысты келуіне кедергі келтіретін себептер ретінде көрші елдермен инвестициялар үшін жоғары бәсекелестік, инфрақұрылымның жеткіліксіз дамуы және жергілікті жеткізушілермен мәселелерді атауға болады.

Арнайы экономикалық аймақтардың инвестицияларды тартудағы рөлі халықаралық ғылыми әдебиеттерде кеңінен қарастырылған. UNCTAD, World Bank және OECD ұйымдарының зерттеулерінде АЭА-ның тікелей шетелдік инвестицияларды ынталандыру, экспортты ұлғайту және өңірлік дамуға ықпал ету тетіктері талданған. Аталған еңбектерде негізінен АЭА-лардың жалпы тиімділігі, институционалдық модельдері және мемлекеттік қолдау құралдарына басымдық берілген.

Қытай Халық Республикасымен кең ауқымды және өзара тиімді сауда-экономикалық ынтымақтастықты нығайту Қазақстан Республикасының сыртқы экономикалық байланыстарын дамытудың жалпы стратегиясының басты бағыттарының бірі болып табылады.

Бүгінгі күні Қытай Қазақстанның негізгі сауда-экономикалық әріптестерінің бірі болып табылады. Алайда, екі ел арасындағы сыртқы сауда айналымының оң өсу серпініне қарамастан, өзара сауда көлемі екі елдің нақты мүмкіндіктерін көрсетпейді және тұтастай алғанда, сауда саласындағы екі жақты қатынастар деңгейі мемлекеттердің қолдағы әлеуетіне сәйкес келмейді.

Қазақстанның шекара маңы аудандарын дамытудың әлеуеті инвестициялық ахуалдың ерекшеліктерімен, игерілетін нарықтың өндірістік факторларының құнымен және мемлекеттік шекараны кесіп өтумен байланысты транзакциялық шығындармен, көлік жағдайлары, шекаралық өтпелердің және кедендік бекеттердің инфрақұрылымымен айқындалады.

Бұл аспектілер өңірлердің де, сол сияқты тұтастай алғанда елдің де әлеуметтік-экономикалық дамуының құрамдас бөлігі ретінде, шекара маңы аумақтарының экономикасын көтеру мақсатында Қазақстан Республикасында шекара маңы ынтымақтастығына қарым-қатынасты өзгертудің қажеттілігін айқындайды.

Қазіргі уақытта республиканың әлеуеті халықаралық жүк ағындары жүйесінде толық көлемде әрекет етпейді, негізгі халықаралық көлік дәліздерінің мамандануы соңына дейін қалыптастырылмаған, елдің аумағы бойынша көлік жүк ағындарын толыққанды қалыптастыруды қамтамасыз етуге арналған халықаралық стандарттарға сәйкес көлік жолдарының сервистік қызметтері мен сапасының деңгейін арттыру талап етіледі.

Көлік дәліздерінің қызметі халықаралық бизнес, трансұлттық компаниялар, отандық және шетелдік инвесторлар өкілдерінің неғұрлым көп санын, ең алдымен, бизнесті жүргізудің өзінің либералдық жағдайларымен, әсіресе, елдің орта және шағын кәсіпкерлігін ойдағыдай дамыту үшін қажетті нарықтық шығындарды барынша азайтумен тартады.

Қазақстандық зерттеушілердің еңбектерінде де арнайы экономикалық аймақтардың ұлттық экономиканы әртараптандырудағы орны, салықтық және кедендік жеңілдіктердің әсері, сондай-ақ жекелеген АЭА-лардың қызмет нәтижелері зерттелген. Алайда қолданыстағы ғылыми жұмыстардың басым бөлігінде АЭА-ларды жалпылама деңгейде талдау басым болып, нақты аймақтардың инвестициялық тартымдылығына кешенді және салыстырмалы талдау жеткіліксіз жүргізілген.

Сонымен қатар «Қорғас-Шығыс қақпасы» арнайы экономикалық аймағына арналған зерттеулер саны шектеулі және көбіне сипаттамалық сипатта болып келеді. Бұл АЭА-ның трансшекаралық орналасуы, халықаралық көлік-логистикалық хаб ретіндегі жаңа функциялары және соңғы жылдардағы институционалдық өзгерістері оның қызметін жаңаша ғылыми тұрғыдан бағалауды қажет етеді. Атап айтқанда, инвестицияларды тарту тиімділігіне әсер ететін факторлар, іске асырылған жобалардың экономикалық қайтарымы және АЭА-ның өңірлік даму процестеріндегі рөлі жеткілікті деңгейде зерделенбеген.

Зерттеудің негізгі мақсаты – инвестицияларды тартудағы арнайы экономикалық аймақтардың рөлін айқындау және «Қорғас-Шығыс қақпасы» арнайы экономикалық аймағының даму ерекшеліктерін айқындау.

Зерттеу объектісі – Қазақстан Республикасындағы арнайы экономикалық аймақтар жүйесі аясындағы инвестициялық қызмет, оның ішінде «Қорғас-Шығыс қақпасы» арнайы экономикалық аймағының инвестициялар тарту бойынша қызметі.

Зерттеу пәні – «Қорғас-Шығыс қақпасы» арнайы экономикалық аймағында инвестицияларды тарту тетіктері, экономикалық ынталандыру құралдары, институционалдық ерекшеліктері және олардың аймақтың әлеуметтік-экономикалық дамуына әсері.

Әдебиеттерге шолу

Соңғы уақытта ғалымдардың АЭА-қа назары артты. Олардың жұмыс орындарын құруға, институционалдық реформаға, қайталама әсерлерге және инвестицияларға әсері кеңінен жарияланды. Алайда, АЭА саясатының фирмалардың компанияларды орналастыру туралы шешімдеріне әсерін түсінуімізде әлі де олқылықтар бар. Бұл аймақтар шынымен де қосымша инвестицияларды тарта ма, әлде жай ғана елде болатын инвестицияларды аудара ма, – бұл сұрақ негізінен жауапсыз қалады.

Дүниежүзілік банк зерттеулерінде (World Bank, 2017) АЭА-тардың тиімділігі инфрақұрылым сапасына, институционалдық ортаға және мемлекеттік басқару деңгейіне тәуелді екені атап өтіледі. Зерттеу нәтижелері көрсеткендей, табысты АЭА-тар инвестиция көлемін арттырып қана қоймай, аймақтық экономикалық дамуға мультипликативтік әсер береді.

OECD (2018) зерттеулерінде АЭА-лар инвестициялық саясаттың құрамдас бөлігі ретінде қарастырылады. Ұйым баяндамасында АЭА-тар инвестиция тартуда тиімді құрал бола алатыны, алайда олардың елдің жалпы инвестициялық климатымен үйлесімді болуы қажеттігі көрсетілген.

Asian Development Bank еңбектерінде Қытай, Вьетнам және Корея тәжірибелері талданған. Бұл елдерде АЭА-тар өндірістік кластерлер қалыптастыру арқылы шетелдік инвесторларды тартуда айтарлықтай нәтижелерге қол жеткізген. Атап айтқанда, Қытайдағы Шэньчжэнь АЭА мысалы инвестиция, экспорт және инновация арасындағы өзара байланыстың тиімді моделін көрсетеді (ADB, 2020).

АЭА инвестициялық тартымдылығын түсіндіретін зерттеулерді бірнеше негізгі бағыттарға бөлуге болады. Бірінші бағыт АЭА-дағы фискалдық және институционалдық жеңілдіктердің инвестициялық шешімдерге әсерін көздейді. Ambroziak & Hartwell (2018); Cizkowicz *et al.*, (2017) және басқа зерттеулер АЭА кәсіпкерлік қызмет үшін ерекше жағдайлар жасау арқылы инвестициялар тартуға ықпал ететіндігін көрсетеді. Бұл жұмыстарда салықтық жеңілдіктер, әкімшілік рәсімдерді жеңілдету және реттеуші артықшылықтар АЭА-ны ынталандырудың негізгі құралдары ретінде қарастырылады.

Сонымен қатар әдебиеттерде инвестицияларды тартудағы фискалдық жеңілдіктердің рөлі туралы нақты пікір жоқ. Farole (2011) және FIAS (2009) зерттеулері АЭА тиімділігі салықтық преференциялармен шектелмейтінін, инфрақұрылым, институционалдық орта және бизнесті жүргізу шарттары да маңызды екенін көрсетеді. Бұл ұстаным АЭА-ны салықтық жеңілдіктер ұсынатын аумақ емес, инвестициялық қызмет үшін кешенді институционалдық және инфрақұрылымдық орта ретінде қарастыру қажеттілігін көрсетеді.

Екінші бағыт АЭА-ның географиялық орналасуы мен инфрақұрылымдық қамтамасыз етілуінің маңыздылығын атап көрсетеді. UNCTAD (2019), UNCTAD (2023) және Farole (2011) жұмыстарында АЭА-ның көлік желілеріне, нарықтарға және негізгі логистикалық бағыттарға жақындығы инвестициялық тартымдылықты қалыптастыратын маңызды факторлардың бірі ретінде қарастырылады. Бұл тәсіл фискалдық ынталандыруға басымдық беретін зерттеулерді толықтырады, өйткені инвестор үшін өндірістік және логистикалық шығындарды, сондай-ақ са-

лықтық жеңілдіктерді төмендететін жағдайлар да маңызды.

Бұл бағыттағы қорытындыларды Frick *et al.*, (2019) зерттеулерінде нақтыланған. Дамушы елдердегі АЭА-ны салыстыра отырып, авторлар нарыққа қол жеткізу, саяси тұрақтылық және еңбек шығындары сияқты жалпы экономикалық факторлардың инвесторлардың шешімдерінде маңызды екенін көрсетеді. Бұдан басқа, инвестицияларды тарту АЭА шеңберінде сапалы индустриялық инфрақұрылымға, стратегиялық орналасуға және қызмет көрсету деңгейіне ықпал ететін болады. Фискалдық ынталандырудың әсері салыстырмалы түрде шектеулі екендігі көрсетілген.

Бұл тұжырым салық жеңілдіктері негізгі фактор ретінде қарастырылатын зерттеулерден өзгеше. Мысалы, Jasiniak & Koziński (2017) Польшадағы АЭА жүргізген зерттеулерінде салықтық жеңілдіктер инвесторлардың орналасу шешімдеріне әсер ететін маңызды құрал екенін көрсетеді. Демек, әдебиеттерде фискалдық ынталандырудың рөліне қатысты белгілі бір айырмашылық бар: бір зерттеу оларды инвестицияларды тартудың маңызды факторы ретінде бағаласа, басқа зерттеулер олардың әсері инфрақұрылыммен, нарыққа қол жетімділікпен және институционалдық жағдайлармен салыстырғанда шектеулі екенін көрсетеді.

Үшінші бағыт институционалдық орта мен басқару сапасының маңыздылығын көрсетеді. Hartwell (2018), сондай-ақ институционалдық тәсілді қолданатын зерттеулер АЭА нәтижелілігін тек экономикалық ынталандырулармен ғана емес, сонымен қатар институттар, басқару құрылымы және экономикалық субъектілер арасындағы өзара іс-қимылмен байланыстырады. Бұл тәсіл АЭА қызметінің нәтижесі берілетін жеңілдіктердің көлеміне ғана емес, оларды тиімді іске асыруға және институционалдық ортаның сапасына да байланысты екенін көрсетеді. Институционалдық тәсіл АЭА құрылымын және экономикалық агенттердің өзара іс-қимылын жекелеген факторларға қарағанда жан-жақты қарастыруды ұсынады.

Ресейлік зерттеулерде АЭА-ның инвестициялық және аймақтық даму құралы ретіндегі рөліне әртүрлі көзқарастар қалыптасты. Матякубов У.Р. және Кипкеева А. арнайы экономикалық аймақтарға шетелдік инвестицияларды тартудың тиімділігін зерттеді. Авторлар салықтар мен кедендік төлемдерден толық немесе ішінара босату ел кірістерін қалыптастырудың тиімді

ынталандырушысы болып табылмайтындығын анықтады, сондай-ақ салықтық жеңілдіктер деңгейін салынған инвестициялар көлеміне байланыстыруды да даулы деп санайды. Инвестициялардың үлкен көлемі әрдайым инвестициялық қызметте тиімді бола бермейді (Матякубов & Кипкеева, 2024). Майоров И.М. және Щеглов М.В. арнайы экономикалық аймақтарды құрудағы Қытай Халық Республикасының тәжірибесін зерттей отырып, қолданыстағы қызмет тетіктерін қолдану мен біріктірудің, сондай-ақ Қытайдың тәжірибесін пайдаланудың дайын қытайлық моделін қолдану экономикада реформаларды тиімдірек жүргізуге, еркін экономикалық аймақтардың жұмыс істеуінің нақты схемаларын жасауға, шетелдік инвесторлардың капиталын тартуға қолайлы жағдайлар жасауға мүмкіндік беретінін дәлелдейді (Майоров & Щеглов, 2018). Сиваш О.С. арнайы экономикалық аймақтарды құрудың артықшылықтарын және арнайы экономикалық аймақтардың аймақтағы инвестициялық процестің тұрақты дамуына әсерін қарастырады. Өз кезегінде, арнайы экономикалық аймақтардың аумақтарындағы инвестициялық және экономикалық қызметті жандандыру аймақ ішінде де, әртүрлі субъектілері арасында да технологиялық және кооперациялық байланыстарды қалыптастыруға мүмкіндік береді, бұл күшті синергетикалық әсер тудырады және салааралық байланыстарды күшейтеді (Сиваш, 2018). Квашнина И.А. әлемдік экономикадағы өзгерістер, оның ішінде COVID-19 пандемиясының әсерінен АЭА дамытудың мәселелері мен перспективалары қарастырады. Шетелдік инвесторлар жекелеген жобаларда маңызды рөл атқарса да, арнайы экономикалық аймақтар аумақтарында еңбек өнімділігі мен кірістің өсуіне ықпал етсе де, олардың ТШИ тартуға қосқан жалпы үлесі өте қарапайым болып қала береді. Әлемдік экономикадағы АЭА инвестициялар ағынының және оларды пайдалану тиімділігін арттырудың маңызды, бірақ қосымша механизмі ретінде қарастырылуы керек деген қорытындыға келді (Квашнина, 2021).

Қазақстанда АЭА-лардың дамуы индустриялық-инновациялық саясатпен тікелей байланысты. ҚР «Арнайы экономикалық және индустриялық аймақтар туралы» Заңында АЭА-лардың негізгі мақсаты ретінде инвестициялар тарту, экспортқа бағдарланған өндірістерді дамыту және жаңа жұмыс орындарын құру айқындалған.

Арнайы экономикалық аймақтардың дамуын, оларға инвестициялық тартымдылықты

зерттеген отандық экономист-зерттеушілер бар. Кенжетеева А. С. зерттеуде Қазақстанның арнайы экономикалық аймақтарының тиімділігін институционалдық тұрғыдан қарастырады (Kenzhetayeva, (2025)). Қытай моделімен салыстырмалы талдау негізінде автор АЭА басқарушылық дербестігін күшейту, инфрақұрылымдық қамтамасыз етуді жетілдіру, кластерлік тәсілді дамыту және мемлекеттік реттеудің ашықтығын арттыру қажеттілігі туралы қорытындыға келеді. Ахметов, (2022) Қазақстанның арнайы экономикалық және индустриялық аймақтарындағы шетелдік инвестицияларды қаржылық-құқықтық реттеуді зерттейді. Ахметов АЭА-ның шетелдік инвесторлар үшін тартымдылығы салықтық преференциялардың болуымен ғана емес, сонымен қатар құқықтық және әкімшілік реттеудің сапасымен де айқындалатынын көрсетеді. Saulius & Konysbek, (2024) мемлекеттік реттеуге, әкімшілік кедергілерге, инфрақұрылымға және инвестициялық тартымдылыққа назар аудара отырып, Қазақстан, Қырғызстан және Ресейдің салыстырмалы материалында АЭА басқаруын зерттеді. Зерттеу нәтижесінде Ресейде, Қазақстанда және Қырғызстанда АЭА құру тәсілдері мен мақсаттарындағы айырмашылықтарға қарамастан, мемлекеттік реттеу осы аймақтардың тиімділігі мен дамуына тікелей әсер етеді деген қорытындыға келді. Mirzaliyeva, (2019) Қазақстанның арнайы экономикалық аймақтарын әлемдік экономикадағы олардың дамуының жаңа тенденциялары тұрғысынан қарастырады. Қайталама деректерді, заңнаманы және халықаралық тәжірибені талдау негізінде автор АЭА тиімділігі инвестициялық преференциялар жүйесімен ғана емес, сонымен қатар басқару сапасымен, инфрақұрылымдық қамтамасыз етумен, экспорттық бағдарланумен және аймақтардың жаһандық экономиканың өзгерістеріне бейімделу қабілетімен де анықталатынын көрсетеді.

Жалпы алғанда, ғылыми әдебиеттер арнайы экономикалық аймақтардың инвестиция тартуда маңызды рөл атқаратынын дәлелдейді. Халықаралық тәжірибе АЭА-лардың тиімділігі институционалдық ортаға, инфрақұрылым сапасына және басқару жүйесіне тәуелді екенін көрсетсе, Қазақстан тәжірибесі бұл құралдың әлеуеті жоғары болғанымен, оны іске асыруда бірқатар мәселелер бар екенін айқындайды. «Қорғас-Шығыс қақпасы» арнайы экономикалық аймағы инвестиция тартудың нақты мысалы ретінде зерттеу үшін өзекті болып табылады және оның

тәжірибесі Қазақстандағы АЭА-лардың тиімділігін бағалауға мүмкіндік береді.

Осылайша, әдебиеттерді салыстырмалы талдау АЭА-ның инвестициялық тартымдылығын бір фактормен түсіндіру жеткіліксіз екенін көрсетеді. Бір зерттеу тобы фискалдық және әкімшілік жеңілдіктердің маңыздылығын атап көрсетсе, екінші топ инфрақұрылым мен стратегиялық орналасуға басымдық береді, ал үшінші топ институционалдық ортаның сапасына басымдық береді.

Әдіснама

Зерттеу барысында инвестицияларды тартудағы арнайы экономикалық аймақтардың рөлін бағалау үшін кешенді ғылыми әдістер жиынтығы қолданылды. Әдіснамалық негіз ретінде өңірлік экономика, инвестициялық даму және институционалдық теориялардың қағидалары алынды.

Зерттеудің негізгі әдістеріне мыналар жатады: жүйелік, салыстырмалы, статистикалық, экономикалық-логикалық, құжаттық талдау.

Жүйелік талдау әдісі АЭА-ны инвестициялық, өндірістік, экспорттық және инфрақұрылымдық элементтердің өзара байланысын қамтитын бірыңғай экономикалық жүйе ретінде қарастыру үшін қолданылды. Салыстырмалы талдау Қазақстандағы АЭА-лардың негізгі көрсеткіштерін, оның ішінде инвестициялар көлемін, қатысушылар санын, өндіріс көлемін және экспорт көрсеткіштерін салыстыруға мүмкіндік берді. Статистикалық талдау көрсеткіштердің уақыт бойынша динамикасын, құрылымын және өзгеру қарқынын бағалау үшін пайдаланылды. Экономикалық-логикалық талдау алынған нәтижелерді түсіндіру және АЭА-лардың инвестициялық тартымдылығына әсер ететін негізгі факторларды анықтау мақсатында қолданылды. Құжаттық талдау АЭА қызметін реттейтін нормативтік-құқықтық актілерді, мемлекеттік бағдарламаларды, ресми есептерді және халықаралық ұйымдардың аналитикалық материалдарын зерделеуді қамтыды.

Зерттеудің ақпараттық базасын Қазақстан Республикасының Ұлттық статистика бюросының деректері, Индустрия және инфрақұрылымдық даму министрлігінің ресми материалдары, «Қорғас-Шығыс қақпасы» АЭА басқарушы компаниясының есептері, сондай-ақ халықаралық ұйымдардың (UNCTAD, World Bank, OECD, АДБ) аналитикалық баяндамалары құрайды.

Зерттеудің эмпирикалық бөлігінде АЭА-лардың инвестициялық тиімділігін бағалау үшін инвестициялар көлемі, қатысушылар саны, өндіріс көлемі, экспорт және басқа да негізгі әлеуметтік-экономикалық көрсеткіштердің динамикасы мен құрылымы талданды. Негізгі назар «Қорғас-Шығыс қақпасы» АЭА-ның инвестициялық көрсеткіштерін бағалауға және оның инвестициялық тартымдылығын айқындайтын факторларды анықтауға аударылды.

Зерттеу шеңберінде алынған деректер негізінде «Қорғас» АЭА-ның инвестициялық тиімділігі бағаланып, оның инвестициялық тартымдылығын арттыруға бағытталған ұсыныстар әзірленді.

Нәтижелер мен талқылау

АЭА тиімділігін анықтайтын факторларға қатысты зерттеулер мен «ең жақсы тәжірибе бойынша ұсыныстар» аймақтардың тиімділігіне әсер ететін көптеген факторларды анықтады. Frick *et al.*, (2019) аймақтардың сәттілігін анықтайтын факторларды жалпы үш санатқа бөлуге болады: АЭА саясатының сипаттамалары, аймақ сипаттамалары және контекстік факторлар. Төменде біз олардың әрқайсысының дәлелдерін қарастырамыз.

Басты назар АЭА саясатының ерекшеліктеріне аударылады. Корпоративтік салықтан босату, бажсыз импорт және экспорт немесе қосылған құн салығынан босату (ҚҚС) сияқты салықтық жеңілдіктер дәстүрлі түрде кез келген АЭА саясатының негізін құрайды және көбінесе АЭА табысының кілті болып саналады. Алайда, бұл болжамның пайдасына қарама-қайшы деректер бар. Farole (2011) салық жеңілдіктері мен АЭА тиімділігі арасында ешқандай корреляция жоқ деп есептейді, ал Frick *et al.*, (2019) салық жеңілдіктері тек табысы жоғары дамушы елдерде АЭА тиімділігімен байланысты екенін көрсетеді. Салықтық жеңілдіктер фискалдық емес жеңілдіктермен толықтырылады, оның ішінде «бір терезе» және жергілікті жерде кеден бекеттері арқылы әкімшілік рәсімдерді жеңілдету. Көбінесе АЭА-да жұмыс істейтін компаниялар жеңілдетілген әкімшілік рәсімдерден де пайда көреді. Негізгі идея – шығындарды азайту мақсатында инвесторлар үшін тартымды бизнес-орта құру. Зерттеулер инвестициялар үшін қолайлы нормативтік-құқықтық базаның оң рөлін мойындағанымен (Blonigen, 2005), аймақтық деңгейдегі фискалдық емес ынталандырулар инвестиция-

ларды тартуға қаншалықты ықпал ететіні белгісіз болып қалады.

Факторлардың екінші жиынтығы аймақтың сипаттамаларын қамтиды. Оларға стратегиялық орналасу, оператор түрі, инфрақұрылым және аймақта көрсетілетін қызметтер кіреді. Ірі портқа немесе қалаға жақындық сияқты стратегиялық орындар аймақтың жетістігі үшін маңызды болып саналады (Aggarwal, 2005; ADB, 2015; FIAS, 2009; Madani, 1999). Сол сияқты, сенімді электрмен жабдықтау, сумен жабдықтау және қайта өңдеу инфрақұрылымын қамтамасыз ету аймақ тиімділігінің негізгі факторы болып саналады (Madani, 1999; Rolfe *et al.*, 2004).

Орналастырылған аймақ оның өміршеңдігінің кілті болып табылатын елдермен және/немесе аймақтармен байланысты контекстік факторлар. Оларға арзан жұмыс күшінің жеткіліктілігі және нарықтарға артықшылықты қол жетімділік жатады (Farole, 2011; Madani, 1999; Rolfe *et al.*, 2004). Frick *et al.*, (2019) ірі нарықтарға жақындық АЭА-ға инвестицияларды ынталандырады деп хабарлайды. Жалпы іскерлік орта мен институционалдық құрылым да тікелей шетелдік инвестицияларды тарту үшін маңызды болып саналады (Blonigen, 2005; Kang & Jiang, 2012). Адами капиталмен қамтамасыз ету, күштердің үлкен резервінің болуы немесе инфрақұрылымның сапасы сияқты басқа факторлар да фирманы аймақтарға тартуға ықпал етеді (ADB, 2015; Nel & Rogerson, 2013).

Инвестициялау туралы шешім қабылдаған кезде фирмалар әдетте екі сатылы процесті орындайды (Hutzschenreuter *et al.*, 2020): біріншіден, олар белгілі бір елді таңдайды; екіншіден, олар сол елде қайда инвестиция салуға назар аударады. Жекелеген елдер бойынша зерттеулер (Ambroziak & Hartwell, 2018; Wang, 2013) елдің таңдауына жарық түсіре алмайды. Көптеген елдер инвестицияларды тарту құралы ретінде арнайы экономикалық аймақтарды құру саясатын қолданатындықтан, бұл біздің біліміміздегі маңызды алшақтық.

Әдебиетте көрсетілген АЭА тиімділігіне әсер ететін факторлардың үш түрі – АЭА саясатының ерекшеліктері, АЭА сипаттамалары және контекстік факторлар – инвестициялық шешім қабылдаудың әртүрлі кезеңдеріне әсер етеді. Ел мен аймақтық контекст процестің екі кезеңіндегі инвестицияларға әсер етеді. Елдің нарықтарға қол жетімділігі, сондай-ақ оның жұмыс күші мен бизнес жағдайлары орналасқан жерді таңдауға әсер етеді. Белгілі бір АЭА-ны қоршап тұрған аймақтың контекстік факторлары ел ішінде орналастыру туралы шешімге әсер етеді. Салықтық және фискалдық емес ынталандыру сияқты ел ішіндегі барлық АЭА-ға ортақ ұлттық АЭА саясатының ерекшеліктері Елді таңдау кезінде инвестициялық шешімдерге әсер етеді. Жеке АЭА сипаттамалары осы елдегі АЭА таңдауына әсер етеді. 1-суретте теориялық негіз көрсетілген.

1-сурет

Инвестициялық шешімдер қабылдау процесі



Ескерту: (Frick & Rodríguez-Pose, 2023) дереккөзі негізінде автормен құрастырылған

Соңғы мәліметтер бойынша, 2023 жылы арнайы экономикалық аймақтарға ТШИ ағындары тарихи рекордты көрсетіп, әлемдегі ТШИ-ді тартатын барлық жобалардың 5% – на жетті. Салыстыру үшін, 2022 жылы олардың үлесі 3,7%, 2021 жылы-3,33%, ал 2017-2020 жылдары ол 2,6% -2,8% аралығында өзгерді.

Дүниежүзілік еркін экономикалық аймақтар ұйымының (WFZO) мәліметтері бойынша бүкіл әлемде 7000-ға жуық АЭА бар.

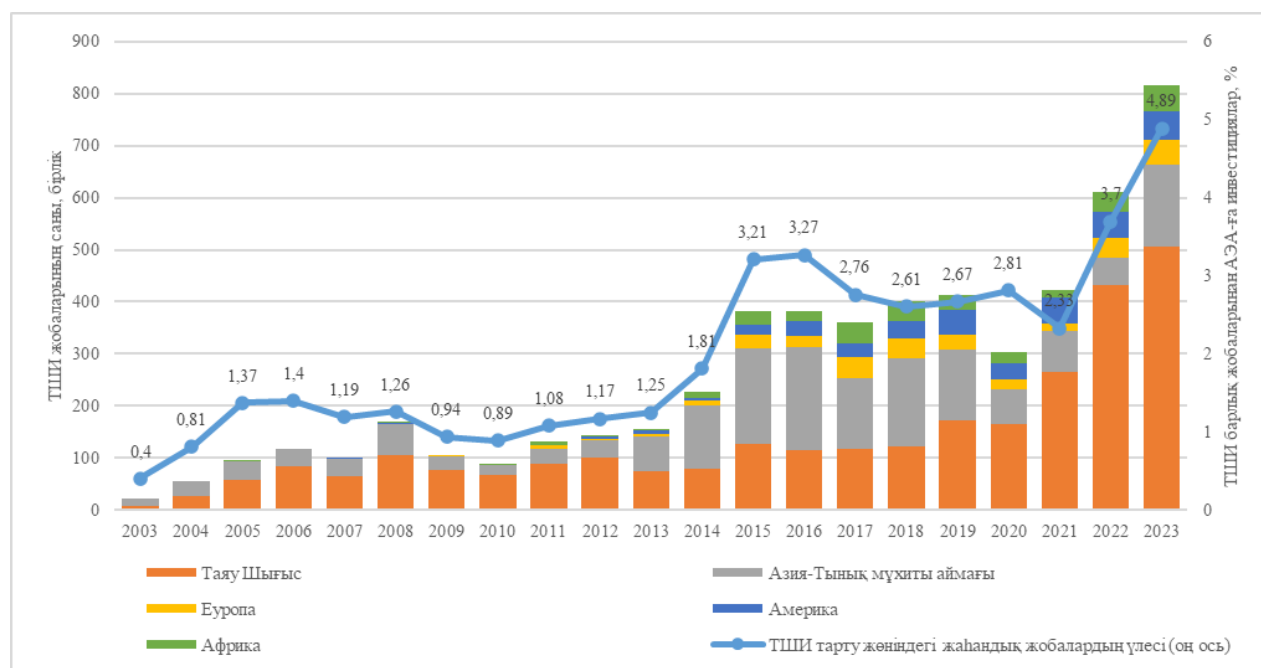
Таяу Шығыс және Азия елдері АЭА-ға инвестициялар тарту бойынша көшбасшы болды (2-сурет). Таяу Шығыс мемлекеттері соңғы жылдары барынша серпінді өсуді көрсетіп отыр,

бұл таңқаларлық емес, өйткені онда БАӘ, Катар, Кувейт және басқалар сияқты елдер орналасқан. БАӘ арнайы/еркін аймақтарды дамытудың тамаша үлгісі болып саналады. Он жылдан астам уақыт бойы бұл елдің арнайы аймақтары сарапшылар рейтингінде бірінші орынға ие болды. Тоғыз жыл қатарынан 2023 жылға дейін Dubai Multi Commodities Centre (DMCC) бірінші орынды иеленді (FDI Intelligence, 2024).

Жалпы, АЭА көмегімен инвесторларды тартатын және экономиканы дамытатын басқа елдерді атап өтуге болады. Олардың қатарына, мысалы, Сингапур және ҚР-мен көршілес Қытай кіреді.

2-сурет

Арнайы экономикалық аймақтарға жаһандық тікелей шетелдік инвестициялардың ағыны, аймақтар бөлінісінде



Ескерту: (FDI Intelligence, 2024) дереккөзі негізінде авторлармен құрастырылған

2025 жыл Қазақстанның инвестициялық тартымдылығы үшін бетбұрыс болды. Ел Орталық Азияның негізгі экономикалық хабының мәртебесін сақтап қана қоймай, ірі инфрақұрылымдық және өнеркәсіптік жобалар есебінен өз позициясын нығайтты. Билік инвесторларды қолдаудың кешенді шараларына: арнайы экономикалық аймақтардағы салықтық жеңілдіктерден бастап экономиканың тұрақты даму кепілдіктеріне дейін бәс тігуде. Нәтижесі айқын: Қазақстанға Еуропадан, Қытайдан және АҚШ-тан жаңа

ойыншылар келді, ал жұмыс істеп тұрған компаниялар өндірісті кеңейтуде.

ESCAP (БҰҰ Азия және Тынық мұхиты үшін экономикалық және әлеуметтік комиссиясы) мәліметтері бойынша, 2024 жылы Қазақстан жаңа жобаларға 15,7 млрд АҚШ долларын тартып, Солтүстік және Орталық Азия елдері арасында инвестициялар көлемі бойынша көшбасшы болды. Бұл 2023 жылмен салыстырғанда 88%-ға көп.

Инвестициялық жобаларды жеделдету мақсатында Қазақстанда енгізілген «жасыл дәліз»

тетігі әкімшілік кедергілерді азайтуға және стратегиялық инвесторларға рұқсат беру және мемлекеттік қызметтерді алу рәсімдерін жеңілдетуге бағытталған. Тетіктің негізгі экономикалық маңызы инвесторлардың транзакциялық және уақыттық шығындарын азайту арқылы инвестициялық жобаларды іске асырудың тартымдылығын арттырумен байланысты. Қазіргі уақытта тетік шеңберінде ірі инвестициялық жобаларды іске асыру Қазақстанның инвестициялық ахуалын жақсартуға және капитал тарту процесін жеделдетуге ықпал етеді.

Бұл үрдіс арнайы экономикалық аймақтардың даму көрсеткіштерінде де байқалады. АЭА қызметінің барлық кезеңінде өңдеу өнеркәсібіне 3,7 трлн теңгеден астам инвестиция тартылды, оның ішінде соңғы бес жылда 2,4 трлн теңге іске асырылды. Мемлекет тарапынан АЭА инфрақұрылымына 427,5 млрд теңге бағыттау жеке инвестицияларды тарту үшін базалық инфрақұрылымдық жағдайларды қалыптастыруға мүмкіндік берді. Осылайша, мемлекеттік инвестициялар жеке капиталға қажетті көлік, инженерлік және өндірістік инфрақұрылымды қалыптастыратын катализатор рөлін атқарады.

Түркістандағы Тұран АЭА (2018-2043) өнеркәсіптік, әкімшілік, тарихи және әуежай кіші аймақтарынан тұрады. Наурыз айында ашылған «Орталық Азия халықаралық өнеркәсіптік ынтымақтастық орталығы» кіші аймағында поливинилхлорид өндіру, тамшылатып суару және

ауыл шаруашылығы өнімдерін қайта өңдеу жүйелері саласындағы жобалар іске асырылатын болады. Инвестиция көлемі 185,1 млрд теңгені (358,5 млн АҚШ доллары) құрайды, 1150 жұмыс орнын құру күтілуде. Өзбекстанмен тауар айналымы бес жыл ішінде 10 миллиард долларға жетуі мүмкін болғандықтан, 2026 жылы толық іске қосылады деп күтілуде.

Қызылжар АЭА (2019-2044) Петропавлда Арнайы мемлекеттік даму қорынан 9,6 млрд теңге (18,6 млн АҚШ доллары) алды. 317,1 млрд теңге (614,2 млн АҚШ доллары) көлемінде мәлімделген инвестициялары бар 20-дан астам компания тіркелген, олар 4000-ға жуық жұмыс орнын ашады деп күтілуде. Қазіргі уақытта бес жоба іске асырылуда, онда 700-ге жуық адам жұмыспен қамтылған.

Тамақ өнеркәсібі, машина жасау және ауыл шаруашылығы саласында жалпы сомасы 279 млрд теңгеге (540,4 млн АҚШ доллары) тағы он алты жоба жоспарланған. Сумен жабдықтау, кәріз, жылыту, жолдар, темір жолдар, коммуникациялар және абаттандыру жүйелерінің құрылысы жалғасуда.

Орта есеппен аумақтардың инфрақұрылыммен қамтамасыз етілуі барлық АЭА бойынша шамамен 70% -ды құрайды.

Әлемдік тәжірибе көрсетіп отырғандай, АЭА жұмысының тиімділігі инфрақұрылымның да-йындығы дәрежесіне және оны салуға жұмсалатын шығындарды барынша азайтуға тікелей байланысты.

1-кесте

Арнайы экономикалық аймақтар (АЭА) бойынша салықтық түсімдер көлемі

№	АЭА атауы	Салықтық түсімдер көлемі, млрд теңге	Инфрақұрылымға бөлінген қаражат көлемі, млрд теңге	1 бюджеттік теңгеге қайтарылған салықтар	
				теңге	%
1	Астана – жаңа қала	293,57	24,8	11,84	1183,75
2	Ақтау теңіз порты	65,22	7,8	8,36	836,17
3	Инновациялық технологиялар паркі	66,18	27,0	2,45	245,10
4	Оңтүстік	14,58	8,12	1,80	179,58
5	Ұлттық индустриялық мұнай-химия технопаркі	61,28	171,6	0,36	35,71
6	Сарыарқа	22,95	25,174	0,91	91,15
7	Павлодар	30,74	14,1	2,18	218,03
8	Қорғас – Шығыс қақпасы	10,26	38,3	0,27	26,80
9	Jibek Joly	5,10	26,8	0,19	19,02
10	«Қорғас» халықаралық шекара маңы ынтымақтастығы орталығы	0,08	65,8	0,00	0,12

Кестенің жалғасы

№	АЭА атауы	Салықтық түсімдер көлемі, млрд теңге	Инфрақұрылымға бөлінген қаражат көлемі, млрд теңге	1 бюджеттік теңгеге қайтарылған салықтар	
				теңге	%
11	Астана-Технополис	2,86	0	–	–
12	Turan	3,18	5,3	0,60	60,04
13	QYZYLJAR	1,06	8,5	0,12	12,43
14	Alatau	0,25	0	–	–
Барлығы		577,3	423,3	1,36	136,38

Ескерту: (Qazindustry, 2025) дереккөзі негізінде авторлармен құрастырылған

1-кестенің деректері АЭА-ға бағытталған бюджет қаражатының салықтық қайтарымы өңірлер бойынша айтарлықтай ерекшеленетінін көрсетеді. Жалпы, 1 бюджеттік теңгеге салық түсімдерінің 1,36 теңгесі сәйкес келеді. Ең үлкен қайтарым «Астана-жаңа қала» АЭА (11,84 теңге) және «Ақтау теңіз порты» (8,36 теңге) байқалса, ал «Қорғас-Шығыс қақпасы» (0,27 теңге) және ҰИМТ (0,36 теңге) бойынша көрсеткіштер едәуір төмен.

Бұл айырмашылық инфрақұрылымға жұмсалған қаражат көлемінің өзі жоғары фискалдық нәтиже бермейтінін көрсетеді. Төмен табыс инвестициялық жобаларды іске қосу қарқынының жеткіліксіздігіне, резиденттердің экономикалық белсенділігіне және инфрақұрылымға нақты жүктемеге байланысты болуы мүмкін. Сондықтан АЭА тиімділігін бағалау кезінде бюджеттік

шығындармен қатар инвестициялық жобаларды іске асыруды және инфрақұрылымды нақты пайдалануды ескеру қажет.

АЭА-ға тартылған инвестициялардың жалпы көлемі олардың құрылған жылдарынан бастап 2024 жылға дейінгі кезеңде 3,6 трлн теңгені құрады. Бұл көрсеткіш 2020–2024 жылдардағы инвестициялар көлемінің қосындысы емес, әрбір АЭА-ның бүкіл қызмет ету кезеңін қамтитын жинақталған көрсеткіш болып табылады. Тартылған инвестициялар көлемі бойынша негізгі көшбасшылар «ҰИМТ» АЭА (1 349,5 млрд теңге), «Turan» (525,6 млрд теңге) және «Астана-жаңа қала» (501,9 млрд теңге) болып табылады. 2024 жылдың қорытындысы бойынша «Астана-жаңа қала» (266,2 млрд теңге), «ИТП» (124,6 млрд теңге) және «ҰИМТ» (63,1 млрд теңге) АЭА неғұрлым елеулі инвестициялар түсті (2-кесте).

2-кесте

АЭА бойынша инвестициялар көлемі, млрд теңге

№	АЭА атауы	2020	2021	2022	2023	2024	АЭА құрылғаннан бастап тартылған инвестициялардың жиынтық көлемі
1	Астана – жаңа қала	16,0	16,2	9,6	22,8	266,2	501,87
2	Ақтау теңіз порты	72,8	60,5	32,6	11,9	38,5	335,71
3	Инновациялық технологиялар паркі	4,9	8,2	13,6	36,1	124,6	220,04
4	Оңтүстік	2,9	20,3	5,5	0,3	9,6	68,24
5	Ұлттық индустриялық мұнай-химия технопаркі	250,6	298,7	153,0	75,5	63,1	1 349,45
6	Сарыарқа	29,59	26,13	5,70	15,0	25,5	198,36
7	Павлодар	4,4	4,6	3,8	15,2	48,2	151,42
8	Қорғас – Шығыс қақпасы	0,57	1,32	2,25	2,81	3,3	58,34
9	Jibek Joly	0,1	5,796	4,77	1,2	8,5	46,59

Кестенің жалғасы

№	АЭА атауы	2020	2021	2022	2023	2024	АЭА құрылғаннан бастап тартылған инвестициялардың жиынтық көлемі
10	«Қорғас» халықаралық шекара маңы ынтымақтастығы орталығы	—	0	—	9,7	2,8	32,50
11	Астана-Технополис	1,1	9,9	17,2	12,4	20,7	61,76
12	Turan	147,3	207,0	57,4	60,1	43,8	525,61
13	QYZYLJAR	2,0	11,7	3,4	11,6	12,4	41,02
14	Alatau	—	—	—	7,5	9,0	9,59
	Барлығы	532,2	670,3	308,8	282,1	676,2	3 600,5

Соңғы бағанда әрбір АЭА құрылған кезден бастап 2024 жылға дейін тартылған инвестициялардың жиынтық көлемі берілген. АЭА-лардың құрылған жылдары әртүрлі болғандықтан, соңғы бағандағы көрсеткіштер 2020–2024 жылдардағы мәндердің қосындысына тең емес.

Ескерту: (Qazindustry, 2025) дереккөзі негізінде авторлармен құрастырылған

29 мыңнан астам тұрақты жұмыс орнын құрумен 418 жоба іске қосылды. Өнім өндіру көлемі 10,7 трлн теңгені құрады, оның ішінде 792,2 млрд теңгеге жуық өнім экспортталды.

2025 жылдың үшінші тоқсанындағы жағдай бойынша қазақстандық АЭА 10 трлн теңгеден (19,2 млрд АҚШ доллары) астам инвестиция тартты, оның төрт трлн теңгесі

(7,7 млрд АҚШ доллары) өнеркәсіп секторына инвестицияланды.

Барлығы 549 жоба аяқталды, оның өндіріс көлемі 12 трлн теңгені (23 млрд АҚШ долларын), ал экспорт – 954,8 млрд теңгені (1,8 млрд АҚШ долларын) құрады, бұл ретте 33 022 жұмыс орны құрылды. Шетелдік инвестициялар бір триллион теңгені (2 миллиард АҚШ доллары) құрайды.

3-кесте

Арнайы экономикалық аймақтар бойынша өндіріс көлемі, млрд теңге

№	АЭА атауы	2020	2021	2022	2023	2024	АЭА* құрылғаннан бастап жиынтық өндіріс көлемі
1	Астана – жаңа қала	799,87	1 022,80	1 238,40	1 165,79	1 716,27	7 907,2
2	Ақтау теңіз порты	37,30	14,21	15,82	41,04	63,43	515,9
3	Инновациялық технологиялар паркі	76,60	91,40	152,30	213,70	218,14	982,3
4	Оңтүстік	15,62	30,36	39,07	38,36	44,98	230,7
5	Ұлттық индустриялық мұнай-химия технопаркi	6,57	10,84	19,78	68,89	109,25	231,6
6	Сарыарқа	17,63	20,23	25,69	33,91	39,89	230,9
7	Павлодар	42,24	42,30	56,80	55,31	59,59	380,4
8	Қорғас – Шығыс қақпасы	8,14	10,67	13,36	15,00	27,69	82,4
9	Jibek Joly	2,10	0,30	2,00	0,13	0,25	6,9
10	Астана-Технополис	0,20	0,10	0,03	3,57	5,46	10,2
11	QYZYLJAR	—	11,20	36,41	63,70	63,082	174,4
	Барлығы	1 006,3	1 254,4	1 599,7	1 699,4	2 348,0	10 752,9

*Соңғы бағанда әрбір АЭА құрылған кезден бастап 2024 жылға дейінгі жиынтық өндіріс көлемі берілген. АЭА-лардың құрылған жылдары әртүрлі болғандықтан, соңғы бағандағы көрсеткіштер 2020–2024 жылдардағы мәндердің қосындысына тең емес.

Ескерту: (Qazindustry, 2025) дереккөзі негізінде авторлармен құрастырылған

3-кесте деректері АЭА қатысушыларының өндірістік белсенділігінің тұрақты өсу үрдісін көрсетеді. Жалпы өндіріс көлемі 2020 жылғы 1 006,3 млрд теңгеден 2024 жылы 2 348,0 млрд теңгеге дейін өсіп, 2,3 есеге артқан. АЭА құрылған жылдарынан бастап 2024 жылға дейінгі кезеңде өндірістің негізгі бөлігі «Астана – жаңа қала» (7 907,2 млрд теңге), «Инновациялық технологиялар паркі» (982,3 млрд теңге) және «Ақтау теңіз порты» (515,9

млрд теңге) АЭА-ларына тиесілі. Бұл өндірістің АЭА-лар арасында біркелкі бөлінбегенін және экономикалық нәтиженің бірнеше ірі аймақтарда шоғырланғанын көрсетеді. Сонымен қатар, «Қорғас – Шығыс қақпасы» АЭА-да өндіріс көлемінің 2020–2024 жылдары 8,14 млрд теңгеден 27,69 млрд теңгеге дейін өсуі оң динамиканы көрсеткенімен, оның жалпы АЭА өндірісіндегі үлесі әлі де салыстырмалы түрде төмен.

4-кесте

АЭА қатысушыларының экспорт көлемі, млрд теңге

№	АЭА атауы	2020	2021	2022	2023	2024	АЭА құрылғаннан бастап* жиынтық экспорт көлемі
1	Астана – жаңа қала	28,52	16,5	21,06	24,14	22,69	147,5
2	Ақтау теңіз порты	0,6	0,3	0,1	1,15	0,11	3,9
3	Инновациялық технологиялар паркі	0,94	0,26	1,0	2,17	5,34	15,6
4	Оңтүстік	9,33	13,15	15,86	11,61	20,23	103,8
5	Ұлттық индустриялық мұнай-химия технопаркі	5,32	7,79	14,21	60,36	88,33	185,3
6	Сарыарқа	6,0	11,68	8,29	22,1	16,86	119,6
7	Павлодар	20,11	20,27	31,38	28,15	22,06	184,6
8	Қорғас – Шығыс қақпасы	0,001	3,94	0,47	0,37	5,92	12,9
9	Jibek Joly	0	0	0	0	0,12	0,1
10	QYZYLJAR	0	0	1,89	7,23	9,66	18,8
	Барлығы	70,8	73,9	94,3	157,3	191,3	792,1

*Соңғы бағанда әрбір АЭА құрылған кезден бастап 2024 жылға дейінгі жиынтық экспорт көлемі берілген. АЭА-лардың құрылған жылдары әртүрлі болғандықтан, соңғы бағандағы көрсеткіштер 2020–2024 жылдардағы мәндердің қосындысына тең емес.

Ескерту: (Qazindustry, 2025) дереккөзі негізінде авторлармен құрастырылған

4-кесте деректері АЭА қатысушыларының экспорттық белсенділігінің 2020-2024 жылдары өскенін көрсетеді. Экспорт көлемі 70,8 млрд теңгеден 191,3 млрд теңгеге дейін ұлғайып, 2,7 есеге өскен. Алайда 2024 жылы экспорттың жалпы өндіріс көлеміндегі үлесі небәрі 8,1%-ды құрады. Бұл АЭА-ларда өндірістің өсуі экспорттық бағыттың кенеюімен толық деңгейде қатар жүрмейтінін көрсетеді. АЭА-тар құрылғаннан бастап 2024 жылға дейінгі кезеңде экспорттың негізгі бөлігі ҰИМТ(185,3 млрд теңге), Павлодар (184,6 млрд теңге) және «Астана – жаңа қала» (147,5 млрд теңге) АЭА-ларында шоғырланған, ал «Қорғас – Шығыс қақпасы» АЭА-ның экспорт көлемі құрылған жылдан бастап 12,9 млрд теңгені құрап, өндіріс

көлемімен салыстырғанда төмен деңгейде қалды. Осыған байланысты АЭА тиімділігін арттырудың маңызды бағыты өндірісті ұлғайтумен қатар, экспортқа бағдарланған өндірістерді дамыту және сыртқы нарықтарға шығу мүмкіндіктерін кеңейту болып табылады.

«Қорғас» негізгі көлік-логистикалық торабына екі АЭА кіреді: «Қорғас» халықаралық шекара маңы ынтымақтастық орталығы» (ХШЫО) және «Қорғас – Шығыс қақпасы». Қорғас торабы АЭА-ға 1,083 трлн теңгеге жоспарланған 105 жобаның 75,6 млрд-қа жобалары енгізілді.

«Қорғас» шекара маңы ынтымақтастығы халықаралық орталығы – Қазақстан мен Қытайдың шекаралас аумақтарында орналасқан сауда-экономикалық, инвестициялық ынтымақтастық,

сондай-ақ туризмді дамыту кешені. АЭА-ның жалпы ауданы 608,56 га.

Қазіргі уақытта «Қорғас» ХШБЮ» АЭА-да жалпы құны 2 234,4 млрд теңге болатын 41 жоба іске асырылуда. Оның сегізі (17 млрд теңгеге) пайдалануға берілді. Іске асыру сатысында 2027 жылға дейін аяқталатын 33 жоба бар. Олардың ішінде ірі жобалар: «Қазақстан-Қытай халықаралық өнеркәсіптік қаласы», жел энергетикасы қондырғылары зауыты, электр энергиясын сақтау және жинақтау жүйелері, металл бұйымдары зауыты, кофе және шай сусындары зауыты бар.

«Қорғас-Шығыс қақпасы» АЭА Қытайды, Орталық Азияны және Таяу Шығысты байланыстыратын логистикалық хаб құрудың стратегиялық нысаны ретінде қарастырылады.

«Қорғас-Шығыс қақпасы» АЭА құру мақсаттары:

- Қазақстан Республикасының сауда-экспорттық қызметінің мүдделерін және транзиттік әлеуетін іске асыруды қамтамасыз ететін, сондай-ақ іргелес мемлекеттермен экономикалық және мәдени алмасуды дамытуға ықпал ететін тиімді көліктік-логистикалық және индустриялық орталық құру;

- қазақстандық өнімді өндіру мен өткізудің жалпы әлемдік жүйесіне интеграциялауды жүзеге асыру, халықаралық стандарттарға сәйкес инновациялық, бәсекеге қабілетті отандық өнімді құру;

- инвестициялық жобаларды іске асыру үшін қолайлы инвестициялық ахуал құру және отандық және шетелдік инвестицияларды тарту;

- республика экономикасының әлемдік шаруашылық байланыстар жүйесіне кіруін жандандыру үшін өңірді жедел дамыту;

- нарықтық қатынастардың құқықтық нормаларын жетілдіру, басқару мен басқарудың заманауи әдістерін енгізу;

- халықты жұмыспен қамтуды арттыру (SezUnion, 2019).

АЭА-ның жалпы аумағы 5431,5 гектарды құрайды және Қазақстан Республикасы аумағының ажырамас бөлігі болып табылады. Үш негізгі аймақты – логистикалық және индустриялық, сондай-ақ құрғақ порттың көліктік-логистикалық кешенін қамтиды: (129,8 га) құрғақ порт үшін; (224,9 га) логистикалық аймақ үшін; (224,6 га) индустриялық аймақ үшін.

3-сурет

«Қорғас-Шығыс қақпасы» АЭА-ның орналасқан аумағы



Ескерту: («Қорғас-Шығыс қақпасы» АЭА, 2025) дереккөзінен алынған

АЭА-ның негізгі элементі құрғақ порт болып табылады, ол теміржол тармағының тар табанынан кең жолға және автожол көлігіне шамадан

тыс жүктеуге арналған бірнеше терминалдарды қамтиды және қызметтері әртүрлі жүк операциялары болып табылатын дамып келе жатқан

мультимодальды логистикалық хаб болып табылады, мысалы: вагон және контейнерлік операциялар, шамадан тыс жүктеме, терминалды өңдеу, қосымша логистикалық қызметтер.

Логистикалық аймақ құрғақ портқа/темір-жол жүк терминалына іргелес жерде орналасқан. Бұл нысанға ұлттық, аймақтық және халықаралық қажеттіліктерді қанағаттандыру мақсатында әртүрлі учаскелерде орналасқан әртүрлі көтерме қоймалар, сату және сақтау базалары кіреді.

Өнеркәсіптік аймақта бірқатар өндірістердің түпкі пайдаланушылары орналасатын болады, бұл ретте ауыл шаруашылығы және тамақ өнеркәсібі объектілері, бастапқы өңдеудің былғары-үлбір шикізатын өндіру жөніндегі жеңіл өнеркәсіп, металл бұйымдарын өндіру жөніндегі ауыр өнеркәсіп объектілері, сондай-ақ машиналар мен жабдықтарды жинау жөніндегі объектілер (Казахский ПромТрансПроект, n.d.).

АЭА аумағында кедендік рәсім – еркін кедендік аймақ жұмыс істейді. Еркін кеден аймағы – тауарлар АЭА аумағының немесе оның бір бөлігінің шегінде кедендік баждарды, салықтарды төлемей, сондай-ақ шетелдік тауарларға қатысты тарифтік емес реттеу шараларын қолданбай және Кеден одағының тауарларына қатысты тыйым салулар мен шектеулерді қолданбай орналастырылатын және пайдаланылатын кедендік рәсім.

АЭА қатысушыларына жобаны іске асыру үшін 2035 жылға дейін жер учаскесі тегін беріледі («Қорғас-Шығыс қақпасы» АЭА, 2024). «Қорғас-Шығыс қақпасы» АЭА инвестициялардың жалпы көлемі 2030 жылға қарай 522,7 млрд теңге, 2035 жылға қарай 715,5 млрд теңгеге жеткізу жоспарланып отыр. Ал тауарлар мен көрсетілетін қызметтерді (жұмыстарды) өндіру көлемі 2030 жылы 1171,3 млрд теңге, 2035 жылы 1687,8 млрд теңге аясында белгіленген (5-кесте).

5-кесте

«Қорғас-Шығыс қақпасы» арнайы экономикалық аймағының нысаналы индикаторлары

Р/с №	Мақсаттар, міндеттер және көрсеткіштер	Өлшем бірлігі	2024 жыл	2030 жылға қарай қол жеткізу	2035 жылға қарай қол жеткізу
				нысаналы индикатор	нысаналы индикатор
1	Инвестициялардың жалпы көлемі, оның ішінде:	млрд теңге	58,3	522,7	715,5
1.1	шетелдік инвестициялардың көлемі	млрд теңге	5,1	10,2	15,5
1.2	отандық инвестициялардың көлемі	млрд теңге	53,2	512,5	700,0
2	АЭА аумағында тауарлар мен көрсетілетін қызметтерді (жұмыстарды) өндіру көлемі	млрд теңге	82,4	1171,3	1687,8
3	Қатысушылар (компаниялар) саны	бірл.	67	85	95
4	Қызметтің қосалқы түрін жүзеге асыратын адамдардың саны	адам	8100	11300	14500
5	АЭА аумағында құрылатын жұмыс орындарының саны	адам	516	20500	22000
6	АЭА аумағындағы өндірістің жалпы көлеміндегі қазақстандық қамту үлесі	%	35	75	85

Ескерту: (Adilet.zan.kz, 2025) дереккөзі негізінде авторлармен құрастырылған

Алынған нәтижелер «Қорғас-Шығыс қақпасы» АЭА инвестициялық тартымдылық факторларын Frick & Rodriguez-Pose (2023) теориялық моделі тұрғысынан талқылауға көшуге мүмкіндік береді. Зерттеуде анықталған инвестициялық белсенділіктің, қатысушылар санының,

өндіріс көлемінің және құрылатын жұмыс орындарының өзгерістері қарастырылған теориялық факторлардың практикалық көрінісін байқауға мүмкіндік береді.

«Қорғас-Шығыс қақпасы» АЭА жағдайында бұл факторлар кешенді түрде көрінеді. АЭА

қатысушыларына берілетін салықтық және өзге де преференцияларды қоса алғанда, мемлекеттік саясат құралдары, сондай-ақ тиісті инфрақұрылыммен қамтамасыз ету маңызды рөл атқарады. Мұндай ынталандырулардың болуы инвесторлар шығындарының бір бөлігін азайтады және инвестициялық жобаларды аймақта орналастырудың экономикалық тартымдылығын арттырады. Осылайша, зерттеу нәтижелері теориялық модельде ерекшеленетін фискалдық және инфрақұрылымдық факторлардың маңыздылығын растайды.

«Қорғас-Шығыс қақпасы» АЭА шекара маңы аймағында орналасуы және оның көліктік-логистикалық мамандануы халықаралық нарықтарға қолжетімділікті қамтамасыз етеді және сыртқы сауда операцияларына бағдарланған компаниялар үшін қосымша мүмкіндіктер жасайды. Демек, АЭА-ның тартымдылығы мемлекет беретін жеңілдіктермен ғана емес, оның географиялық орналасуымен және трансшекаралық көлік-экономикалық байланыстарға қосылуымен де анықталады.

Зерттеу нәтижелері инвестициялық тартымдылықты инфрақұрылымның болуын, инвестициялық жобаларды орналастыру шарттарын және инвесторлармен өзара іс-қимылдың институционалдық тетіктерін қоса алғанда, АЭА сипаттамаларымен байланыстыруға мүмкіндік береді. Бұл жалпы экономикалық және институционалдық жағдайларды бағалағаннан кейін белгілі бір аймақтың сипаттамалары инвестордың шешіміне әсер етеді деген теориялық модельдің ережесіне сәйкес келеді.

«Қорғас-Шығыс қақпасы» АЭА-да өткізу қабілетін арттыру үшін инфрақұрылымдық жобалар іске асырылуда: «Қорғас-Шығыс қақпасы» АЭА мен ҚХР АЭА арасында тікелей логистикалық дәліз құру, «Khorgos Gateway» терминалын 18 теміржол желісіне дейін кеңейту, SkyNapsa халықаралық жүк-жолаушылар әуежайын салу, SARENS компаниясының өндірістік-логистикалық кешенін салу және Бонд қоймаларын салу.

«Қорғас-Шығыс қақпасы» АЭА-да 64 қатысушы тіркеліп, 58,6 млрд теңгеге 32 инвестициялық жоба іске асырылды. 2 300-ге жуық жұмыс орны құрылды. Іске асыру сатысында жалпы инвестиция көлемі 848,6 млрд теңгені құрайтын тағы 32 жоба бар, онда 5 000-нан астам жұмыс орнын құру жоспарлануда.

«Қорғас-Шығыс қақпасы» АЭА-дағы халықаралық жүк және жолаушылар әуежайының жобасы ICAO халықаралық ұсынымдарына

сәйкес авиациялық инфрақұрылым салудың үш кезеңді бағдарламасын көздейді. Бірінші кезең шеңберінде 2027 жылға дейін:

- өткізу мүмкіндігі сағатына 50 адамға дейін жолаушылар терминалын (2032 жылға қарай – сағатына 500 адамға дейін);

- JET A-1 авиаотыны жаңа түрінің заманауи отын қоймасының көлемі жылына 200 мың тоннаға дейін (2032 жылға қарай – 550 мың тоннаға дейін);

- автотұрағы және жылына 50 мың тонна теміржол түйығы бар жүк терминалын (2032 жылға қарай – жылына 250 мың тоннаға дейін) салу жоспарлануда.

Екінші және үшінші кезеңдер шеңберінде 2032 жылға дейін туристік және ойын-сауық инфрақұрылымы да құрылады. Инвестициялардың жалпы көлемі шамамен 250 млрд теңгені құрайды және 700 жаңа жұмыс орнын ашады (ҚР Премьер-министрінің ресми ақпараттық ресурсы, 2025).

2027 жылдың соңына дейін жалпы инвестиция көлемі 1,1 трлн теңге болатын тағы 65 жобаны іске асыру және 9 мыңнан астам жұмыс орнын құру жоспарлануда. Құрғақ портты кеңейту аясында екі қосымша теміржол жаңартылды және сегіз қосымша теміржол салынды, бұл терминалдың өткізу қабілетін бір жарым есеге арттырды.

«Saron Kazakhstan» бельгиялық компаниясы жалпы құны 8 млрд теңгені құрайтын екінші айналма жол мен ірі тоннажды көлікке арналған уақытша қойманың құрылысын бастады, оны аяқтау 2026 жылдың соңына жоспарланған.

Тауарлар экспортын ұлғайту мақсатында жалпы ұзындығы 294 км Алтынкөл-Жетіген екінші желісі салынуда, оның 64 км Жетісу аумағында орналасқан. Бұл жобаларды іске асыру Қазақстан мен Қытай арасындағы жүк тасымалын арттырады деп күтілуде, бұл өңірдің әлеуметтік-экономикалық дамуына оң әсер етеді.

Бүгінгі таңда АЭА аумағын қамтамасыз ету үшін мемлекет 427,5 млрд теңге бөлді және игерілді, бұл ретте инфрақұрылымның орташа аяқталуы 68,6% -ды құрайды. Инфрақұрылым нысандарының құрылысын толық аяқтау үшін қосымша қаржыландыру қажет.

АЭА-тың жалпы аумағы 136,6 мың гектарды құрайды, оның 114,9 мың гектары құрылысқа, 5,4 мың гектары әуежайлар және 16,4 мың гектары өнеркәсіпке арналған. АЭА-ның инфрақұрылыммен қамтамасыз етілген өнеркәсіп-

тік бөлігінде жобаларға арналған аумақ 4 547,4 га (27,8%), инфрақұрылымның жалпы ауданы 3 899,6 га (23,9%), пайдалы емес алаң 415,3 га (2,5%) және инфрақұрылыммен қамтамасыз

етілмеген жобаларға арналған аумақ 7 488,3 га (45,8%) құрайды деп «Өнеркәсіптің жағдайы туралы Ұлттық баяндамада» көрсетілген (Qazindustry, 2025).

6-кесте

Арнайы экономикалық аймақтар инфрақұрылымының аяқталу деңгейі

№	АЭА атауы	Инфрақұрылымның аяқталу деңгейі, %	Инфрақұрылыммен қамтамасыз етілуі, %	Бөлінген қаражат, млрд тг	Қосымша қажеттілік, млрд тг
1	«Астана-Жаңа қала»	87	89,2	24,8	–
2	«Ақтау теңіз порты»	50	55,9	7,8	–
3	«Инновациялық технологиялар паркі (ИТП)»	100	100	27,0	–
4	«Оңтүстік»	100	56,1	8,1	5,1
5	«Ұлттық индустриялық мұнай-химия технопаркі (ҰИМХТ)»	50	99,6	171,6	194,9
6	«Сарыарқа»	93,2	46,2	25,2	93,5
7	«Павлодар»	65,8	60,2	13,7	10,4
8	«Қорғас-Шығыс қақпасы»	100	15,0	36,9	23,9
9	«Jibek Joly»	72,1	100	26,8	0,7
10	«Қорғас» халықаралық шекара маңы ынтымақтастығы орталығы (МШЫО)	70	93,4	40,8	27,5
11	«Астана-Технополис»	–	36,4	–	105,0
12	«Turan»	50	37,1	5,3	5,8
13	«QYZYLJAR»	54	100	13,8	43,7
	Барлығы	68,6%	68,4	401,8	510,5

Ескерту: (Qazindustry, 2025) дереккөзі негізінде авторлармен құрастырылған

6-кесте деректері Қазақстандағы арнайы экономикалық аймақтар арасында «Қорғас-Шығыс қақпасы» АЭА-сының инфрақұрылымдық даму ерекшеліктерін айқын көрсетеді. Аталған аймақта инфрақұрылымның аяқталу деңгейі 100% болғанымен, инфрақұрылыммен нақты қамтамасыз етілу деңгейі небәрі 15% құрайды. Бұл айырмашылықты түсіндірген кезде инженерлік-коммуникациялық инфрақұрылымның физикалық аяқталуын және оның инвесторлардың нақты қажеттіліктеріне сәйкестігін ажырату маңызды. Өнеркәсіптік жобаларды іске асыру үшін электр энергиясына, газға, суға және көлік коммуникацияларына тұрақты қолжетімділікпен қатар қажетті ресурстардың ұзақ мерзімді теңгерімін алдын ала жоспарлау қажет. Ресурстардың қажеттіліктері мен инвестициялық жобаларды жоспарлаудың

жеткіліксіз үйлестірілуі инфрақұрылымның физикалық тұрғыдан дайын болған жағдайда да толық пайдаланылмауына әкелуі мүмкін. Сондықтан «Қорғас-Шығыс қақпасы» АЭА-да 100% инфрақұрылымдық дайындық пен 15% қамтамасыз ету арасындағы алшақтықты инфрақұрылымдық ұсыныс пен нақты инвестициялық сұраныстың сәйкес келмеуі тұрғысынан да қарастыруға болады.

«Қорғас-Шығыс қақпасы» АЭА-на инфрақұрылымды дамыту үшін 36,9 млрд теңге көлемінде қаражат бөлінген, алайда аймақтың толыққанды жұмыс істеуі үшін қосымша 23,9 млрд теңге қаржыландыру қажет. Бұл жағдай инфрақұрылым объектілерінің іске қосылуы мен пайдаланылуын тежейтін институционалдық, ұйымдастырушылық немесе сұранысқа байланысты факторлардың бар екенін көрсетеді.

Салыстырмалы түрғыдан алғанда, кейбір АЭА-ларда инфрақұрылыммен қамтамасыз етілу деңгейі жоғары (мысалы, «Jibek Joly» – 100%, «Инновациялық технологиялар паркі» – 100%), ал «Қорғас-Шығыс қақпасы» АЭА-сының көрсеткіштері инвестициялық тартымдылықты іске асыру әлеуетінің толық пайдаланылмай отырғанын білдіреді. Геостратегиялық орналасуына, халықаралық транзиттік әлеуетіне және Қытаймен шекара маңындағы артықшылықтарына қарамастан, инфрақұрылымның төмен деңгейде пайдаланылуы аймақтың бәсекеге қабілеттілігін шектейді.

Осыған байланысты «Қорғас-Шығыс қақпасы» АЭА-сының инвестициялық тиімділігін арттыру үшін инфрақұрылым объектілерін нақты жобалармен толтыру, резиденттерді тарту тетіктерін жетілдіру, сондай-ақ басқару және үйлестіру механизмдерін күшейту қажет. Бұл шаралар аймақтың транзиттік-логистикалық және өндірістік әлеуетін толық іске асырып, шетелдік және отандық инвестицияларды тарту рөлін арттыруға мүмкіндік береді.

Қорытынды

Жүргізілген зерттеу нәтижелері Қазақстан Республикасының арнайы экономикалық аймақтары инвестициялық белсенділікті ынталандыруға, өнеркәсіптік өндірісті ұлғайтуға, жұмыс орындарын құруға және экспорттық әлеуетті кеңейтуге ықпал ететінін көрсетті. 2025 жылдың қорытындысы бойынша АЭА аумақтарындағы өндіріс көлемі 3,1 трлн теңгені құрап, 2024 жылмен салыстырғанда шамамен 32%-ға өскен. Бұл АЭА-лардың Қазақстанның индустриялық және инвестициялық даму саясатындағы маңыздылығын көрсетеді.

«Қорғас-Шығыс қақпасы» АЭА мысалында жүргізілген талдау негізінде мынадай негізгі ғылыми нәтижелер алынды:

- АЭА инвестициялық тартымдылығын қалыптастыратын негізгі факторлар жүйеленген. Оларға салықтық және кедендік жеңілдіктермен қатар инфрақұрылымның нақты қолжетімділігі, институционалдық орта және көліктік-логистикалық позициялау ерекшеліктері кіретіні анықталды;

- Инфрақұрылымды ресми қамтамасыз ету мен оны нақты пайдалану арасындағы айырмашылық анықталды. Бұл АЭА тиімділігін тек инфрақұрылымды құру деңгейі арқылы бағалау жеткіліксіз екенін және инвестициялық белсен-

ділікті бағалау кезінде инфрақұрылымды нақты пайдалану көрсеткіштерін ескеру қажет екенін көрсетеді;

- «Қорғас-Шығыс қақпасы» АЭА-ның трансшекаралық орналасуы оның инвестициялық әлеуетінің ерекше факторы ретінде айқындалған. Оның көлік-логистикалық дәліздермен және халықаралық сауда ағындарымен байланысы АЭА-ны инвестициялар тарту және экспортқа бағдарланған өндірісті дамыту құралы ретінде қарастыруға мүмкіндік береді.

Сонымен қатар, жүргізілген талдау АЭА тиімділігінің инфрақұрылымдық қамтамасыз ету деңгейіне, орналасу ерекшеліктеріне және инвестициялық мамандануына тәуелді екенін көрсетті. Осы түрғыдан алғанда, «Қорғас-Шығыс қақпасы» АЭА-ның ерекшелігі оның Қазақстан мен Қытай арасындағы трансшекаралық экономикалық байланыстардың маңызды торабында орналасуымен байланысты. Сондықтан аталған АЭА-ның шекаралық және транзиттік әлеуетін тиімді пайдалану және дамыту бойынша келесі ұсыныстар берілді:

«Қорғас-Шығыс қақпасы» АЭА аумағында трансшекаралық көлік-логистикалық инфрақұрылымды дамыту қажет. АЭА-ның Қазақстан-Қытай шекарасындағы орналасуын ескере отырып, инвестицияларды тек өндірістік объектілерге емес, мультимодальды терминалдарға, қойма және кедендік-логистикалық инфрақұрылымға, оның ішінде температуралық режимді қажет ететін жүктерге арналған қоймаларға бағыттау ұсынылады. Бұл Қытайдан келетін тауарларды қабылдау, сақтау, қайта өңдеу және Қазақстан мен ЕАЭО нарықтарына одан әрі жеткізу операцияларын бір логистикалық тізбекке біріктіруге мүмкіндік береді.

Қазақстан-Қытай шекарасындағы трансшекаралық сауда операцияларын цифрландыруды тереңдету қажет. «Қорғас» торабының ерекшелігіне байланысты инвесторлар үшін кедендік рәсімдердің ұзақтығы, құжат айналымы және шекаралық өткізу операциялары инвестициялық тартымдылыққа әсер етуі мүмкін.

АЭА-ны Қазақстан-Қытай – ЕАЭО бағытындағы өңірлік өндірістік және логистикалық тізбектерге интеграциялау қажет. Бұл үшін АЭА резиденттері үшін Қазақстан нарығымен қатар Орталық Азия және ЕАЭО нарықтарына шығуға бағытталған инвестициялық жобаларды іріктеу критерийлерін енгізу ұсынылады. Мұндай тәсіл «Қорғас-Шығыс қақпасы» АЭА-ны тек шекаралық сауда алаңы емес, Қытайдан Еуразиялық на-

рықтарға шығатын өндірістік-логистикалық хаб ретінде дамытуға мүмкіндік береді.

Траншекаралық инвестициялық жобаларды сүйемелдеудің арнайы институционалдық тетігін қалыптастыру қажет. Қытай инвесторлары үшін «бір терезе» қағидатын тек әкімшілік рәсімдерді оңайлатумен шектемей, жер учаскесін тандау, инфрақұрылымға қосылу, кедендік рәсімдер, рұқсат құжаттарын алу және жобаны іске қосу кезеңдерінің барлығын қамтитын жобалық сүйемелдеу жүйесіне айналдыру ұсынылады. Бұл әсіресе шетелдік инвесторлар үшін жобаны іске асыру мерзімдері мен әкімшілік шығындарды қысқартуға мүмкіндік береді.

АЭА-ның инвестициялық ұсыныстарын Қытайдың шекаралас өңірлерімен нысаналы түрде ілгерілету қажет. Инвестициялық тарту тетігі жалпы халықаралық жарнамамен шектелмей, Қытайдың шекара маңындағы кәсіпкерлік және өндірістік орталықтарымен тұрақты B2B-кездесулер, бірлескен инвестициялық форумдар және нақты жобалар бойынша роуд-шоулар өткізуге бағытталуы тиіс. Бұл тәсіл АЭА-ға нақты инвесторлар мен жобаларды тартуға мүмкіндік береді.

Қазақстан-Қытай ғылыми-технологиялық кооперациясын АЭА қызметімен байланыстыру ұсынылады. Елдің F3TKЖ шығындары ЖІӨ –нің шамамен 0,13% құрайды, бұл экономикалық дамудың үқсас кезеңінде елдер үшін әдетте ұсынылатын 1,0% – 1,5% деңгейден едәуір төмен.

Ғылыми ұйымдарды тарту жалпы сипатта емес, «Қорғас» торабының нақты қажеттіліктеріне сәйкес жүзеге асырылуы тиіс. Атап айтқанда, логистиканы цифрландыру, қоймаларды автоматтандыру, көлік ағындарын басқару, электрондық коммерция және трансшекаралық сауда технологиялары бойынша бірлескен қолданбалы жобаларды іске асыруға басымдық беру қажет.

Осылайша, «Қорғас-Шығыс қақпасы» АЭА-ның инвестициялық тартымдылығын арттырудың негізгі бағыты инфрақұрылымды жалпы түрде кеңейтумен шектелмеуі тиіс. Оның Қазақстан-Қытай шекарасындағы орналасуын, транзиттік әлеуетін және Еуразиялық нарықтарға шығу мүмкіндігін пайдалана отырып, АЭА-ны трансшекаралық өндірістік-логистикалық хаб ретінде мамандандыру қажет.

Алғыс, мүдделер қақтығысы

Авторлар мүдделер қақтығысының жоқтығын мәлімдейді.

Авторлардың қосқан үлесі

ЕЖЖ: әдістеме, деректерді жинау, тұжырымдамалау, деректерді өңдеу, авторлық қадағалау.

РЖБ: зерттеу, түпнұсқа жобаны жазу, мақаланы түзету. Барлық авторлар қолжазбаның жарияланған нұсқасымен танысып, онымен келісті.

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Келін түсті: 21 мамыр 2026 жыл

Қабылданды: 20 қыркүйек 2026 жыл

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INSTITUTIONAL AND STAKEHOLDER DETERMINANTS OF RESILIENCE IN TOURISM PUBLIC-PRIVATE PARTNERSHIPS IN KAZAKHSTAN

Public-private partnerships (PPPs) have become increasingly important mechanisms for tourism infrastructure and destination development. However, the long-term resilience of tourism PPPs may be constrained by institutional uncertainty, regulatory changes, financial risks, and coordination problems between public and private partners and other stakeholders. This study examines the determinants of resilience in tourism PPPs in Kazakhstan by integrating institutional and stakeholder perspectives. A mixed-methods explanatory design was employed. The quantitative component was based on 189 valid questionnaires collected between 3 March and 29 May 2026 through Google Forms using a five-point Likert scale. The questionnaire was available in Kazakh, Russian, and English. The respondents represented public authorities, private tourism and hospitality businesses, PPP professionals, investors, destination-management organisations, support institutions, and other tourism stakeholders. The qualitative component comprised 15 semi-structured interviews conducted online and offline. Interviews lasted approximately 20–90 minutes and were audio- and video-recorded with participants' consent, transcribed, and thematically coded. Quantitative data were analysed using PLS-SEM. The measurement model demonstrated satisfactory reliability and convergent and discriminant validity. The structural model indicated positive relationships between institutional support, regulatory stability, risk-sharing mechanisms, stakeholder communication, stakeholder involvement, and PPP resilience. Stakeholder involvement showed the strongest relationship with PPP resilience ($\beta = 0.267$, $p < 0.001$), followed by risk-sharing mechanisms ($\beta = 0.241$, $p < 0.001$) and institutional support ($\beta = 0.214$, $p < 0.001$). The model explained 61.2% of the variance in PPP resilience. The qualitative findings further indicated that regulatory predictability, adaptive risk allocation, communication, and stakeholder participation are important mechanisms through which tourism PPPs respond to uncertainty. The study contributes an integrated governance-based framework for understanding how institutional conditions, risk-sharing arrangements, and stakeholder relationships shape resilience in tourism PPPs in an emerging tourism economy and provides policy implications for strengthening PPP governance in Kazakhstan.

Keywords: public-private partnerships, tourism PPPs, PPP resilience, institutional support, regulatory stability, stakeholder involvement, Kazakhstan.

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Қазақстандағы туризм саласындағы мемлекеттік-жекешелік әріптестіктің орнықтылығын айқындайтын факторлар: институционалдық және мүдделі тараптар тұрғысынан

Мемлекеттік-жекешелік әріптестік (МЖӘ) туризм инфрақұрылымын дамыту мен дестинацияларды дамытуда барған сайын маңызды тетікке айналып келеді. Алайда туризм саласындағы МЖӘ-нің ұзақ мерзімді тұрақтылығына институционалдық белгісіздік, нормативтік-құқықтық өзгерістер, қаржылық тәуекелдер, сондай-ақ мемлекеттік және жеке серіктестер мен басқа да мүдделі тараптар арасындағы үйлестіру мәселелері әсер етуі мүмкін. Бұл зерттеу институционалдық және мүдделі тараптар перспективаларын біріктіре отырып, Қазақстандағы туризм саласындағы МЖӘ тұрақтылығын айқындайтын факторларды зерттеуге бағытталған. Зерттеуде түсіндірмелі аралас әдістер дизайны қолданылды. Сандық зерттеу компоненті 2026 жылғы 3 наурыз бен 29 мамыр аралығында Google Forms платформасы арқылы бес балдық Ликерт шкаласын пайдалана отырып жиналған 189 жарамды сауалнамаға негізделді. Сауалнама қазақ, орыс және ағылшын тілдерінде ұсынылды. Респонденттер мемлекеттік органдардың өкілдерін,

туристік және қонақжайлылық кәсіпорындарын, МЖӘ мамандарын, инвесторларды, дестинацияларды басқару ұйымдарын, қолдау институттарын және туризм саласындағы басқа да мүдделі тараптарды қамтыды. Сапалық компонент онлайн және офлайн форматта жүргізілген 15 жартылай құрылымдалған сұхбаттан тұрды. Сұхбаттардың ұзақтығы шамамен 20–90 минутты құрады және қатысушылардың келісімімен аудио және бейне форматта жазылып, транскрипцияланып, тақырыптық кодтау жүргізілді. Сандық деректер PLS-SEM әдісі арқылы талданды. Өлшеу моделі қанағаттанарлық сенімділік, конвергенттік және дискриминанттық валидтілікті көрсетті. Құрылымдық модель институционалдық қолдау, нормативтік тұрақтылық, тәуекелдерді бөлу тетіктері, мүдделі тараптар арасындағы коммуникация, мүдделі тараптардың қатысуы және МЖӘ тұрақтылығы арасында оң байланыстар бар екенін көрсетті. МЖӘ тұрақтылығымен ең күшті байланыс мүдделі тараптардың қатысуынан байқалды ($\beta = 0.267$, $p < 0.001$), одан кейін тәуекелдерді бөлу тетіктері ($\beta = 0.241$, $p < 0.001$) және институционалдық қолдау ($\beta = 0.214$, $p < 0.001$) орын алды. Модель МЖӘ тұрақтылығының дисперсиясының 61.2%-ын түсіндірді. Сапалық зерттеу нәтижелері нормативтік-құқықтық ортаның болжамдылығы, тәуекелдерді бейімделе отырып бөлу, тиімді коммуникация және мүдделі тараптардың қатысуы туризм саласындағы МЖӘ-нің белгісіздік жағдайларына жауап беруіне ықпал ететін маңызды тетіктер екенін көрсетті. Зерттеу дамушы туристік экономика жағдайында институционалдық жағдайлардың, тәуекелдерді бөлу тетіктерінің және мүдделі тараптар арасындағы өзара қатынастардың туризм саласындағы МЖӘ тұрақтылығын қалыптастырудағы рөлін түсіндіретін интеграцияланған басқару негізіндегі шеңберді ұсынады және Қазақстандағы МЖӘ басқаруын нығайтуға бағытталған практикалық ұсынымдар береді.

Түйін сөздер: мемлекеттік-жекешелік әріптестік, туризмдегі МЖӘ, МЖӘ орнықтылығы, институционалдық қолдау, нормативтік тұрақтылық, мүдделі тараптардың қатысуы, Қазақстан.

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Факторы резильентности государственно-частного партнерства в сфере туризма в Казахстане: институциональный и стейкхолдерский подход

Государственно-частные партнёрства (ГЧП) приобретают всё большее значение как механизм развития туристской инфраструктуры и дестинаций. Однако долгосрочная устойчивость ГЧП в сфере туризма может ограничиваться институциональной неопределённостью, изменениями нормативно-правового регулирования, финансовыми рисками, а также проблемами координации между государственными и частными партнёрами и другими заинтересованными сторонами. В данном исследовании рассматриваются факторы, определяющие устойчивость ГЧП в сфере туризма в Казахстане, на основе интеграции институционального и стейкхолдерского подходов. В исследовании использован объяснительный дизайн смешанных методов. Количественный компонент основан на 189 валидных анкетах, собранных в период с 3 марта по 29 мая 2026 года посредством Google Forms с использованием пятибалльной шкалы Лайкерта. Анкета была представлена на казахском, русском и английском языках. Респонденты представляли государственные органы, частные предприятия сферы туризма и гостеприимства, специалистов по ГЧП, инвесторов, организации по управлению дестинациями, организации поддержки и других заинтересованных участников туристской сферы. Качественный компонент включал 15 полуструктурированных интервью, проведённых в онлайн- и офлайн-форматах. Продолжительность интервью составляла приблизительно 20–90 минут; с согласия участников интервью записывались в аудио- и видеоматериале, транскрибировались и подвергались тематическому кодированию. Количественные данные были проанализированы с использованием PLS-SEM. Измерительная модель продемонстрировала удовлетворительные показатели надёжности, конвергентной и дискриминантной валидности. Структурная модель выявила положительные взаимосвязи между институциональной поддержкой, регуляторной стабильностью, механизмами распределения рисков, коммуникацией между заинтересованными сторонами, их вовлечённостью и устойчивостью ГЧП. Наиболее сильная взаимосвязь с устойчивостью ГЧП была выявлена для вовлечённости заинтересованных сторон ($\beta = 0.267$, $p < 0.001$), далее следовали механизмы распределения рисков ($\beta = 0.241$, $p < 0.001$) и институциональная поддержка ($\beta = 0.214$, $p < 0.001$). Модель объясняет 61.2% дисперсии устойчивости ГЧП. Результаты качественного анализа также показали, что предсказуемость нормативно-правовой среды, адаптивное распределение рисков, эффективная коммуникация и участие заинтересованных сторон являются важными механизмами, посредством которых туристские ГЧП реагируют на неопределённость. Исследование пред-

лагает интегрированную управленческую основу для понимания того, как институциональные условия, механизмы распределения рисков и отношения между заинтересованными сторонами формируют устойчивость ГЧП в сфере туризма в условиях развивающейся туристской экономики, а также содержит практические рекомендации по укреплению управления ГЧП в Казахстане.

Ключевые слова: государственно-частное партнёрство, ГЧП в туризме, резильентность ГЧП, институциональная поддержка, регуляторная стабильность, участие заинтересованных сторон, Казахстан.

Introduction

Public–private partnerships (PPPs) have become an important mechanism for mobilising private investment and combining public resources, managerial expertise, infrastructure capabilities, and stakeholder knowledge (Hodge & Greve, 2017). In tourism, PPPs can support the development of accommodation facilities, transport infrastructure, attractions, destination infrastructure, recreational facilities, and other services that require cooperation between public authorities and private organisations (Ghanem *et al.*, 2021; Ghanem & Ghaley, 2022).

The importance of PPPs is particularly relevant in emerging tourism economies, where public resources alone may be insufficient to finance the infrastructure and services required for destination development. At the same time, tourism PPPs operate under conditions of considerable uncertainty (Ghanem & Ghaley, 2024). Tourism demand is sensitive to economic fluctuations, geopolitical developments, transport accessibility, changing consumer behaviour, and unexpected external shocks. Long-term PPP arrangements may therefore face challenges that extend beyond conventional questions of investment and financial performance (Tallaki & Bracci, 2021).

In Kazakhstan, the institutional framework recognises PPP as a mechanism for cooperation between public and private partners and emphasises principles including balance, efficiency, transparency, and the distribution of risks and revenues. This makes the question of PPP resilience particularly relevant to tourism development.

The concept of resilience provides a useful perspective because it shifts attention from whether a partnership is successfully established to whether it can maintain essential functions, absorb disruptions, adapt to changing circumstances, and continue operating over time (Ghanem & Ghaley, 2024). In this study, PPP resilience refers to the capacity of tourism PPP arrangements to absorb disturbances, adapt governance and contractual arrangements, coordinate stakeholders, manage risks, and maintain essential partnership functions (Ghanem & Ghaley,

2024). This conceptualisation distinguishes PPP resilience from tourism-sector sustainability, which concerns the long-term environmental, economic, social, and cultural outcomes of tourism development.

Although the PPP literature has examined institutional quality, risk allocation, stakeholder governance, and project performance, less attention has been paid to the combined influence of these factors on resilience in tourism PPPs in emerging economies. In particular, limited empirical evidence exists concerning how institutional support, regulatory stability, risk-sharing mechanisms, communication, and stakeholder involvement jointly contribute to PPP resilience in Kazakhstan.

Therefore, this study addresses the following research problem: What institutional, regulatory, risk-sharing, and stakeholder-related factors contribute to the resilience of tourism public–private partnerships in Kazakhstan?

The study aims to examine how five governance dimensions Institutional Support (IS), Regulatory Stability (RS), Risk-Sharing Mechanisms (RSM), Stakeholder Communication (SC), and Stakeholder Involvement (SI) influence PPP resilience in tourism in Kazakhstan and to explore how stakeholders explain the mechanisms underlying adaptation and continuity.

The specific objectives of the study are to:

Objective 1: To assess the influence of institutional support on the resilience of tourism PPPs in Kazakhstan.

Objective 2: To examine the influence of regulatory stability on the resilience of tourism PPPs in Kazakhstan.

Objective 3: To analyse the relationship between risk-sharing mechanisms and PPP resilience.

Objective 4: To determine the influence of stakeholder communication on PPP resilience.

Objective 5: To determine the influence of stakeholder involvement on PPP resilience.

Objective 6: To explore how tourism PPP stakeholders explain the mechanisms through which these governance factors support adaptation and continuity.

The study addresses five research questions:

RQ1. How does institutional support influence the resilience of tourism PPPs in Kazakhstan?

RQ2. How does regulatory stability influence the resilience of tourism PPPs in Kazakhstan?

RQ3. How do risk-sharing mechanisms influence the resilience of tourism PPPs in Kazakhstan?

RQ4. How does stakeholder communication influence the resilience of tourism PPPs in Kazakhstan?

RQ5. How does stakeholder involvement influence the resilience of tourism PPPs in Kazakhstan?

RQ6. How do tourism PPP stakeholders explain the mechanisms through which these governance factors support adaptation and continuity?

The study contributes to the literature in three ways. It applies an institutional perspective to PPP resilience in tourism. It conceptualises stakeholder involvement as a governance capability rather than only a participatory principle. And it integrates quantitative PLS-SEM evidence with qualitative stakeholder perspectives in the context of an emerging tourism economy.

Literature review

Institutional theory emphasises the importance of formal rules, administrative arrangements, norms, and organisational environments in shaping economic and organisational behaviour. PPPs are particularly dependent on institutional conditions because their implementation involves multiple organisations operating under long-term contractual and regulatory arrangements (Hodge & Greve, 2017; Fleta-Asín *et al.*, 2025). Institutional support can facilitate PPP resilience by reducing uncertainty, clarifying responsibilities, facilitating access to public resources, and supporting coordination between public and private organisations (North, 1990; Williamson, 1985; Ahmad *et al.*, 2022; Ismail *et al.*, 2022). When institutional arrangements are sufficiently supportive, PPP partners may be better able to respond to unexpected disruptions. Accordingly: H1: Institutional support has a positive relationship with PPP resilience.

Tourism PPPs frequently involve long-term investments. Investors therefore require a predictable regulatory environment in which regulatory changes, administrative procedures, and responsibilities can be anticipated. Regulatory instability may increase transaction costs, delay project implementation, and reduce investor confidence (Ghanem *et al.*, 2022; Fleta-Asín *et al.*, 2025). Conversely, predict-

able regulation can facilitate long-term planning and adaptation (Ghanem & Ghaley (2021)). Therefore: H2: Regulatory stability has a positive relationship with PPP resilience.

Risk allocation is a central element of PPP governance. The effectiveness of a PPP depends partly on whether risks are allocated to the party best positioned to manage them (Iossa & Martimort, 2012; Tallaki & Bracci, 2021; Nur *et al.*, 2023). In PPP arrangements, effective risk sharing also depends on appropriate government regulation and the behaviour of private-sector participants, as imbalances in risk allocation may undermine partnership performance and increase vulnerability (Li & Wang, 2023). Tourism PPPs face demand, financial, operational, construction, market, and regulatory risks. Excessive concentration of risk on either the public or private partner may weaken the partnership's ability to respond to shocks (Iossa & Martimort, 2012; Tallaki & Bracci, 2021). Thus: H3: Effective risk-sharing mechanisms have a positive relationship with PPP resilience.

PPP projects involve organisations with different interests, resources, responsibilities, and expectations. Communication enables partners to exchange information, coordinate activities, identify problems, and negotiate solutions (Koppenjan *et al.*, 2022). In tourism, communication is particularly important because projects may involve government agencies, investors, operators, destination organisations, local communities, and other stakeholders. Therefore: H4: Stakeholder communication has a positive relationship with PPP resilience.

Stakeholder theory suggests that organisational outcomes depend partly on relationships with stakeholders who possess relevant resources, knowledge, legitimacy, and influence (Kusio, 2021). Stakeholder involvement can contribute to resilience by increasing access to local knowledge, identifying risks at an early stage, improving legitimacy, facilitating conflict resolution, and strengthening commitment to project outcomes (Hodge & Greve, 2017). Therefore: H5: Stakeholder involvement has a positive relationship with PPP resilience.

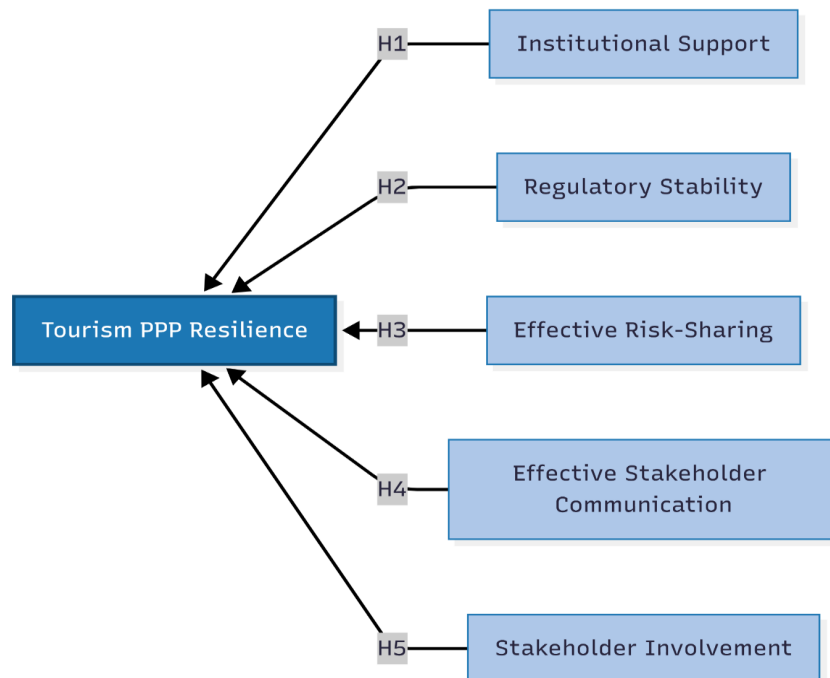
This study conceptualises PPP resilience as a characteristic of the public-private partnership arrangement rather than as a measure of tourism-sector sustainability. The conceptual framework focuses on the capacity of tourism PPPs to maintain essential partnership functions, absorb disruptions, adapt governance and contractual arrangements, coordinate participating stakeholders, and continue operating under changing conditions (Wan *et al.*,

2022; Liu *et al.*, 2025). Accordingly, PPP resilience represents the dependent construct of the study, while institutional support, regulatory stability, risk-sharing mechanisms, stakeholder communication, and stakeholder involvement are conceptualised as governance-related determinants of resilience (Figure 1).

In this study, resilience is treated as a property of the PPP arrangement rather than as an indicator of tourism-sector sustainability. Tourism sector sustainability concerns the long-term environmental, economic, social, and cultural sustainability of

tourism development and destinations. By contrast, PPP resilience concerns the capacity of a specific public–private partnership arrangement to withstand disruptions, adapt to changing conditions, manage risks, maintain stakeholder coordination, and preserve essential partnership functions. Thus, the present study does not assess the sustainability of Kazakhstan’s tourism sector or the sustainability performance of tourism destinations. Instead, it examines the resilience of tourism-related PPP arrangements as governance and implementation mechanisms within the tourism sector.

Figure 1
Conceptual framework of tourism PPP resilience



Note: Developed by the author based on a synthesis of the existing literature and theoretical arguments presented in this study

Institutional support refers to the extent to which PPPs receive adequate institutional, administrative, and organisational support from relevant public and supporting institutions. Strong institutional support can facilitate coordination, access to resources, problem resolution, and adaptation during periods of uncertainty. Therefore, institutional support is expected to strengthen PPP resilience.

Regulatory stability reflects the predictability and consistency of the regulatory environment within which PPPs operate. Stable and predictable

regulations can reduce uncertainty, facilitate long-term planning, and enable partners to respond more effectively to changes. Regulatory stability is therefore expected to contribute positively to PPP resilience.

Risk-sharing mechanisms concern the allocation and management of risks between public and private partners. Appropriate risk allocation can reduce the vulnerability of individual partners, facilitate adaptive responses to disruptions, and support continuity of PPP operations. Accordingly, effective risk-

sharing mechanisms are expected to enhance PPP resilience.

Stakeholder communication represents the effectiveness of information exchange and coordination among public authorities, private partners, investors, operators, and other relevant stakeholders. Effective communication can facilitate joint problem-solving, early identification of risks, and coordinated responses to changing conditions. Stakeholder communication is therefore expected to contribute positively to PPP resilience.

Stakeholder involvement reflects the extent to which relevant actors participate in decision-making, implementation, and adaptation processes. Meaningful involvement can increase shared ownership, improve coordination, incorporate diverse knowledge, and strengthen collective capacity to respond to disruptions. Therefore, stakeholder involvement is expected to positively influence PPP resilience.

Methodology

The study employed an explanatory sequential mixed-methods design consisting of a quantitative survey followed by qualitative semi-structured interviews. The quantitative phase was designed to test the hypothesised relationships between five governance dimensions Institutional Support (IS), Regulatory Stability (RS), Risk-Sharing Mechanisms (RSM), Stakeholder Communication (SC), and Stakeholder Involvement (SI) and PPP resilience. The qualitative phase was subsequently conducted to explain and contextualise the quantitative findings, with particular attention to the mechanisms through which these governance dimensions support adaptation and continuity in tourism PPPs.

The unit of analysis was the tourism-related public–private partnership arrangement and its governance environment. Importantly, PPP resilience was conceptualised as the resilience of the partnership arrangement itself rather than the sustainability or resilience of the tourism sector as a whole. The study therefore focuses on the capacity of tourism PPPs to absorb disruptions, adapt governance and contractual arrangements, manage risks, coordinate stakeholders, and maintain essential partnership functions over time.

The substantive focus of the study was tourism-related public–private partnership arrangements. Survey responses captured stakeholders' perceptions of the governance conditions and resilience of these partnership arrangements.

The empirical context was tourism-related public–private partnership arrangements in Kazakhstan. The study focused on stakeholders directly involved in, responsible for, supporting, or interacting with tourism-related PPP arrangements across Almaty Region, Kyzylorda Region, Pavlodar Region, Abay Region, Atyrau Region, Aktau, and Turkistan Region. The geographical scope was selected to capture variation in tourism development conditions and institutional environments across different parts of Kazakhstan.

Kazakhstan's PPP framework formally recognises cooperation between public and private partners, long-term PPP implementation, joint participation, resource pooling, and balanced allocation of responsibilities, guarantees, risks, and revenues.

The survey was conducted from 3 March to 29 May 2026. A total of 189 valid questionnaires were obtained and included in the quantitative analysis. The questionnaire was distributed through Google Forms. To increase accessibility across stakeholder groups, the questionnaire was available in Kazakh, Russian, English.

All substantive questionnaire items were measured using an exact five-point Likert scale, ranging from: 1 = strongly disagree to 5 = strongly agree.

The questionnaire focused on six constructs:

1. Institutional Support;
2. Regulatory Stability;
3. Risk-Sharing Mechanisms;
4. Stakeholder Communication;
5. Stakeholder Involvement;
6. PPP Resilience.

Respondent profile. The 189 respondents represented a heterogeneous group of stakeholders involved in tourism- and PPP-related activities in Kazakhstan. In the survey the stakeholder composition of the survey sample and demonstrates the diversity of perspectives included in the quantitative phase. This diversity is important because the study conceptualises PPP resilience as a multidimensional governance capability involving institutional conditions, risk-sharing arrangements, communication, and stakeholder involvement. Including respondents from both public and private organisations, as well as investors, PPP professionals, DMOs, infrastructure authorities, and support institutions, therefore allows the analysis to capture perceptions from different positions within the PPP governance environment.

The largest stakeholder group consisted of representatives of the private tourism and hospitality sector (31.7%), followed by public-sector repre-

sentatives (15.3%), infrastructure and transport authorities (10.6%), PPP policy, legal and regulatory professionals (9.5%), and investors and developers (9.5%). The sample therefore incorporates perspectives from actors involved in different aspects of tourism PPP governance. Although the distribution does not claim to represent the proportional structure of all tourism stakeholders in Kazakhstan, the heterogeneous composition is appropriate for examining stakeholder perceptions of PPP governance and resilience.

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This composition allowed the study to incorporate perspectives from both public and private actors as well as organisations supporting or interacting with tourism PPPs.

Interviews were conducted between 3 March and 29 May 2026 as part of the fieldwork period. Interviews were conducted in both online and offline formats. The duration of individual interviews ranged from approximately 20 minutes to 1.5 hours. With participants' permission, interviews were recorded using audio and/or video recording. Participants were informed about the purpose of the study, voluntary participation, confidentiality, and the use of interview data for academic research. The recorded interviews were transcribed prior to analysis.

The qualitative data were analysed using thematic analysis. The analysis followed several stages: transcription of interview recordings, familiarisation with the transcripts, identification of meaningful statements, initial coding, grouping related codes, development of broader themes, review and refinement of themes, interpretation of themes in relation to the quantitative findings. Five major themes emerged: (1) institutional support and regulatory stability; (2) risk-sharing and adaptive risk management; (3) stakeholder communication; (4) stakeholder involvement; and (5) adaptive governance and PPP continuity.

The quantitative data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM). PLS-SEM was selected because the study seeks to examine relationships among multiple latent constructs and to assess the explanatory capacity of an integrated governance model (Hair & Alamer, 2022). The analysis included: indicator reliability, internal consistency reliability, Cronbach's

alpha, rho_A, composite reliability (CR), average variance extracted (AVE), discriminant validity using HTMT, variance inflation factor (VIF), structural path coefficients, bootstrapped t-values, p-values, confidence intervals, effect sizes (f^2), coefficient of determination (R^2). Bootstrapping was used to evaluate the statistical significance of the structural relationships (Hair *et al.*, 2021; Hair *et al.*, 2022).

Participation in the survey and interviews was voluntary. Participants were informed about the purpose of the study and the academic use of the collected data. Given the specialised nature of tourism and PPPs in Kazakhstan, participants were recruited through the researchers' professional networks and snowball sampling. Survey responses were treated confidentially, while interview data were anonymised during transcription and analysis. Participants provided consent before audio/video recording. Particular care was taken to protect participants' anonymity and ensure that professional relationships did not influence their decision to participate.

Results and discussion

A total of 189 valid questionnaires were included in the quantitative analysis. The respondents represented the principal stakeholder groups involved in tourism-related PPPs in Kazakhstan. The sample included public authorities, private tourism and hospitality businesses, PPP project participants, regulatory and legal professionals, infrastructure authorities, investors, destination-management organisations, PPP support institutions, academics, and NGOs. The largest category was the private tourism/hospitality sector (31.7%), while public-sector representatives accounted for 15.3%. The presence of investors, PPP professionals, infrastructure authorities, DMOs, NGOs, and academic participants provided perspectives from multiple sides of the PPP governance process.

Table 1 presents the descriptive statistics for the six constructs included in the conceptual model: Institutional Support (IS), Regulatory Stability (RS), Risk-Sharing Mechanisms (RSM), Stakeholder Communication (SC), Stakeholder Involvement (SI), and PPP Resilience (PPPR). The table provides an initial overview of respondents' perceptions of the governance conditions and resilience of tourism PPPs before assessment of the measurement and structural models. As shown in Table 3, the mean scores for all six constructs were above the mid-point of the five-point Likert scale, indicating gen-

erally moderate-to-positive perceptions of the governance conditions and PPP resilience. Stakeholder Communication recorded the highest mean score ($M = 3.83$, $SD = 0.68$), followed by PPP Resilience ($M = 3.79$, $SD = 0.70$) and Stakeholder Involvement ($M = 3.76$, $SD = 0.73$). Institutional Support also received a relatively positive assessment ($M = 3.74$, $SD = 0.71$). In contrast, Risk-Sharing Mechanisms recorded the lowest mean score ($M = 3.51$, $SD = 0.82$), followed by Regulatory Stability ($M = 3.58$, $SD = 0.79$). This pattern suggests that respondents perceived relational governance conditions, particularly communication and stakeholder involvement, somewhat more positively than formal regulatory and risk-sharing mechanisms. The relatively lower assessment of risk-sharing mechanisms may indicate an area of governance vulnerability, particularly given the exposure of tourism PPPs to demand, operational, financial, and market uncertainties.

Table 1
Descriptive statistics of the main constructs

Construct	Mean	SD
Institutional Support (IS)	3.74	0.71
Regulatory Stability (RS)	3.58	0.79
Risk-Sharing Mechanisms (RSM)	3.51	0.82
Stakeholder Communication (SC)	3.83	0.68
Stakeholder Involvement (SI)	3.76	0.73
PPP Resilience (PPPR)	3.79	0.70

Note: Mean scores are based on a five-point Likert scale. SD = standard deviation. Compiled by the author

These descriptive results provide context for the subsequent measurement and structural analyses. In particular, the relatively high assessment of Stakeholder Involvement and the comparatively lower assessment of Risk-Sharing Mechanisms provide useful background for interpreting their respective relationships with PPP resilience in the structural model. However, the descriptive statistics do not establish predictive relationships; these are assessed subsequently through PLS-SEM (Hair & Alamer, 2022; Hair et al., 2022).

Measurement model assessment. All retained indicators demonstrated satisfactory outer loadings, ranging from 0.714 to 0.891, indicating acceptable

indicator reliability. The reliability and convergent validity of the six constructs were assessed using Cronbach's alpha, rho_A, composite reliability (CR), and average variance extracted (AVE). The results are presented in Table 4. As shown in Table 4, Cronbach's alpha values ranged from 0.861 to 0.901, while rho_A values ranged from 0.866 to 0.905. Composite reliability values ranged from 0.902 to 0.930. All reliability coefficients exceeded the commonly accepted threshold of 0.70, providing evidence of satisfactory internal consistency among the indicators measuring each latent construct. The AVE values ranged from 0.646 to 0.727, exceeding the recommended minimum threshold of 0.50. These results demonstrate satisfactory convergent validity, indicating that each construct explains a substantial proportion of the variance in its corresponding indicators (Table 2).

Overall, the measurement model demonstrated satisfactory indicator reliability, internal consistency reliability, and convergent validity across all six constructs: Institutional Support, Regulatory Stability, Risk-Sharing Mechanisms, Stakeholder Communication, Stakeholder Involvement, and PPP Resilience. These results provide an adequate measurement basis for proceeding to the assessment of discriminant validity and the structural model.

Collinearity assessment. Variance inflation factor (VIF) values for the five predictor constructs ranged from 1.72 to 2.41. All values were below 3.00, indicating that problematic multicollinearity was not present among the predictors. These results support the suitability of the predictor constructs for inclusion in the structural model.

Table 3 presents the structural model results and hypothesis-testing outcomes, including the standardised path coefficients (β), t-values, p-values, confidence intervals, effect sizes (f^2), and decisions regarding H1–H5.

All five hypothesised relationships were positive and statistically significant. Stakeholder Involvement demonstrated the strongest relationship with PPP resilience ($\beta = 0.267$, $t = 4.193$, $p < 0.001$), followed by Risk-Sharing Mechanisms ($\beta = 0.241$, $t = 3.674$, $p < 0.001$), Institutional Support ($\beta = 0.214$, $t = 3.287$, $p < 0.001$), Regulatory Stability ($\beta = 0.196$, $t = 2.941$, $p = 0.003$), and Stakeholder Communication ($\beta = 0.181$, $t = 2.782$, $p = 0.006$). As reported in Table 5, all five hypotheses were supported.

Table 2*Reliability and convergent validity of the measurement model*

Construct	Cronbach's α	rho_A	CR	AVE
Institutional Support	0.874	0.879	0.911	0.673
Regulatory Stability	0.861	0.866	0.902	0.646
Risk-Sharing Mechanisms	0.883	0.889	0.918	0.692
Stakeholder Communication	0.892	0.897	0.926	0.715
Stakeholder Involvement	0.879	0.884	0.914	0.681
PPP Resilience	0.901	0.905	0.930	0.727

Note: CR = composite reliability; AVE = average variance extracted. Compiled by the author

Table 3*Structural model results and hypothesis testing*

Hypothesis	Relationship	β	t	p	95% CI	f ²	Decision
H1	IS $\rightarrow$ PPPR	0.214	3.287	<0.001	[0.086, 0.343]	0.071	Supported
H2	RS $\rightarrow$ PPPR	0.196	2.941	0.003	[0.067, 0.327]	0.058	Supported
H3	RSM $\rightarrow$ PPPR	0.241	3.674	<0.001	[0.111, 0.369]	0.094	Supported
H4	SC $\rightarrow$ PPPR	0.181	2.782	0.006	[0.054, 0.307]	0.048	Supported
H5	SI $\rightarrow$ PPPR	0.267	4.193	<0.001	[0.139, 0.392]	0.116	Supported

Note: Created by the authors

Effect sizes. The f^2 values ranged from 0.048 to 0.116. Stakeholder involvement demonstrated the largest individual effect size ($f^2 = 0.116$), followed by risk-sharing mechanisms ($f^2 = 0.094$). The results indicate that the determinants do not operate as a single dominant factor. These findings suggest that PPP resilience is shaped by complementary relational governance and adaptive contractual mechanisms.

The structural model produced: $R^2 = 0.612$ and Adjusted $R^2 = 0.601$. Thus, the five predictors jointly explain approximately 61.2% of the variance in PPP resilience. This level of explanatory power suggests that PPP resilience is substantially associated with the governance conditions represented in the conceptual model, while also indicating that resilience is influenced by additional contextual and partnership-specific factors beyond the five examined dimensions.

The remaining variance may reflect additional factors not included in the model, including macro-economic conditions, tourism-demand fluctuations, project-specific financial conditions, leadership, technological change, political conditions, and destination-level characteristics.

Qualitative findings

Theme 1. Institutional and regulatory stability

Participants emphasised the importance of predictable institutional arrangements. Interviewees indicated that changes in administrative requirements, approval procedures, and regulatory interpretation may create uncertainty and delay PPP implementation. The qualitative evidence therefore complements the quantitative finding that regulatory stability is positively associated with PPP resilience.

Theme 2. Risk-sharing and adaptive risk management

Risk-sharing emerged as a particularly important theme. Participants referred to tourism PPP vulnerability to changes in visitor demand, operating costs, financing conditions, and investment requirements. Interviewees indicated that resilience requires a clearer allocation of risks between public and private partners.

Theme 3. Stakeholder communication

Interviewees described communication as important for preventing misunderstandings and resolving operational problems. Regular communication between government agencies, investors, tourism operators, and other stakeholders was con-

sidered especially important during periods of uncertainty.

Theme 4. Stakeholder involvement

Stakeholder involvement emerged as the strongest predictor in the quantitative model. The qualitative evidence provides a conceptual explanation for this relationship: early and meaningful involvement enables stakeholders to contribute local knowledge, identify emerging risks, anticipate operational problems, and participate in collective problem-solving before disagreements develop into major conflicts. Thus, stakeholder involvement appears to function as an adaptive governance capability through which PPPs mobilise distributed knowledge and strengthen their capacity to respond to uncertainty.

Theme 5. Adaptive governance

The interviews further indicated that resilience involves the capacity to modify operational arrangements while maintaining the core objectives of a PPP. Participants referred to flexible decision-making, communication, renegotiation where justified, and coordinated responses to external shocks.

Conceptual Interpretation of the Findings

The findings provide empirical support for conceptualising PPP resilience as a governance capability of tourism public-private partnerships rather than as a measure of tourism-sector sustainability. The five governance dimensions examined in the study—Institutional Support, Regulatory Stability, Risk-Sharing Mechanisms, Stakeholder Communication, and Stakeholder Involvement—were all positively and significantly associated with PPP resilience. This indicates that the capacity of tourism PPPs to absorb disruptions, adapt to changing conditions, coordinate participating actors, and maintain essential partnership functions is shaped by the quality of their institutional, regulatory, contractual, and relational governance arrangements.

The relative strength of the relationships provides further conceptual insight. Stakeholder involvement demonstrated the strongest relationship with PPP resilience ($\beta = 0.267$, $p < 0.001$; $f^2 = 0.116$), followed by risk-sharing mechanisms ($\beta = 0.241$, $p < 0.001$; $f^2 = 0.094$) and institutional support ($\beta = 0.214$, $p < 0.001$; $f^2 = 0.071$). These findings suggest that PPP resilience is not produced solely by formal institutional conditions. Rather, resilience appears to emerge through the interaction of relational governance and adaptive contractual mechanisms. Active stakeholder involvement can facilitate access to local knowledge, early identification of emerging risks, joint problem-solving, and coordinated responses, while appropriate risk-sharing enables

partners to distribute and manage the consequences of uncertainty.

Regulatory stability also demonstrated a significant positive relationship with PPP resilience ($\beta = 0.196$, $p = 0.003$). Conceptually, this finding indicates that adaptive capacity does not imply the absence of institutional stability. Instead, resilience requires a balance between predictability and adaptability. PPP partners need sufficiently stable regulatory conditions to make long-term commitments while also requiring mechanisms that allow contractual and governance arrangements to be adjusted when significant external disruptions occur.

Stakeholder communication showed the smallest, although still significant, relationship with PPP resilience ($\beta = 0.181$, $p = 0.006$). This finding suggests that communication may function primarily as an enabling mechanism through which other governance capabilities are activated. Information exchange allows stakeholders to identify problems, coordinate actions, and negotiate responses, thereby supporting the practical implementation of stakeholder involvement, risk management, and adaptive governance.

The explanatory power of the model ($R^2 = 0.612$; adjusted $R^2 = 0.601$) further supports a multidimensional conceptualisation of PPP resilience. The findings indicate that resilience cannot be adequately explained by a single institutional, financial, or stakeholder factor. Instead, it represents a governance capacity emerging from complementary institutional, regulatory, contractual, and relational mechanisms. The qualitative findings reinforce this interpretation by identifying regulatory predictability, adaptive risk allocation, stakeholder communication, stakeholder involvement, and adaptive governance as mechanisms through which tourism PPPs respond to uncertainty and maintain continuity.

Importantly, these findings should not be interpreted as evidence of tourism-sector sustainability. The dependent construct in this study is specifically PPP resilience, referring to the capacity of tourism-related public-private partnership arrangements to absorb disturbances, adapt governance and contractual arrangements, coordinate stakeholders, manage risks, and maintain essential partnership functions. Tourism sustainability, by contrast, concerns the long-term environmental, economic, social, and cultural sustainability of tourism development. Thus, the present findings concern the resilience of the PPP governance and partnership mechanism, rather than the sustainability performance of Kazakhstan's tourism sector or individual tourism destinations.

The findings demonstrate a positive relationship between institutional support and PPP resilience ($\beta = 0.214$, $p < 0.001$). A supportive institutional environment can reduce uncertainty by clarifying responsibilities, facilitating coordination, and improving access to public-sector resources. However, the relatively modest effect size ($f^2 = 0.071$) indicates that institutional support should not be viewed as sufficient by itself. Its contribution appears to operate alongside financial, regulatory, and stakeholder mechanisms.

Regulatory stability demonstrated a positive relationship with PPP resilience ($\beta = 0.196$, $p = 0.003$). The result is particularly relevant for long-term tourism investments because investors must make decisions based on expectations about future regulatory conditions. The comparatively low mean for regulatory stability ($M = 3.58$) suggests that respondents perceive regulatory conditions less positively than communication conditions. This points to the importance of improving regulatory predictability and administrative consistency.

Risk-sharing demonstrated a positive relationship with resilience ($\beta = 0.241$, $p < 0.001$). The result indicates that the resilience of tourism PPPs depends partly on whether financial, operational, demand, and market risks are allocated appropriately. The relatively low mean score for risk-sharing ($M = 3.51$) is noteworthy because it suggests that risk allocation remains an area requiring improvement. Kazakhstan's PPP framework itself emphasises balanced distribution of responsibilities, guarantees, risks, and revenues between public and private partners. An important finding is the relatively low descriptive assessment of Risk-Sharing Mechanisms ($M = 3.51$; Table 2), despite its relatively strong positive relationship with PPP resilience ($\beta = 0.241$, $p < 0.001$). This combination is theoretically meaningful. It suggests that risk-sharing is perceived as a comparatively weaker aspect of current PPP governance, while at the same time being an important determinant of resilience. Thus, improving risk allocation and risk-management arrangements may represent a particularly important opportunity for strengthening tourism PPP resilience in Kazakhstan.

Stakeholder communication was positively associated with resilience ($\beta = 0.181$, $p = 0.006$). Although its coefficient was the smallest among the five predictors, communication provides a mechanism through which stakeholders can exchange information and coordinate responses to emerging problems. The qualitative evidence supports this interpretation.

Stakeholder involvement demonstrated the strongest relationship with PPP resilience ($\beta = 0.267$, $t = 4.193$, $p < 0.001$). This suggests that resilience is strongly associated with the degree to which relevant stakeholders participate in decision-making, information exchange, implementation, and problem-solving. The finding supports a conceptualisation of resilience as a relational governance capability rather than merely a financial outcome. Stakeholder Involvement received a relatively high mean score ($M = 3.76$; Table 2) and demonstrated the strongest relationship with PPP resilience ($\beta = 0.267$, $p < 0.001$). The consistency between the descriptive and structural findings strengthens the interpretation that stakeholder participation represents an important governance capability within tourism PPPs.

The findings indicate that tourism PPP resilience is multidimensional. Rather than depending on a single factor, resilience appears to involve institutional capacity, regulatory predictability, risk allocation, communication, stakeholder involvement. The model explains 61.2% of the variance in PPP resilience, indicating meaningful explanatory power. The relatively stronger relationships of stakeholder involvement and risk-sharing suggest that resilience requires both relational governance and contractual/financial adaptability.

The findings provide theoretical support for understanding tourism public-private partnership (PPP) resilience as a multidimensional governance capability shaped by institutional, relational, and adaptive mechanisms. All five governance dimensions examined in the study—Institutional Support, Regulatory Stability, Risk-Sharing Mechanisms, Stakeholder Communication, and Stakeholder Involvement—demonstrated positive and statistically significant relationships with PPP resilience. These findings extend the understanding of PPP resilience beyond conventional financial and project-performance perspectives by demonstrating that the ability of tourism PPPs to maintain continuity under uncertainty is also dependent on the institutional environment, stakeholder relationships, and adaptive governance mechanisms.

In this study, resilience is treated as a property of the PPP arrangement rather than as an indicator of tourism-sector sustainability. Tourism sector sustainability concerns the long-term environmental, economic, social, and cultural sustainability of tourism development and destinations. By contrast, PPP resilience concerns the capacity of a specific public-private partnership arrangement to withstand disruptions, adapt to changing conditions, manage

risks, maintain stakeholder coordination, and preserve essential partnership functions.

Thus, the present study does not assess the sustainability of Kazakhstan's tourism sector or the sustainability performance of tourism destinations. Instead, it examines the resilience of tourism-related PPP arrangements as governance and implementation mechanisms within the tourism sector.

The findings on Institutional Support ($\beta = 0.214$, $p < 0.001$) and Regulatory Stability ($\beta = 0.196$, $p = 0.003$) are consistent with the central assumptions of Institutional Theory, which emphasises that organisational behaviour and performance are influenced by the institutional rules, norms, structures, and expectations within which organisations operate. In the context of tourism PPPs, institutional conditions shape the predictability of decision-making, allocation of responsibilities, regulatory compliance, and interactions between public and private actors.

The significant relationship between Institutional Support and PPP resilience suggests that supportive institutional arrangements provide an important foundation for maintaining partnership continuity during periods of uncertainty. Institutional support can reduce administrative uncertainty, facilitate coordination between public and private actors, and provide access to organisational and regulatory resources. This finding indicates that institutions do not merely establish the initial conditions for PPP implementation; they also contribute to the capacity of PPP arrangements to adapt and continue functioning when external conditions change.

Similarly, the positive effect of Regulatory Stability indicates that predictable and consistent regulatory conditions are important for PPP resilience. The finding is particularly relevant to tourism PPPs because such partnerships typically involve long-term investment commitments and interaction with multiple public authorities. Frequent regulatory changes, inconsistent interpretation of requirements, or uncertainty concerning administrative procedures may increase transaction costs and weaken the ability of partners to respond effectively to disruptions.

However, the findings also suggest that institutional resilience should not be understood as rigid institutional stability. Rather, the results point towards a balance between predictability and adaptability. Stable rules provide the certainty required for long-term cooperation, while sufficiently flexible institutional arrangements allow partners to modify procedures and contractual arrangements when unexpected circumstances arise. Thus, from an Institutional Theory perspective, resilient tourism PPPs re-

quire institutions that are simultaneously predictable enough to reduce uncertainty and adaptable enough to accommodate change.

The strongest relationship in the structural model was observed between Stakeholder Involvement and PPP resilience ($\beta = 0.267$, $p < 0.001$, $f^2 = 0.116$). This finding provides strong empirical support for the relevance of Stakeholder Theory to tourism PPP resilience. Stakeholder Theory emphasises that organisational outcomes are influenced by relationships among actors who affect, or are affected by, organisational activities.

Tourism PPPs are particularly dependent on stakeholder relationships because their implementation involves public authorities, private businesses, investors, destination-management organisations, local actors, infrastructure providers, and other institutions. Consequently, the resilience of a PPP cannot be explained exclusively by the resources or capabilities of either the public or private partner.

The stronger effect of stakeholder involvement suggests that active participation may be more important for resilience than stakeholder presence alone. Meaningful involvement enables stakeholders to contribute local knowledge, identify emerging risks, communicate operational difficulties, and participate in collective problem-solving. Such participation can improve the ability of PPP partners to identify problems at an early stage and develop coordinated responses before disruptions become more serious.

The qualitative findings reinforce this interpretation. Interview participants emphasised the importance of early stakeholder participation, information exchange, joint problem-solving, and coordination. These findings suggest that stakeholder involvement operates not simply as a governance principle but as a practical resilience mechanism. By mobilising knowledge and capabilities distributed across different stakeholder groups, participation increases the capacity of PPPs to respond collectively to uncertainty.

This finding extends the application of Stakeholder Theory in the tourism PPP context. Rather than treating stakeholder involvement primarily as a means of improving legitimacy or reducing conflict, the findings indicate that stakeholder participation can contribute directly to the adaptive capacity and continuity of PPP arrangements (Ghanem et al., 2021; Kusio, 2021).

The relationship between Risk-Sharing Mechanisms and PPP resilience was also relatively strong ($\beta = 0.241$, $p < 0.001$, $f^2 = 0.094$). This finding can

be interpreted through Resilience Theory, particularly the emphasis on the capacity of systems to absorb disturbances, adapt to changing conditions, and maintain essential functions.

Tourism PPPs are exposed to multiple forms of uncertainty, including fluctuations in tourist demand, changing operating costs, financial pressures, regulatory changes, and unexpected external disruptions. In such conditions, resilience depends partly on whether risks are appropriately identified, allocated, monitored, and managed among the participating partners.

The positive relationship between risk-sharing mechanisms and PPP resilience therefore suggests that resilience is partly generated through the capacity to distribute and adapt to risk rather than simply to avoid risk. When risks are allocated according to the capabilities and responsibilities of the participating actors, partners may be better positioned to absorb shocks and maintain essential partnership functions.

The qualitative findings further support this interpretation. Participants highlighted the importance of flexible risk allocation, financial adaptability, and the capacity to adjust operational arrangements when external conditions change. These findings demonstrate that resilience is not equivalent to maintaining existing arrangements unchanged. Instead, resilient PPPs are capable of adjusting governance and risk-management arrangements while preserving their core objectives.

From a Resilience Theory perspective, this indicates that tourism PPP resilience involves both absorptive capacity and adaptive capacity. Absorptive capacity refers to the ability to withstand disruptions without losing essential functions, whereas adaptive capacity concerns the ability to modify governance, contractual, operational, or relational arrangements in response to changing circumstances.

Stakeholder Communication had the smallest coefficient among the five predictors, although the relationship remained statistically significant ($\beta = 0.181$, $p = 0.006$). This finding should not be interpreted as indicating that communication is unimportant. Instead, it suggests that communication may operate primarily as an enabling mechanism through which other governance capabilities become effective.

From a Stakeholder Theory perspective, communication facilitates information exchange and coordination between actors with different interests, resources, and responsibilities. From a Resilience Theory perspective, timely communication allows

partners to identify emerging disturbances, share information about risks, coordinate responses, and adjust actions.

The qualitative findings support this interpretation, with participants emphasising regular communication as important for preventing misunderstandings, resolving operational problems, and coordinating responses during periods of uncertainty. Thus, communication may indirectly strengthen resilience by enabling stakeholder involvement, risk management, and adaptive governance.

The relatively smaller coefficient may therefore indicate that communication alone is insufficient to create resilience. Communication becomes more consequential when it is translated into participation, coordinated decision-making, risk management, and adaptive action.

Taken together, the findings suggest that the three theoretical perspectives are complementary rather than competing explanations of tourism PPP resilience. Institutional Theory explains the importance of the external governance environment through institutional support and regulatory stability. These factors establish the conditions under which public and private partners can make decisions and sustain long-term cooperation. Stakeholder Theory explains the relational dimension of resilience through stakeholder communication and involvement. These mechanisms enable the mobilisation of distributed knowledge, coordination of interests, and collective problem-solving. Resilience Theory explains how PPPs transform these institutional and relational conditions into adaptive capacity. In particular, risk-sharing mechanisms enable partners to absorb and respond to uncertainty while maintaining essential partnership functions.

Accordingly, the findings support an integrated conceptualisation in which: Institutional conditions provide the enabling environment, stakeholder relationships provide the relational capacity, and adaptive risk-management mechanisms provide the means through which tourism PPPs respond to disruption and maintain continuity. This integrated interpretation also explains why Stakeholder Involvement emerged as the strongest predictor of PPP resilience. Although institutional and regulatory conditions establish the structural environment for PPP operation, resilience ultimately depends on the capacity of participating actors to mobilise knowledge, coordinate decisions, share risks, and collectively adapt to changing circumstances. The model's explanatory power ($R^2 = 0.612$) further supports this multidimensional interpretation. The five

governance dimensions explain 61.2% of the variance in PPP resilience, indicating that resilience is substantially associated with the institutional, regulatory, risk-sharing, and stakeholder mechanisms incorporated into the conceptual framework. At the same time, the unexplained variance indicates that other contextual and partnership-specific factors may also influence resilience.

Importantly, these theoretical findings concern the resilience of tourism PPP arrangements rather than the sustainability of the tourism sector. The study therefore does not conceptualise PPP resilience as an indicator of environmental, economic, social, or cultural tourism sustainability. Instead, PPP resilience refers specifically to the capacity of tourism-related partnership arrangements to absorb disruptions, adapt governance and contractual arrangements, coordinate stakeholders, manage risks, and maintain essential partnership functions over time.

National authorities should strengthen regulatory predictability and transparency in tourism PPPs. PPP frameworks should establish clearer mechanisms for justified adaptation when major external shocks occur.

Regional authorities should establish structured coordination platforms involving public authorities, private investors, tourism businesses, DMOs, local stakeholders, PPP support organisations.

Private partners should evaluate regulatory, operational, demand, financial, and stakeholder risks before entering long-term PPP agreements. Risk allocation should be based on the capacity of each partner to manage particular risks.

PPP managers should introduce regular stakeholder meetings, formal communication protocols, joint risk monitoring, early-warning mechanisms, transparent reporting, conflict-resolution procedures.

Destination-level organisations should be actively incorporated into PPP governance. Local stakeholders can provide knowledge concerning social, cultural, economic, environmental, and operational conditions that may not be available to national-level actors.

Based on the findings, five policy directions are proposed.

1. Strengthen regulatory predictability. Government agencies should reduce unnecessary regulatory changes and provide timely information when changes are unavoidable.

2. Institutionalise risk-sharing. Tourism PPP agreements should explicitly identify financial, de-

mand, operational, construction, and regulatory risks and specify the responsible party.

3. Institutionalise stakeholder engagement. Stakeholder participation should continue throughout the PPP lifecycle rather than being limited to the project-planning stage.

4. Strengthen communication mechanisms. Formal communication channels should connect national authorities, regional administrations, investors, tourism operators, DMOs, and other stakeholders.

5. Introduce resilience-oriented monitoring. PPP monitoring should include indicators of regulatory stability, stakeholder participation, risk exposure, communication, adaptive capacity, continuity of project operations.

Conclusion

This study examined the determinants of resilience in tourism public-private partnerships in Kazakhstan. Using an explanatory sequential mixed-methods design, the study combined evidence from 189 survey respondents and 15 semi-structured interviews. The composition of the quantitative sample included stakeholders from public authorities, private tourism and hospitality businesses, PPP professionals, investors, destination-management organisations, infrastructure-related institutions, and other tourism stakeholders, providing perspectives from different positions within the tourism PPP governance environment.

The descriptive findings indicated generally moderate-to-positive perceptions across the six constructs examined. Stakeholder Communication received the highest mean score ($M = 3.83$), followed by PPP Resilience ($M = 3.79$) and Stakeholder Involvement ($M = 3.76$), whereas Risk-Sharing Mechanisms received the lowest mean score ($M = 3.51$), followed by Regulatory Stability ($M = 3.58$). The structural analysis demonstrated positive and statistically significant relationships between all five proposed determinants and PPP resilience. Stakeholder Involvement showed the strongest relationship with resilience, followed by Risk-Sharing Mechanisms and Institutional Support. Regulatory Stability and Stakeholder Communication also demonstrated statistically significant positive relationships.

The findings indicate that tourism PPP resilience should be understood as a multidimensional governance capability rather than solely as a financial or project-performance outcome. The qualitative findings reinforce this interpretation by showing that stakeholders associate resilience with regulatory

predictability, appropriate risk allocation, effective communication, meaningful stakeholder participation, and adaptive decision-making.

The study therefore contributes to the tourism PPP literature by shifting attention from the establishment and financing of PPPs toward the governance mechanisms that enable partnerships to maintain essential functions and adapt under uncertainty. The findings also extend Institutional, Stakeholder, and Resilience Theory by demonstrating that PPP resilience emerges from the interaction of institutional conditions, stakeholder relationships, and adaptive risk-management mechanisms.

For Kazakhstan, the findings indicate that improving PPP resilience requires more than increasing private investment. It requires an institutional environment that provides regulatory predictability, contractual arrangements that allocate risks appropriately, communication mechanisms that facilitate coordination, and governance arrangements that meaningfully involve relevant stakeholders. In this respect, strengthening stakeholder involvement and risk-sharing mechanisms appears particularly important, given their relatively strong relationships with PPP resilience.

Importantly, the study concerns the resilience of tourism-related PPP arrangements rather than the sustainability of Kazakhstan's tourism sector. PPP resilience refers to the capacity of partnership arrangements to absorb disruptions, adapt governance and contractual arrangements, coordinate stakeholders, manage risks, and maintain essential partnership functions over time.

The study has several limitations. First, the study focuses on Kazakhstan. Consequently, the findings should be interpreted within the country's institu-

tional, regulatory, and economic context. Second, the quantitative component is based primarily on stakeholder perceptions. Future studies should combine perceptual measures with objective project-level indicators such as investment, project duration, financial performance, visitor numbers, employment, and project continuity. Third, the cross-sectional survey design limits causal interpretation. The observed relationships should therefore be understood as associations rather than definitive causal effects. Fourth, the model includes five principal determinants. Other variables, including leadership, political stability, digitalisation, organisational learning, destination attractiveness, and macroeconomic conditions, could be incorporated in future research.

Finally, comparative studies involving other Central Asian and emerging tourism economies could determine whether the relationships identified in Kazakhstan are context-specific or reflect broader patterns of tourism PPP resilience.

Funding

This study was supported by funding from the authors.

Conflict of interest

The authors declare that there is no conflict of interest.

Authors' contributions

BY: *Conceptualization, conducting the research, data collection, and writing – preparation of the initial draft.*

BZhA: *Conceptualization, writing – review and editing.*

AMN: *Methodology and formal analysis.*

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Received: 17 August 2026
Accepted: 20 September 2026

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KEY DIGITAL ADVERTISING MEASUREMENT CHALLENGES IN KAZAKHSTAN

Digital advertising in Kazakhstan is expanding rapidly, yet the growing volume of platform-generated data does not necessarily provide a complete account of advertising effectiveness. Because these indicators inform campaign optimisation and advertising decisions, uncertainty about the constructs they can validly represent creates a practical need for a structured assessment of the broader measurement environment. This study aims to identify, prioritise, and map the macro-environmental conditions shaping the adequacy and interpretation of conventional digital advertising metrics in Kazakhstan. Its scientific significance lies in integrating documentary analysis with multi-criteria modelling to distinguish the local importance of measurement-related conditions from their structural influence. Its practical relevance concerns the selection and interpretation of metrics for advertising decision-making.

A sequential documentary and mathematical modelling design combined an adapted PESTEL framework with the Analytic Hierarchy Process (AHP), the Decision-Making Trial and Evaluation Laboratory (DEMATEL), a DEMATEL-informed adjustment of AHP priorities, and sensitivity analysis. Four dimensions were identified: Political-Legal, Economic, Social, and Technological. AHP ranked Technological conditions first (0.3854), followed by Social (0.3399), Economic (0.1813), and Political-Legal conditions (0.0934). DEMATEL identified Technological and Political-Legal conditions as net drivers, whereas Economic and Social conditions occupied net effect positions. The network adjustment preserved the ranking while producing a more balanced priority distribution. The principal ranking and driver-effect structure also remained stable under the tested alternative judgments.

The findings indicate that Kazakhstan's measurement challenge is not simply insufficient data, but a potential mismatch between sophisticated systems of digital delivery and the narrower constructs captured by routine platform indicators. The study contributes a transparent preliminary framework for aligning advertising objectives, target constructs, metrics, and interpretive boundaries. In practice, the framework can support advertisers, agencies, and analysts in determining when platform metrics are sufficient and when complementary evidence is required.

Keywords: digital advertising, advertising measurement, advertising effectiveness, AHP-DEMATEL, Kazakhstan.

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Қазақстандағы цифрлық жарнаманы өлшеудің негізгі мәселелері

Қазақстанда цифрлық жарнама қарқынды дамып келеді, алайда платформалар қалыптастыратын деректер көлемінің ұлғаюы жарнама тиімділігі туралы әрдайым толық түсінік бере бермейді. Бұл көрсеткіштер жарнамалық науқандарды оңтайландыру және шешім қабылдау үшін қолданылатындықтан, олардың қандай конструкторды дұрыс көрсете алатынына қатысты белгісіздік өлшеудің кеңірек ортасын құрылымдық бағалаудың практикалық қажеттілігін туындатады. Зерттеудің мақсаты – Қазақстандағы кеңінен қолданылатын цифрлық жарнама метрикаларының барабарлығы мен интерпретациясына ықпал ететін макроорта жағдайларын анықтау, басымдыққа қою және өзара байланысын картаға түсіру. Жұмыстың ғылыми маңыздылығы құжаттық талдау мен көпкритерийлі модельдеуді біріктіру арқылы өлшеуге қатысты жағдайлардың жергілікті маңызын олардың құрылымдық ықпалынан ажыратуға мүмкіндік беруімен айқындалады. Практикалық маңыздылығы жарнама саласындағы шешімдерді қабылдау кезінде метрикаларды таңдау мен түсіндіруді қолдауға байланысты.

Құжаттық және математикалық модельдеудің дәйекті дизайны бейімделген PESTEL моделін, иерархияларды талдау әдісін (AHP), DEMATEL әдісін, AHP басымдықтарын DEMATEL негізінде түзетуді және сезімталдық талдауын біріктірді. Құжаттық деректер төрт өлшемді қалыптастыру және авторлар жасаған жұптық салыстырулар мен ықпал жөніндегі пайымдауларды негіздеу үшін

үшін пайдаланылды. АНР нәтижесі бойынша технологиялық өлшем ең жоғары жергілікті басымдыққа ие болды (0,3854), одан кейін әлеуметтік (0,3399), экономикалық (0,1813) және саяси-құқықтық (0,0934) өлшемдер орналасты. DEMATEL технологиялық және саяси-құқықтық жағдайларды ықпалды көбірек беретін факторлар, ал экономикалық және әлеуметтік жағдайларды ықпалды көбірек алатын факторлар ретінде анықтады. Желілік түзету бастапқы ранжирлеуді сақтап, басымдықтардың бөлінуін неғұрлым теңгерімді етті. Негізгі ранжирлеу мен «драйвер-әсер» құрылымы тексерілген баламалы пайымдаулар жағдайында да тұрақты болды.

Нәтижелері Қазақстандағы өлшеу мәселесі деректердің жеткіліксіздігімен ғана емес, цифрлық жарнаманы орналастыру мен жеткізудің күрделі жүйелері және стандартты платформалық көрсеткіштер қамтитын неғұрлым тар конструкттар арасындағы ықтимал сәйкессіздікпен де байланысты екенін көрсетеді. Зерттеу жарнама мақсаттарын, нысаналы конструкттарды, метрикаларды және интерпретация шектерін сәйкестендіруге арналған бастапқы модельді ұсынады. Практикада бұл модель жарнама берушілерге, агенттіктерге және талдаушыларға платформалық метрикалардың қай кезде жеткілікті екенін және қай кезде қосымша деректер қажет болатынын анықтауға көмектесе алады.

Түйін сөздер: цифрлық жарнама, цифрлық жарнаманы өлшеу, жарнама тиімділігі, АНР-DEMATEL, Қазақстан.

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Ключевые проблемы измерения цифровой рекламы в Казахстане

Цифровая реклама в Казахстане стремительно развивается, однако увеличение объема данных, генерируемых платформами, не обязательно обеспечивает полное представление об эффективности рекламы. Поскольку эти показатели используются для оптимизации рекламных кампаний и принятия решений, неопределенность в отношении того, какие конструкты они могут корректно отражать, обуславливает практическую необходимость структурированной оценки более широкой среды измерения. Цель исследования – выявить, приоритизировать и отобразить макросредовые условия, определяющие адекватность и интерпретацию общепринятых метрик цифровой рекламы в Казахстане. Научная значимость работы заключается в интеграции документального анализа и многокритериального моделирования, позволяющей разграничить локальную важность условий, связанных с измерением, и их структурное влияние. Практическая значимость состоит в поддержке выбора и интерпретации метрик при принятии решений в сфере рекламы.

Последовательный дизайн документального и математического моделирования объединил адаптированную модель PESTEL, метод анализа иерархий (АНР), метод DEMATEL, DEMATEL-информированную корректировку приоритетов АНР и анализ чувствительности. Документальные данные использовались для формирования четырех измерений и обоснования авторских суждений, положенных в основу попарных сравнений и оценки влияния. Согласно АНР, наивысший локальный приоритет получило технологическое измерение (0,3854), за ним следовали социальное (0,3399), экономическое (0,1813) и политико-правовое (0,0934). DEMATEL определил технологические и политико-правовые условия как факторы-драйверы, тогда как экономические и социальные условия заняли позиции факторов-эффектов. Сетевая корректировка сохранила исходное ранжирование, сделав распределение приоритетов более сбалансированным. Основное ранжирование и структура «драйвер-эффект» также оставались устойчивыми при проверенных альтернативных суждениях.

Результаты показывают, что проблема измерения в Казахстане заключается не только в недостатке данных, но и в возможном несоответствии между сложными системами размещения и доставки цифровой рекламы и более узкими конструктами, отражаемыми стандартными платформенными показателями. Исследование предлагает прозрачную предварительную модель согласования рекламных целей, целевых конструктов, метрик и границ интерпретации. На практике модель может помочь рекламодателям, агентствам и аналитикам определять, когда платформенных метрик достаточно, а когда необходимы дополнительные данные.

Ключевые слова: цифровая реклама, измерение цифровой рекламы, эффективность рекламы, АНР-DEMATEL, Казахстан.

Introduction

Digitalisation has transformed advertising into a data-intensive system of automated delivery, audience targeting, interaction tracking, and performance optimisation. In Kazakhstan, digital formats accounted for an estimated 72.4% of total advertising spending in 2024 and 73.7% in 2025, while the country had 19.2 million internet users in early 2025 (Kemp, 2025; Statista Market Insights, 2025). This expansion has increased the managerial importance of impressions, views, click-through rates, conversions, and return on advertising expenditure.

Greater technical observability, however, does not necessarily provide a complete account of advertising effectiveness. Platform metrics represent operationally defined events: an impression records delivery, while conversions depend on advertiser-selected actions and attribution settings (Google Ads Help, n.d.-a, n.d.-b). These indicators are useful for evaluating particular stages of campaign performance, but they do not independently establish attention, comprehension, memory, brand evaluation, or incremental behavioural effects. Experimental research likewise shows that visual attention may vary despite registered exposure and that causal advertising returns can remain difficult to isolate even in data-rich environments (Johnson, Lewis, & Reiley, 2017; Lewis & Rao, 2015; Sajjacholapunt & Ball, 2014).

This distinction is especially relevant in Kazakhstan, where digital and programmatic delivery, social-media participation, e-commerce platforms, and formal online-advertising regulation are developing simultaneously. Recent Kazakhstan-specific studies have examined market development, targeting and platform dependence, as well as consumer attention to social-media advertising (Smykova *et al.*, 2025; Tursumbayeva & Beifert, 2026). However, these studies focus primarily on market, managerial, or consumer-level phenomena. The unresolved issue is therefore not simply whether more data are available, but whether routinely reported indicators are adequate for the broader decisions and constructs they are used to represent.

Previous research has examined digital exposure, attention, attribution, and incremental effects mainly at the campaign, platform, channel, or consumer level. Less is known about how the broader technological, social, economic, and institutional environment jointly shapes the adequacy and strategic interpretation of advertising measurement

in Kazakhstan. This gap is practically important because external conditions may influence both which metrics are available and how confidently they can support managerial conclusions. Conventional environmental scanning can organise such conditions, but a descriptive framework alone does not establish their relative importance or represent their interdependencies.

On this basis, the study advances the analytical proposition that the principal digital advertising measurement challenge in Kazakhstan is not data scarcity per se, but a potential mismatch between platform-defined observability and the broader constructs inferred from routine metrics, and that the relevant macro-environmental dimensions differ in both local importance and structural influence. At the analytical level, the object of the study is Kazakhstan's national digital advertising market considered as a macro-industrial and institutional system, while the subject is the macro-environmental conditions shaping the adequacy, interpretation, and strategic use of conventional digital advertising metrics.

Accordingly, the study aims to identify, prioritise, and map the macro-environmental conditions shaping the adequacy and interpretation of conventional digital advertising effectiveness metrics in Kazakhstan. To achieve this aim, the study: (1) extracts and consolidates measurement-related dimensions from documentary evidence; (2) estimates their local priorities; (3) maps their direct and indirect interdependencies and derives network-adjusted priorities; and (4) examines the stability of the resulting structure under selected alternative judgments. These tasks are addressed through three research questions: (RQ1) Which measurement-related dimensions emerge from documentary evidence? (RQ2) How are these dimensions prioritised through the Analytic Hierarchy Process (AHP)? (RQ3) What directional influence structure and network-adjusted priorities emerge through the Decision-Making Trial and Evaluation Laboratory (DEMATEL), and how stable are they under the tested alternative judgments?

To answer these questions, the study adopts a sequential documentary and mathematical modelling approach combining adapted PESTEL factor extraction, Analytic Hierarchy Process prioritisation, Decision-Making Trial and Evaluation Laboratory influence mapping, a DEMATEL-informed adjustment of AHP priorities, and sensitivity analysis. Its scientific contribution is a transparent preliminary framework that distinguishes local importance from

structural influence and connects macro-environmental analysis with the interpretation of digital advertising metrics. Its practical significance lies in supporting advertisers, agencies, and analysts in matching metrics to specific decision-relevant constructs, making attribution assumptions explicit, and determining when platform metrics require complementary evidence.

Literature review

From platform observability to advertising effectiveness

The digitalisation of advertising has substantially expanded the range and granularity of observable campaign events. Advertising platforms routinely record impressions, views, clicks, website visits, transactions, and attributed conversions, allowing managers to monitor delivery and response at a level that was difficult to achieve in traditional media. However, the availability of these indicators does not make them interchangeable. Each measure corresponds to a particular operational stage of the advertising process, while advertising effectiveness may also involve attention, comprehension, memory, brand evaluation, behavioural response, and incremental economic outcomes.

The distinction between technical exposure and audience processing is supported by research on online advertising attention. Sajjacholapunt & Ball (2014), using eye tracking and memory tests, demonstrated that banner placement and creative characteristics affected both attention allocation and subsequent memory. More recently, Barnea et al., (2023) found across experimental and field settings that restricting repeated access to content increased attention allocation and viewing time, with downstream effects on comprehension and recall. Kazakhstan-specific evidence points in the same general direction: Smykova et al., (2025), using eye tracking with 17 participants, found that attention to visual and textual elements differed across two social-media advertisements. Together, these studies indicate that registered exposure alone does not determine how advertising content is processed.

Media context and channel boundaries further complicate interpretation. Calder *et al.*, (2009) found that advertising responses were associated with engagement in the surrounding online media experience, while Dinner *et al.*, (2014) showed that traditional, online display, and paid-search advertising can generate own-channel and cross-channel

sales effects. Accordingly, apparently comparable placements may produce different responses, and outcomes recorded within a native platform may not represent the total contribution of advertising.

Observed conversions also do not independently establish incremental advertising effects. Targeting and platform optimisation can make exposed users systematically different from unexposed users, creating a counterfactual problem. Ghost Ads addressed this issue by comparing exposed consumers with control-group counterparts who would otherwise have received the advertisement (Johnson, Lewis, & Nubbemeyer, 2017). Lewis & Rao (2015) further showed that even very large advertising experiments can yield imprecise ROI estimates when true effects are small relative to natural variation in sales, while another study found that extensive covariates provided only limited gains in precision (Johnson, Lewis, & Reiley, 2017). A recent review by Johnson (2023) shows that these challenges remain relevant under contemporary digital delivery, highlighting limited experimental control, non-compliance, identity fragmentation, spillovers, and incrementality optimisation. Data abundance therefore does not remove the need for credible identification and explicit causal assumptions.

Advertising responses may also be nonlinear and heterogeneous. Chae *et al.*, (2019) found that users differed in their responses to accumulated display-ad exposures and identified a subgroup for whom additional impressions were associated with a negative marginal effect on subsequent website visits. The same number of impressions may therefore represent insufficient exposure for one consumer, diminishing returns for another, and excessive repetition for a third. Moreover, website visits themselves remain a distinct outcome rather than a direct equivalent of final conversion or profitability.

These limitations do not imply that conventional platform metrics are invalid. Impressions, clicks, views, and conversions provide meaningful information about technically defined stages of advertising delivery and response. The problem arises when they are used to infer constructs that they do not directly measure. Previous research examined EEG, heart-rate variability, and eye-tracking measures in relation to recall, liking, and YouTube views (Guixeres *et al.*, 2017). Hartnett *et al.*, (2025) more recently compared eight physiological measures of attention to video advertising with EEG and self-reported attention.

Heart rate performed best among the tested scalable measures in distinguishing high- from low-attention ads, while several eye-tracking measures showed limitations for that specific classification task. Their findings reinforce that attention is not a unitary construct and that measurement validity depends on the operational definition, baseline, and intended inference. Complementary measures should therefore be selected for the constructs they can validly represent rather than treated as universal replacements for behavioural or platform indicators.

Recent Kazakhstan-specific research also emphasises the importance of the surrounding market environment. Tursumbayeva & Beifert (2026) identify targeting difficulties, rising advertising costs, limited analytical competencies, and dependence on international platforms among challenges facing digital advertising in Kazakhstan. Together with the consumer-level evidence of Smykova *et al.*, (2025), these studies indicate emerging local academic attention to digital advertising while leaving open how technological, social, economic, and institutional conditions jointly shape the adequacy and interpretation of routine metrics.

Overall, the literature suggests that digital advertising measurement should be understood as a layered rather than unitary process. Platform indicators establish observable events, but their substantive interpretation depends on audience processing, media context, cross-channel behaviour, attribution assumptions, response heterogeneity, and the availability of credible counterfactual evidence. The measurement challenge is therefore not the absence of metrics, but the risk of extending technically defined indicators beyond their construct and inferential boundaries.

From macro-environmental scanning to structured multi-criteria modelling

Macro-environmental analysis is used to organise external conditions that may shape the operation and development of an industry. PESTEL structures these conditions into Political, Economic, Social, Technological, Environmental, and Legal dimensions, allowing a complex environment to be divided into analytically manageable categories. Its value lies primarily in systematic scanning rather than in producing priorities by itself. Accordingly, the framework should be linked to a clearly defined research problem, geographical and sectoral scope, and evidence base rather than applied as a generic checklist.

Recent methodological discussions emphasise that the standard PESTEL structure may be adapted when this is justified by the research context. Karadzhev & Patarchanova (2025) recommend defining the analytical objective and boundaries in advance, drawing on reliable interdisciplinary evidence, interpreting factors rather than merely listing them, and explicitly considering interactions across dimensions. They also identify the artificial separation of macro-environmental categories as a limitation of conventional applications, since political and legal conditions, technological development, social behaviour, and economic incentives frequently influence one another. Their position supports using PESTEL as a flexible organising framework while requiring methodological justification for combining, excluding, or reformulating its standard dimensions.

Nevertheless, a documentary PESTEL analysis remains predominantly classificatory unless an additional procedure is introduced to distinguish the relative importance of the retained dimensions. The Analytic Hierarchy Process addresses this problem through pairwise comparisons. Saaty & Vargas (2012) describe AHP as a method for deriving relative priorities from judgments concerning the importance of criteria in relation to a specified objective. Rather than requiring all criteria to share a natural measurement scale, AHP translates pairwise assessments into a common ratio-scale priority structure. It also provides a consistency assessment that identifies whether the complete set of comparisons contains an excessive level of internal contradiction.

This mathematical structure does not make the resulting priorities independent of judgment. The selection of criteria and the comparisons assigned to them remain conditional on the decision maker's understanding of the problem. Saaty and Vargas explicitly distinguish the mathematical processing of judgments from the subjective preferences and interpretations that generate them. They also note that a comparison matrix may be internally consistent while remaining substantively irrelevant or distant from external values. A low Consistency Ratio should therefore be understood as evidence of internal coherence rather than proof that the resulting weights are objectively correct.

AHP alone also does not fully represent directional interdependencies among dimensions. DEMATEL was developed to transform assessed direct influences into a structural map incorporating

both direct and indirect relations. Si *et al.*, (2018), reviewing 346 DEMATEL applications, identify the method as particularly suitable for examining intertwined factors and distinguishing components that predominantly transmit influence from those that predominantly receive it. In classical DEMATEL, the total-relation matrix is used to calculate prominence, representing the combined influence given and received, and relation, indicating whether a factor occupies a net cause or net effect position within the specified system.

The terms cause and effect in DEMATEL require careful interpretation. They describe the balance of directional influences encoded in the judgment matrix; they do not independently establish temporal or empirical causality. Similarly, prominence indicates a factor's structural involvement within the model rather than its directly observed importance in the external market. This distinction makes AHP and DEMATEL complementary: AHP addresses relative importance under a defined criterion, whereas DEMATEL represents the directional structure of assessed interdependencies.

Quantified PESTEL applications have begun to combine these functions. Karadzhov & Patarchanova (2025) describe AHP as a means of assigning local priorities and DEMATEL as a means of revealing interdependencies between macro-environmental dimensions. However, much of the related literature remains oriented toward expert-based strategic selection, organisational alternatives, or environmental and infrastructure decisions. Within the reviewed advertising literature, measurement studies are generally conducted at the campaign, consumer, platform, or channel level, while macro-environmental studies rarely examine how external conditions shape the interpretation of digital advertising indicators.

The present study connects these two streams by using documentary evidence to construct an adapted PESTEL framework for the digital advertising measurement environment in Kazakhstan, AHP to estimate local priorities, and DEMATEL to map the specified influence structure. The resulting model is intended as a transparent preliminary diagnosis rather than a statistically observed representation of market causality. Its contribution lies in distinguishing the importance of measurement-related dimensions from their structural involvement and in providing a framework that can subsequently be examined, refined, or challenged through stakeholder and campaign-level research.

Materials and methods

Research design and analytical scope

This study employed a desk-based exploratory analytical design to identify, prioritise, and map the macro-environmental conditions shaping the measurement of digital advertising effectiveness in Kazakhstan. The unit of analysis was the national digital advertising market considered as a macro-industrial and institutional system, rather than individual campaigns, firms, platforms, or consumers. The study therefore examined conditions affecting the adequacy, interpretation, and strategic use of conventional advertising metrics; it did not estimate campaign performance, compare metric-level predictive validity, or directly measure audience responses.

The analytical procedure was designed to address the three research questions stated in the Introduction. RQ1 concerned the identification and consolidation of measurement-related macro-environmental dimensions; RQ2 concerned the estimation of their local priorities; and RQ3 concerned their directional influence structure, network-adjusted priorities, and stability under selected alternative judgments.

The study proceeded through five sequential stages: (1) selection and claim-specific appraisal of documentary sources; (2) extraction, consolidation, and organisation of measurement-related factors within an adapted PESTEL framework; (3) estimation of local priorities through the Analytic Hierarchy Process; (4) modelling of direct and indirect interdependencies through the Decision-Making Trial and Evaluation Laboratory and derivation of DEMATEL-informed network-adjusted priorities; and (5) sensitivity and robustness analysis. Stages 1 and 2 addressed RQ1, Stage 3 addressed RQ2, and Stages 4 and 5 addressed RQ3.

The design is therefore described as a sequential documentary and mathematical modelling procedure rather than a mixed-methods study. Documentary evidence informed factor construction and matrix judgments, while the mathematical stages transformed those judgments into priority and influence structures. The resulting weights, ranks, and driver-effect positions are interpreted as outputs of a transparent preliminary decision-support framework, not as empirically established causal properties of Kazakhstan's advertising market. The framework is intended for subsequent examination, refinement, or challenge through stakeholder and campaign-level research.

Documentary corpus and source appraisal

The documentary material was assembled purposively and represented in a claim-level evidence ledger. The ledger contained 25 evidence records: four Political-Legal, nine Economic, six Social, and six Technological. By evidential status, five records concerned observed information, nine concerned estimated information, three concerned legal or policy provisions, seven supported conceptual mechanisms, and one concerned a forecast used only as contextual evidence. The records drew on official statistics, legislation and policy documents, local industry monitoring, commercial market databases, institutional and digital-audience reports, platform documentation, and peer-reviewed literature. Several documents supported more than one claim, and some records synthesised evidence from multiple sources; consequently, the number of ledger records should not be interpreted as the number of independent documents. *(Full source details, claim-level evidential boundaries, and links between the evidence records and model judgments are documented in the supporting Evidence and Judgment Ledger, which is available upon request).*

The broader methodological and conceptual source base covered publications issued between 2009 and July 2026, whereas Kazakhstan-specific

market, audience, and regulatory evidence was concentrated primarily in 2023–2026. One forecast-type evidence record referring to 2028 was retained only as contextual evidence and was not used as a quantitative model input. Documents were selected for their relevance to the identification, definition, or contextualisation of measurement-related factors in Kazakhstan; the corpus was not intended as an exhaustive or systematic review of the national advertising market.

Documentary analysis considered provenance, publication date, geographic and temporal scope, purpose, definitions, market coverage, and methodological transparency (Bowen, 2009). Reported values were classified as administrative observations, monitoring estimates, modelled estimates, or forecasts. Kazakhstan-specific evidence was distinguished from international research used only to support theoretical mechanisms or comparative interpretation.

Sources were appraised on a claim-specific basis. Official records supported statistical and legal claims; industry monitoring was used within its stated channel coverage; commercial databases were retained when they provided otherwise unavailable estimates, but their outputs and exclusions were explicitly labelled; and academic studies supported conceptual links between platform indicators and broader advertising outcomes (Table 1).

Table 1
Documentary evidence base and evidential boundaries

Source category	Principal analytical use	Evidential boundary
Official statistical and legal records	Macroeconomic, demographic, institutional, and regulatory conditions	Advertising-specific detail may be limited; legal provisions do not establish actual market effects
Local industry monitoring	Media expenditure, advertiser concentration, and channel structure	Findings apply only to the monitored media, prices, and periods
Commercial market databases	Market estimates, forecasts, and longitudinal comparison	Model-based outputs depend on definitions, exclusions, and estimation procedures
Institutional and digital-audience reports	E-commerce, platform development, audience access, and creative-economy context	Analytical classifications and advertising reach may not equal statutory categories or unique active users
Peer-reviewed literature	Conceptual mechanisms and methodological justification	International findings are not Kazakhstan-specific effect estimates

Note: compiled by the authors based on the documentary source appraisal and the supporting Evidence and Judgment Ledger. Sources were evaluated on a claim-specific basis; inclusion in the corpus did not imply equal evidential authority across all claims

Cross-source differences were examined by period, channel coverage, geography, currency, treatment of taxes and production costs, and estimation method. Methodologically non-

comparable indicators were reported separately rather than averaged. For example, Statista outputs were treated as model-based estimates, while K Research concentration measures were restricted to

the media covered by its monitoring (K Research Central Asia, 2025; Statista Market Insights, 2025). Numerical transformations were used only when the original values, units, assumptions, and formulas could be reproduced; unsupported transformations were excluded from the prioritisation model.

PESTEL factor extraction and construction of analytical judgments

The factor framework was developed through documentary coding, conceptual consolidation, and relevance screening. Indicators, regulatory changes, market developments, and theoretically relevant mechanisms were extracted as candidate themes and provisionally assigned to PESTEL dimensions. A theme was retained in the model only when the documentary evidence supported a plausible connection with advertising measurement, such as data generation and access, cross-channel

comparability, attribution, or the relationship between technically recorded events and human responses. Other market developments were treated as context rather than mathematical criteria.

Overlapping themes were consolidated into four dimensions: Political-Legal (P/L), Economic (E), Social (S), and Technological (T) (Table 2). Political and Legal factors were combined because the retained themes concerned a closely connected institutional domain of regulation, disclosure, formalisation, data governance, and platform accountability. The Environmental dimension was considered but excluded because the reviewed evidence did not identify a sufficiently direct and distinct mechanism linking it to the adequacy or interpretation of digital advertising metrics in Kazakhstan. This exclusion reflects the study's measurement-specific scope, not the general irrelevance of environmental issues to advertising.

Table 2
Operational definition and interpretive boundaries of the retained dimensions

Dimension	Scope and measurement relevance	Interpretive boundary
Political-Legal	Regulation, disclosure, data governance, market formalisation, and platform accountability shape reporting conditions and access to advertising information	Regulatory development does not itself establish compliance or metric validity
Economic	Expenditure, concentration, cost pressures, budget allocation, and commercial incentives shape demand for attribution and accountable outcomes	Market growth or concentration does not independently demonstrate measurement failure
Social	Demographics, media use, attention, avoidance, trust, and cognitive response affect whether recorded exposure corresponds to meaningful audience reception	International behavioural findings are not Kazakhstan-specific effect estimates
Technological	Infrastructure, platform architecture, algorithmic delivery, data generation, and optimisation determine which events are observed, reported, and attributed	Accurate technical registration does not establish attention, comprehension, persuasion, or causality

Note: compiled by the authors based on documentary coding, conceptual consolidation, and relevance screening. Lower-level documentary themes defined and substantiated the dimensions but were not independently weighted in the AHP-DEMATEL model

The identified 14 lower-level themes defined and substantiated the four dimensions but were not treated as individually observed variables or independently weighted criteria. Modelling at the macro-cluster level maintained conceptual comparability and a tractable number of judgments; detailed source support and limitations were retained in the evidence ledger.

Two distinct judgment sets were constructed. AHP comparisons assessed the relative importance of each dimension in shaping the adequacy and interpretation of digital advertising measurement. They were informed by the directness of the

documented mechanism, the range of outcomes potentially affected, and the dimension's role in structuring available evidence; they did not represent market size, expenditure, or document frequency. DEMATEL judgments instead assessed the direct directional influence of one dimension on another. Influence was recorded only when a plausible documentary mechanism could be articulated; co-occurrence, similarity, and indirect association were insufficient.

Both matrices therefore contained document-informed researcher judgments rather than numerical observations extracted from the sources.

Written rationales preserved the evidence, interpretation, and uncertainty underlying each assessment. No independent expert panel or separate coder generated the matrices, so transparency and traceability were prioritised while external examination of the factor definitions and influence assumptions remains necessary. A dedicated Judgment Ledger worksheet recorded all six unique AHP pairwise comparisons and all twelve off-diagonal DEMATEL directional judgments. Each judgment was linked to the evidence records used to inform its substantive rationale. The ledger documented the assigned value, its interpretation, the supporting rationale and evidence IDs, the authors' confidence in the judgment, its verification

status, and any alternative value examined in the sensitivity analysis.

AHP-DEMATEL modelling and network adjustment

The four retained dimensions were analysed through a sequential AHP-DEMATEL procedure. AHP estimated their relative local priorities, DEMATEL represented the specified direct and indirect influence structure, and the DEMATEL total-relation matrix was subsequently used to obtain network-adjusted priorities.

For AHP, pairwise judgments followed Saaty's fundamental scale and formed the reciprocal matrix reported in Table 3 (Saaty & Vargas, 2012).

Table 3

Document-informed judgment matrices used in the AHP-DEMATEL model

Panel A. AHP pairwise-comparison matrix

Dimension	P/L	E	S	T
P/L	1	1/2	1/3	1/5
E	2	1	1/2	1/2
S	3	2	1	1
T	5	2	1	1

Panel B. DEMATEL direct-relation matrix

Influencing ↓ / Receiving →	P/L	E	S	T
P/L	0	3	1	2
E	1	0	3	3
S	1	3	0	4
T	2	4	4	0

Note: compiled by the authors based on document-informed researcher judgments recorded in the supporting Judgment Ledger. AHP entries represent relative importance. DEMATEL entries represent assessed direct influence, where 0 denotes no influence and 4 denotes very high influence. Both matrices contain document-informed researcher judgments rather than numerical observations extracted directly from the documentary sources

The matrix was normalised by columns, and the local priority of dimension i was calculated by row averaging:

$$\tilde{a}_{ij} = \frac{a_{ij}}{\sum_{k=1}^n a_{kj}}, \quad w_i = \frac{1}{n} \sum_{j=1}^n \tilde{a}_{ij} \quad (1)$$

where:

$\tilde{a}_{ij}$ – normalised element in row i and column j of the AHP pairwise-comparison matrix;

a_{ij} – original pairwise-comparison value expressing the relative importance of dimension i to dimension j ;

w_i – local AHP priority of dimension i ;

n – number of dimensions ($n = 4$);

i, j, k – indices of the dimensions.

Judgment consistency was assessed using:

$$\lambda_{\max} = \frac{1}{n} \sum_{i=1}^n \frac{(Aw)_i}{w_i}$$

$$CI = \frac{\lambda_{\max} - n}{n-1}, \quad CR = \frac{CI}{RI} \quad (2)$$

where:

A – AHP pairwise-comparison matrix;

w – local-priority vector obtained from Equation (1);

$(Aw)_i$ – i -th element of the matrix-vector product Aw ;

$\lambda_{\max}$ – estimated maximum eigenvalue of A ;

CI – consistency index;

CR – consistency ratio;

RI – random index corresponding to matrix order n .

A $CR < 0.10$ was treated as acceptable internal coherence, not as evidence of external validity.

DEMATEL direct influences were assessed on a 0-4 scale ranging from no influence to very high influence; the resulting matrix is presented in Table 3 (Si *et al.*, 2018). It was normalised as:

$$X = \frac{Z}{s} \quad (3)$$

$$s = \max \left(\max_i \sum_j z_{ij}, \max_j \sum_i z_{ij} \right)$$

where:

Z – initial DEMATEL direct-relation matrix;

z_{ij} – assessed direct influence of dimension i on dimension j ;

X – normalised direct-relation matrix;

s – normalisation factor determined by the largest row or column sum of Z .

And $s = 10$ for the baseline matrix. The total-relation matrix was then calculated as:

$$T = X(I - X)^{-1} \quad (4)$$

where:

T – DEMATEL total-relation matrix;

I – identity matrix of order n .

For each dimension, $D_i = \sum_j t_{ij}$ represented total influence given and $R_i = \sum_j t_{ji}$ represented total influence received. $D_i + R_i$ indicated prominence, whereas $D_i - R_i$ indicated a net driver position when positive and a net effect position when negative. These terms describe positions within the specified judgment model and do not establish observed market causality.

To incorporate the modelled interdependencies, T was normalised by columns and applied once to the AHP vector:

$$W_{ij} = \frac{t_{ij}}{\sum_k t_{kj}}, \quad g = Ww \quad (5)$$

where:

W_{ij} – element in row i and column j of the column-normalised total-relation matrix W ;

t_{ij} – element of T representing the total direct and indirect influence of dimension i on dimension j ;

W – column-normalised total-relation matrix;

g – DEMATEL-informed network-adjusted priority vector;

w – local AHP priority vector used as the input to the network adjustment.

The resulting g vector is described as a DEMATEL-informed network adjustment of AHP priorities. Because no limit supermatrix or iterative convergence procedure was used, the method is not presented as ANP or standard DANP. Calculations used unrounded values, and no influence threshold was applied to the reported DEMATEL indicators or adjusted priorities. All AHP, DEMATEL, network-adjustment, and sensitivity calculations were performed in Microsoft Excel for Mac, version 16.78, using formula-driven worksheets and matrix functions. Full-precision values were retained throughout the analytical procedure, and rounding was applied only when presenting the results in tables and text. No specialised MCDM software package was used.

Sensitivity analysis and interpretive boundaries

Sensitivity analysis examined whether the principal results depended disproportionately on selected researcher judgments. Five one-at-a-time AHP scenarios and one targeted DEMATEL robustness check were specified, as summarised in Table 4. In each AHP scenario, one comparison and its reciprocal were changed while the remaining judgments and baseline DEMATEL matrix were held constant. The complete AHP procedure was repeated, including consistency assessment, and the resulting priority vector was transformed using the baseline DEMATEL adjustment matrix.

For the DEMATEL check, the assessed direct influence of Political-Legal on Economic was increased from 3 to 4. The direct-relation matrix was renormalised and the total-relation matrix, prominence and relation indicators, driver-effect positions, and network-adjusted priorities were recalculated while the baseline AHP vector remained fixed. Because this change altered the DEMATEL normalisation factor, absolute prominence and relation magnitudes were not compared directly across specifications.

Table 4
Sensitivity and robustness specifications

Scenario	Judgment change	Components held constant
AHP-S1	Social : P/L, 3:1 → 5:1	Remaining AHP judgments and baseline DEMATEL
AHP-S2	Technology : P/L, 5:1 → 3:1	Remaining AHP judgments and baseline DEMATEL
AHP-S3	Social : Economic, 2:1 → 3:1	Remaining AHP judgments and baseline DEMATEL
AHP-S4	Technology : Economic, 2:1 → 3:1	Remaining AHP judgments and baseline DEMATEL
AHP-S5	Technology : Social, 1:1 → 2:1	Remaining AHP judgments and baseline DEMATEL
DEM-R1	P/L → Economic direct influence, 3 → 4	Remaining DEMATEL judgments and baseline AHP vector

Note: compiled by the authors based on the sensitivity-analysis design and the alternative judgments documented in the supporting Judgment Ledger. Reciprocal AHP entries were changed simultaneously. AHP-S1-S5 assess the sensitivity of AHP judgments with the DEMATEL structure fixed; DEM-R1 is a targeted DEMATEL robustness check with the AHP vector fixed

Robustness was assessed through AHP consistency ratios, dimension rankings, changes in local and adjusted priorities, and the signs of the DEMATEL relation indicators. The analysis was local and scenario-based: it did not examine all possible judgment combinations, assign probability distributions, or produce statistical confidence intervals. Stability therefore indicates limited dependence on the tested specifications, not unique correctness or external validation.

Further limitations arise from the purposive documentary corpus and researcher-led factor and matrix construction. The framework does not directly test the predictive validity of platform metrics, establish observed market causality, or identify any other method as a superior replacement. Its internally tested outputs remain a preliminary decision-support model requiring subsequent stakeholder and campaign-level examination.

Results and discussion

Documentary factor framework

Documentary analysis identified four interconnected dimensions shaping digital advertising measurement in Kazakhstan: Political-Legal, Economic, Social, and Technological. Together, they describe an environment in which institutional rules, commercial incentives, audience responses, and platform architectures determine both which advertising events are observable and how those events can be interpreted.

Kazakhstan's Law on Online Platforms and Online Advertising regulates advertising identification and labelling, targeted advertising, sponsored content, profiling, and information retention (Respublika Kazakhstan, 2023, arts. 19-22). These developments strengthen the institutional

basis for transparency and accountability, but do not establish compliance or the validity of reported effectiveness indicators.

The Economic dimension combines market expansion with growing demand for attributable performance. Statista estimated total advertising expenditure at USD 772.52 million in 2024 and USD 835.36 million in 2025 (equivalent to approximately KZT 363 billion and KZT 436 billion, respectively), with digital formats representing 72.4% and 73.7%, respectively (Statista Market Insights, 2025). These are model-based nominal estimates rather than administrative observations. K Research additionally reported 772 advertisers in the traditional media covered during the first half of 2025 and an 88% share of monitored list-price expenditure for the top 50 advertisers; these figures apply only to the monitored channels and cannot be extended to direct digital-platform spending (K Research Central Asia, 2025). Retail e-commerce reached an estimated KZT 3.439 trillion in 2024, illustrating the expanding commercial environments in which exposure, platform activity, and purchases may be recorded together, although this figure does not measure advertising expenditure (Strategy & Digital Kazakhstan Association, 2025).

The Social dimension concerns the gap between digital reach and meaningful audience response. Kazakhstan had an estimated 19.2 million internet users and 15.7 million social-media user identities in early 2025 (Kemp, 2025). However, an impression, view, or interaction does not independently demonstrate attention, comprehension, memory, attitude formation, or behavioural change. Differences across advertising formats and communication contexts further imply that identically named metrics may arise from different patterns of audience processing (Sajjacholapunt & Ball, 2014).

The Technological dimension captures the platform architectures through which advertising is delivered, reported, optimised, and attributed. Google Ads defines impressions and advertiser-selected conversion actions, while its attribution models allocate conversion credit across advertising interactions and can affect both reported conversion data and automated bidding (Google Ads Help, n.d.-a, n.d.-b). The modelled importance of programmatic delivery in Kazakhstan increases the relevance of automated measurement, while proprietary platform data systems may also create dependence on platform-defined constructs and access conditions (Competition & Markets Authority, 2020; Statista Market Insights, 2025). International evidence distinguishing verification, attribution, and effective-

ness measurement is used here to specify this mechanism, not to estimate its severity in Kazakhstan (Competition and Markets Authority, 2020).

Overall, the documentary evidence indicates that Kazakhstan's challenge is not simply insufficient data. It is a potential mismatch between increasingly sophisticated systems of advertising delivery and observation and the narrower operational constructs represented by routinely available metrics. This documentary framework provided the basis for the AHP prioritisation and DEMATEL influence analysis (Table 5). Accordingly, the four-dimensional documentary framework addresses RQ1 and provides the analytical basis for the subsequent prioritisation and influence modelling.

Table 5
Documentary framework and measurement implications

Dimension	Documentary manifestations	Measurement implication and boundary
Political-Legal	Advertising identification and labelling; targeted and sponsored-content provisions; information retention; platform-transparency and accountability requirements	Strengthens transparency and accountability but does not establish compliance or metric validity
Economic	Growing modelled expenditure and digital share; concentration in monitored media; expanding e-commerce	Increases demand for attribution and accountable outcomes, but market scale does not demonstrate measurement failure
Social	Extensive digital participation; differentiated formats and communicators; exposure-response distinction	Recorded reach or interaction does not independently establish attention, memory, attitudes, or behaviour
Technological	Platform-defined events; attribution models; programmatic delivery; proprietary data systems	Determines what is observed and optimised, but technical registration does not establish human-level effectiveness or causality

Note: compiled by the authors based on documentary analysis of regulatory, market, audience, technological, and peer-reviewed sources. Documentary themes were used to substantiate the four dimensions but were not independently weighted as lower-level criteria

AHP local priorities

Addressing RQ2, the AHP results ranked the Technological dimension first with a local priority of 0.3854, followed by Social at 0.3399, Economic at 0.1813, and Political-Legal at 0.0934 (Table 6). The pairwise judgments were internally coherent, with $\lambda_{\max}=4.0248$, $CI=0.0083$, and $CR=0.0093$. The low Consistency Ratio indicates limited internal contradiction but does not validate the priorities externally.

The two leading dimensions together accounted for 72.53% of the local priority. Technology represents the systems that define, generate, attribute, and optimise observable advertising events, whereas the Social dimension concerns whether

those events correspond to attention, comprehension, memory, attitudes, or behaviour. Their relatively close priorities therefore locate the central measurement challenge at the interface between platform-generated observability and human response.

Economic conditions received a lower but still substantive priority because expenditure, commercial incentives, and transaction-based ecosystems increase demand for attribution and accountable outcomes. However, they primarily explain why measurement matters commercially rather than whether an indicator adequately represents advertising response. Political-Legal conditions received the lowest local priority because

regulation and disclosure were judged to affect measurement adequacy less directly than data-generating technologies and audience processes.

This is a relative result under the stated criterion and does not imply that institutional conditions are unimportant.

Table 6
Local AHP priorities

Dimension	Priority	Rank
Technological	0.3854	1
Social	0.3399	2
Economic	0.1813	3
Political-Legal	0.0934	4

Note: compiled by the authors based on AHP calculations using the document-informed pairwise-comparison matrix. $\lambda_{max} = 4.0248$, $CI = 0.0083$, and $CR = 0.0093$; values were calculated from unrounded inputs and rounded only for presentation

DEMATEL influence structure

DEMATEL distinguished the local importance of the dimensions from their structural involvement and net directional positions. Technology showed the highest prominence ($D+R=9.0854$) and a positive relation value ($D-R=0.2807$), identifying it as a highly connected net driver. Its position reflects the role of platform architecture in shaping advertising delivery, reporting, attribution, and optimisation, while also remaining responsive to commercial demand and audience behaviour.

Political-Legal conditions had the lowest prominence ($D+R=5.1957$) but the strongest positive relation value ($D-R=0.8669$). They therefore occupied the clearest net driver position despite receiving the lowest local AHP priority. This result illustrates that a dimension may transmit influence through regulation, disclosure, data governance, and accountability without being the most immediately important factor for measurement adequacy.

Economic conditions displayed high prominence ($D+R=8.2906$) and the most negative

relation value ($D-R=-1.0358$), making them the strongest net effect dimension. Advertising investment, attribution demand, and commercial incentives were therefore positioned as highly connected outcomes shaped by technological, social, and institutional conditions, although they also generated feedback into the wider system.

Social conditions had similarly high prominence ($D+R=8.2409$) but a relation value close to zero ($D-R=-0.1118$). Their classification as a net effect does not imply passivity; rather, audience behaviour and cognitive response both influence and are influenced by platform architectures, formats, and commercial pressures.

Overall, Political-Legal and Technological dimensions occupied net driver positions, while Economic and Social dimensions occupied net effect positions (Table 7). These classifications represent the directional structure encoded in the document-informed matrix and should not be interpreted as empirically observed causality.

Table 7
DEMATEL prominence and relation indicators

Dimension	D+R	D-R	Position
Technological	9.0854	0.2807	Net driver
Economic	8.2906	-1.0358	Net effect
Social	8.2409	-0.1118	Net effect
Political-Legal	5.1957	0.8669	Net driver

Note: compiled by the authors based on the DEMATEL calculations performed using the document-informed direct-relation matrix. $D+R$ indicates prominence within the specified influence structure, while $D-R$ indicates the net directional position. Positive values denote net drivers and negative values denote net effects

Network-adjusted priorities

The DEMATEL-informed adjustment preserved the original ranking while producing a more balanced priority distribution. Technology remained first at 0.2982, followed by Social at 0.2628, Economic at 0.2429, and Political-Legal at 0.1961 (Table 8). The difference between the highest and lowest priorities decreased from 0.2920 in the local AHP model to 0.1021 after adjustment.

Technology and Social declined by 0.0871 and 0.0772, respectively, but retained the two leading positions. Their reduced weights reflect the incorporation of interdependencies with institutional

and economic conditions rather than a substantive decline in their relevance. Technology remained dominant, consistent with its highest local priority and its extensive involvement across the total-relation matrix, while Social remained central to the interpretation of whether recorded advertising events correspond to meaningful audience responses.

Economic increased from 0.1813 to 0.2429, reflecting its high structural involvement and net-receiving position. Political-Legal showed the largest increase, from 0.0934 to 0.1961, reflecting its modelled pattern of direct and indirect influence across the total-relation matrix.

Table 8

Local and network-adjusted priorities

Dimension	Local AHP	Network-adjusted	Change	Rank
Technological	0.3854	0.2982	−0.0871	1
Social	0.3399	0.2628	−0.0772	2
Economic	0.1813	0.2429	+0.0616	3
Political-Legal	0.0934	0.1961	+0.1027	4

Note: compiled by the authors based on the AHP priorities and the DEMATEL-informed network-adjustment calculations. No rank reversal occurred. Changes represent network-adjusted minus local AHP priorities. Values were calculated using unrounded inputs and rounded only for presentation

These adjusted values should not be interpreted as more objectively correct estimates of market importance. Local AHP priorities represent relative importance under the stated measurement criterion, whereas network-adjusted priorities additionally reflect the influence structure specified in the DEMATEL matrix. Together, the results indicate that the measurement challenge remains primarily technological and social but is embedded within economic incentives and institutional conditions.

Sensitivity and robustness analysis

The principal ranking remained stable across all five AHP sensitivity scenarios: Technology ranked first, followed by Social, Economic, and Political-Legal. All alternative matrices retained acceptable internal consistency, with CR values ranging from 0.0023 to 0.0225 (Table 9). Network-adjusted priorities also changed only slightly: the largest

range observed across the scenarios was 0.0068, or less than 0.7 percentage points. The leading positions of Technology and Social therefore did not depend on any single tested pairwise judgment.

The targeted DEMATEL check produced a larger but still limited redistribution. Increasing the assessed Political-Legal influence on Economic from 3 to 4 raised the adjusted Political-Legal priority from 0.1961 to 0.2149, while the other priorities declined moderately. Nevertheless, the ordering $T > S > E > P/L$ remained unchanged. Political-Legal and Technology also retained their net driver positions, while Economic and Social remained net effects.

Absolute DEMATEL prominence and relation magnitudes were not compared directly because the modified judgment changed the normalisation factor from 10 to 11. The check therefore focused on rank stability, the signs of D–R, driver-effect classifications, and adjusted priorities.

Table 9*Sensitivity and robustness results**Panel A. AHP sensitivity*

Specification	Modified judgment	CR	Adjusted ranking
Baseline	No change	0.0093	T > S > E > P/L
AHP-S1	Social : P/L, 3:1 → 5:1	0.0023	T > S > E > P/L
AHP-S2	Technology : P/L, 5:1 → 3:1	0.0039	T > S > E > P/L
AHP-S3	Social : Economic, 2:1 → 3:1	0.0225	T > S > E > P/L
AHP-S4	Technology : Economic, 2:1 → 3:1	0.0127	T > S > E > P/L
AHP-S5	Technology : Social, 1:1 → 2:1	0.0153	T > S > E > P/L

Panel B. Targeted DEMATEL check

Dimension	Baseline adjusted	Alternative adjusted	Change
Technological	0.2982	0.2908	−0.0074
Social	0.2628	0.2552	−0.0076
Economic	0.2429	0.2391	−0.0038
Political-Legal	0.1961	0.2149	+0.0188

Note: compiled by the authors based on the AHP sensitivity and targeted DEMATEL robustness calculations. In AHP-S1-S5, the baseline DEMATEL matrix was fixed. In the DEMATEL check, Political-Legal → Economic was changed from 3 to 4 while the baseline AHP vector was fixed. Ranking and driver-effect classifications remained unchanged

Taken together, the DEMATEL influence structure, network-adjusted priorities, and robustness results address RQ3. These findings support the internal stability of the framework under the selected one-at-a-time changes. However, the analysis did not examine simultaneous perturbations, all possible matrix configurations, alternative factor definitions, or independently generated expert judgments. The results therefore indicate robustness to the tested specifications rather than unique correctness or external validity.

Integrated interpretation and implications for advertising measurement

These integrated findings provide partial and qualified support for the proposition that Kazakhstan's digital advertising challenge is not simply insufficient data, but a potential mismatch between technically observable events and the broader constructs inferred from them. Technology and Social accounted for 72.53% of the local AHP priority, locating the problem at the interface between platform-defined observability and human response. DEMATEL nevertheless showed that this interface is embedded in a wider system: Technology and Political-Legal conditions occupied net driver positions, while Economic and Social conditions were highly involved net effects. The network adjustment preserved the ranking but increased the representation of Economic and

Political-Legal conditions, indicating that measurement adequacy cannot be separated from commercial incentives, attribution demands, governance, and data-access conditions.

This interpretation aligns conceptually with prior advertising research. Sajjacholapunt & Ball (2014) showed that technically available exposure does not determine how visual attention and memory are distributed, while Calder *et al.*, (2009) demonstrated that responses depend partly on engagement with the surrounding media context. Dinner *et al.*, (2014) further showed that advertising effects may cross channel boundaries, making native-platform outcomes an incomplete representation of total response. At the causal level, studies demonstrated that large datasets and extensive covariates do not by themselves eliminate uncertainty in incremental advertising effects (Johnson, Lewis, & Reiley, 2017; Lewis & Rao, 2015). The present study does not reproduce these campaign-level findings in Kazakhstan; rather, it extends their measurement logic to the macro-environment by showing how technological, social, economic, and institutional conditions may jointly shape the interpretation of conventional indicators.

The findings therefore do not imply that impressions, views, clicks, or conversions are invalid. Each provides evidence about a defined stage of advertising delivery or response. An impression records an opportunity for exposure, a

click records a specific interaction, and a conversion records an action attributed under stated rules. Problems arise when these measures are interpreted as direct evidence of attention, comprehension, memory, persuasion, or incremental behaviour. The appropriate question is not whether a conventional metric is useful in general, but whether it corresponds to the decision-relevant construct and whether its inferential boundary is made explicit.

A practical implication is an objective-construct-indicator alignment approach. Measurement should begin with the advertising objective, identify the construct required for the decision, select an indicator that directly represents that construct, and retain its definitional and inferential limits. A layered structure may combine delivery and opportunity-to-see indicators; attention and information-processing measures; memory and attitudinal outcomes; behavioural and incremental effects; and contextual information on attribution rules, observation windows, platform definitions, data access, and regulatory requirements. Not every campaign requires every layer. Routine optimisation may rely primarily on platform indicators, whereas high-value strategic decisions, cross-platform comparisons, or claims about psychological and causal effects may require complementary evidence.

Such evidence may include experiments, lift studies, marketing-mix or attribution models, surveys, recall and recognition measures, qualitative research, independent verification, eye tracking, and psychophysiological or consumer-neuroscience methods. Consistent with Guixeres *et al.*, (2017), these approaches should be treated as complementary because they capture different parts of the advertising-response process and introduce their own assumptions and limitations. Similarly named platform indicators should not be assumed equivalent when they differ in eligibility criteria, counting rules, attribution windows, or identity systems. Regulatory transparency is also distinct from measurement validity: correct labelling, disclosure, and data retention may improve accountability without establishing attention, attribution accuracy, or incremental effect.

Several limitations qualify the findings. The documentary corpus was purposive rather than exhaustive and may omit proprietary or rapidly changing market information. Factor extraction and matrix construction were researcher-led, and no independent expert panel or separate coder generated the judgments. AHP consistency and

sensitivity results demonstrate internal coherence and local stability, not external validity. The study also did not test individual platform metrics, observe consumer responses, or estimate causal market relationships. Consequently, the model identifies plausible measurement pressures and interdependencies rather than empirically verified deficiencies in Kazakhstan's advertising practice.

The present study constitutes the first, documentary-modelling phase of a broader sequential research programme. At the time of writing, the second phase is underway and involves semi-structured interviews with advertising practitioners, researchers, and other relevant stakeholders to examine, refine, extend, or challenge the proposed factor structure and directional mechanisms. No interview data are analysed or reported in the present article. Following this qualitative phase, independently elicited expert judgments will be used to reconstruct the AHP and DEMATEL matrices and compare them with the document-informed baseline model developed here.

Subsequent campaign-level research should compare platform-reported indicators with independently measured attention, memory, attitudes, and behavioural outcomes, while distinguishing correlation from incremental effect. Together, these stages would convert the present documentary diagnosis into progressively testable evidence. The principal challenge is therefore not to reject conventional indicators, but to define what they measure, identify what they leave unobserved, and supplement them when managerial conclusions extend beyond their operational boundaries.

Conclusion

This study examined the macro-environmental conditions shaping the adequacy and interpretation of conventional digital advertising effectiveness metrics in Kazakhstan. A sequential documentary and mathematical modelling procedure was used to identify relevant dimensions, estimate their local priorities, map their directional interdependencies, and assess the stability of the resulting framework.

Documentary analysis identified four interconnected dimensions: Political-Legal, Economic, Social, and Technological. Their combined interpretation indicates that the measurement challenge is not simply a shortage of advertising data. Rather, it concerns a potential mismatch between increasingly sophisticated systems of digital delivery, attribution,

and optimisation and the narrower operational constructs represented by impressions, views, clicks, and attributed conversions. These indicators remain useful for the stages they directly measure, but they do not independently establish attention, comprehension, memory, persuasion, or incremental behavioural effects.

Within the AHP model, Technology received the highest local priority, followed by Social, Economic, and Political-Legal conditions. Technology and Social together accounted for 72.53% of the initial priority structure, locating the central problem at the interface between platform-generated observability and meaningful audience response. DEMATEL provided a complementary structural perspective: Technology had the highest prominence, while Technology and Political-Legal conditions occupied net driver positions. Economic and Social conditions were classified as net effects, although both remained strongly involved in the model. The network adjustment produced a more balanced distribution without changing the ranking, suggesting that the direct importance of technological and social factors is embedded within wider commercial and institutional relationships. Sensitivity analysis further showed that the ranking and driver-effect structure remained stable under the selected alternative judgments.

The study contributes a transparent preliminary framework that distinguishes local importance from structural influence and connects macro-environmental analysis with the problem of advertising-measurement interpretation. Its practical implication is that advertising indicators should be selected and interpreted through alignment among the campaign objective, target construct, available measure, and inferential boundary. Platform metrics may provide sufficient evidence for routine delivery and optimisation decisions, whereas broader claims about psychological response, cross-platform performance, or incremental effects may require complementary evidence.

The findings remain conditional on a purposively constructed documentary corpus and researcher-generated AHP and DEMATEL judgments. Internal consistency and sensitivity stability do not establish external validity, and the study did not directly observe market causality or test individual advertising metrics. Subsequent research should therefore examine the framework through stakeholder interviews, independently generated expert judgments, and campaign-level

comparisons between platform indicators and attention, memory, attitudinal, and behavioural outcomes. The central task for advertising measurement in Kazakhstan is not to abandon conventional metrics, but to define their meaning precisely and supplement them when managerial conclusions extend beyond what those metrics directly observe.

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

Data Availability Statement: Researcher-generated supporting materials underlying this study, including the Evidence and Judgment Ledger and the AHP-DEMATEL calculation workbook, are available from the corresponding author upon reasonable request. Third-party source documents remain subject to their original access and licensing conditions.

Declaration on the Use of Generative AI and AI-Assisted Technologies: During the preparation of this manuscript, the authors used OpenAI's ChatGPT to assist with language editing, structural refinement, consistency checking, and the organisation of supporting documentation. The tool was not used as a source of evidence, to generate empirical data, or as a substitute for the original source materials and calculation workbooks. The research problem, source selection, final methodological decisions, researcher-generated judgments, calculations, interpretation, and conclusions remained under the authors' control. All AI-assisted outputs were critically reviewed and verified by the authors, who take full responsibility for the accuracy, originality, and integrity of the final manuscript.

Author Contributions:

GB & AK: conceptualization, methodology, writing - original draft, writing - review and editing investigation;

GB: data curation, formal analysis, resources, supervision;

AK: validation, visualization, project administration;

All authors have read and agreed to the final version of the manuscript.

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Received: 27 July 2026
Accepted: 20 September 2026

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DIGITALISATION IN LOGISTICS: OPPORTUNITIES FOR DIVERSIFYING RISKS IN THE REPUBLIC OF KAZAKHSTAN

The article addresses the issue of diversifying logistics risks affecting the transport and logistics system of the Republic of Kazakhstan. The relevance of the study is determined by the need to enhance the resilience of the national logistics system amid geopolitical instability, sanctions, infrastructure wear, currency fluctuations, inflationary pressure, rising tariffs, cyber threats, and labor shortages. The aim of the study is to identify the main types of logistics risks in Kazakhstan and to scientifically substantiate the possibilities of digitalisation and innovative approaches to their mitigation. The study employed methods of statistical, comparative, and expert analysis. The empirical base included official statistical data, industry reports, indicators of inflation, currency exchange rates, transport tariffs, as well as actual data on railway, urban bus, and air transport for the years 2021–2024.

As a result of the study, the main risks affecting Kazakhstan's logistics system have been systematized, and the interconnections of geopolitical, economic, infrastructural and digital factors have been identified. The scientific contribution of the article lies in considering logistics risks as a system of complex factors affecting the resilience of the national transport system. The practical significance is determined by proposals aimed at digitalisation, infrastructure renewal, the development of alternative routes and strengthening cybersecurity.

Keywords: logistics, risks, transport, infrastructure, economy, digitalization, cybersecurity, investments, transit.

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Логистикадағы цифрландыру: Қазақстан Республикасындағы тәуекелдерді әртараптандыру мүмкіндіктері

Мақалада Қазақстан Республикасының көлік-логистика жүйесіне әсер ететін логистикалық тәуекелдерді әртараптандыру мәселесі қарастырылады. Зерттеудің өзектілігі геосаяси тұрақсыздық, санкциялық шектеулер, инфрақұрылымдық тозу, валюта бағамының ауытқуы, инфляциялық қысым, тарифтердің өсуі, киберқауіптер мен кадр тапшылығы жағдайында ұлттық логистикалық жүйенің тұрақтылығын күшейту қажеттілігімен айқындалады. Зерттеудің мақсаты – Қазақстандағы логистикалық тәуекелдердің негізгі түрлерін анықтау және оларды төмендетуде цифрландыру мен инновациялық тәсілдердің мүмкіндіктерін ғылыми тұрғыдан негіздеу.

Зерттеу барысында статистикалық, салыстырмалы және сараптамалық талдау әдістері қолданылды. Эмпирикалық база ретінде 2021–2024 жылдардағы ресми статистикалық деректер, салалық есептер, инфляция, валюта бағамы, көлік тарифтері және теміржол, қалалық автобус, әуе көлігі салалары бойынша нақты көрсеткіштер пайдаланылды.

Зерттеу нәтижесінде Қазақстанның логистикалық жүйесіне әсер ететін негізгі тәуекелдер жүйеленіп, геосаяси, экономикалық, инфрақұрылымдық және цифрлық факторлардың өзара байланысы айқындалды. Мақаланың ғылыми үлесі логистикалық тәуекелдерді ұлттық көлік жүйесінің тұрақтылығына әсер ететін кешенді факторлар жүйесі ретінде қарастыруында. Практикалық маңызы цифрландыру, инфрақұрылымды жаңғырту, баламалы маршруттарды дамыту және киберқауіпсіздікті күшейтуге бағытталған ұсыныстармен анықталады.

Түйін сөздер: логистика, тәуекелдер, көлік, инфрақұрылым, экономика, цифрландыру, киберқауіпсіздік, инвестициялар, транзит.

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Цифровизация в логистике: возможности диверсификации рисков в Республике Казахстан

В статье рассматривается вопрос диверсификации логистических рисков, влияющих на транспортно-логистическую систему Республики Казахстан. Актуальность исследования определяется необходимостью усиления устойчивости национальной логистической системы в условиях геополитической нестабильности, санкционных ограничений, износа инфраструктуры, колебаний валютного курса, инфляционного давления, роста тарифов, киберугроз и нехватки кадров. Цель исследования – определить основные виды логистических рисков в Казахстане и научно обосновать возможности цифровизации и инновационных подходов в их снижении.

В ходе исследования использовались методы статистического, сравнительного и экспертного анализа. В качестве эмпирической базы были использованы официальные статистические данные, отраслевые отчёты, показатели инфляции, валютного курса, транспортных тарифов, а также реальные показатели по железнодорожному, городскому автобусному и воздушному транспортам за 2021–2024 годы.

В результате исследования систематизированы основные риски, влияющие на логистическую систему Казахстана, выявлены взаимосвязи геополитических, экономических, инфраструктурных и цифровых факторов. Научный вклад статьи заключается в рассмотрении логистических рисков как системы комплексных факторов, влияющих на устойчивость национальной транспортной системы. Практическое значение определяется предложениями, направленными на цифровизацию, обновление инфраструктуры, развитие альтернативных маршрутов и усиление кибербезопасности.

Ключевые слова: логистика, риски, транспорт, инфраструктура, экономика, цифровизация, кибербезопасность, инвестиции, транзит.

Introduction

The transport and logistics system of the Republic of Kazakhstan constitutes a strategically significant sector that ensures the country's sustainable economic development and determines its international transit potential. Kazakhstan's geographical position between Europe and Asia positions it as a key link within major international transport corridors. Nevertheless, in the current context, the functioning of the national logistics system is significantly influenced by geopolitical instability, sanctions constraints, transformations in global trade routes, inflationary pressures, rising transportation tariffs, infrastructural limitations, and ongoing processes of digital transformation.

Under these conditions, the issue of managing and diversifying logistical risks has become particularly relevant. Although existing scholarly literature addresses the modernization of transport infrastructure, the development of transit corridors, and the digitalization of logistics, a comprehensive and systematized assessment of logistical risks in Kazakhstan—considering the interdependence of geopolitical, economic, infrastructural, and techno-

logical factors—remains insufficiently developed. In this regard, the central research problem of this study lies in identifying the key risks affecting the stability of Kazakhstan's transport and logistics system and substantiating effective directions for their diversification.

The object of the study is the transport and logistics system of the Republic of Kazakhstan. The subject of the study encompasses the geopolitical, economic, infrastructural, and technological risks affecting the stability of this system, as well as the mechanisms for their mitigation. The main research question is formulated as follows: what are the dominant risks influencing Kazakhstan's logistics system under current conditions, and which diversification strategies can enhance national transit resilience?

The aim of the study is to conduct a comprehensive analysis of the key risks within Kazakhstan's logistics system and to provide a scientific justification for priority directions of their diversification. To achieve this aim, the following tasks are addressed: assessing the current state of the logistics system; identifying the principal categories of risks; analyzing their interrelationships and im-

pack levels; and developing practical recommendations to improve the stability of the transport and logistics system.

The scientific novelty of the study lies in conceptualizing logistical risks within the specific transport and transit context of Kazakhstan as an integrated, multi-factor system. The paper proposes a structured classification of risks into interconnected geopolitical, economic, infrastructural, and technological blocks. The practical significance of the research is determined by the applicability of its findings to the improvement of transport and logistics policy, the prioritization of infrastructure development, the diversification of transport corridors, the implementation of digital solutions, and the enhancement of investment strategies.

Literature Review

Changes in transport service tariffs are widely recognized in contemporary economic and logistics research as a critical factor influencing macroeconomic stability, social accessibility, and the competitiveness of national economies (Christopher & Peck, 2004; Ponomarov & Holcomb, 2009; Tang, 2006). Empirical evidence from various countries demonstrates that transportation costs have a direct impact on inflation, the final prices of goods and services, the accessibility of mobility for the population, and the overall logistics expenses of businesses (Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan (BNS), 2025; OECD, 2023; World Bank, 2023). In this context, examining the mechanisms underlying tariff formation in rail, urban bus, and aviation sectors is of both theoretical and practical importance.

Studies focusing on rail transport indicate that tariff increases are largely driven by infrastructure depreciation, rising energy costs, and the necessity of rolling stock modernization. Sultanbek *et al.* (2024) & Bepaly (2023) associate tariff dynamics with increasing capital repair expenditures and infrastructural constraints (Rygzynov *et al.*, 2023; Taisarinova *et al.*, 2020). According to the International Union of Railways (UIC, 2022), higher electricity and fuel prices constitute key determinants of rising freight and passenger tariffs (BNS, 2025; World Bank, 2023). Additionally, World Bank (2023) and OECD (2023) emphasize the role of government subsidies, regulatory frameworks, and management efficiency in shaping

tariff policies. While these studies provide valuable sector-specific insights, their scope remains largely confined to the railway domain.

In the case of urban bus transport, the literature primarily links tariff growth to increasing operational costs (Naumov *et al.*, 2022). Reports by the OECD (2023) and Bureau of National Statistics (2025) identify fuel price volatility as a principal driver of fare increases in urban mobility systems. The World Bank (2024) further highlights the impact of rising driver wages, higher maintenance costs, and investments in environmentally sustainable transport solutions, such as electric buses, on tariff formation. National-level studies by Bureau of National Statistics (2025) and Bureau of National Statistics (2025) attribute increases in public transport fares in Kazakhstan to insufficient government subsidies, low profitability of transport services, and the need for fleet renewal (BNS, 2025; Tazhiyev *et al.*, 2024). However, these analyses tend to address tariff changes in isolation, without integrating them into a broader logistics risk framework.

In the aviation sector, tariff dynamics are influenced by factors such as aviation fuel prices, airport fee structures, international restrictions, and increasing operational costs. Industry reports by IATA (2023) and ICAO (2024) emphasize the central role of fuel price escalation and airport service charges in driving airfare increases. IATA (2023) further underline the indirect effects of international sanctions, particularly in limiting access to affordable fuel, spare parts, and supply chains—an issue that is especially critical for countries with developing aviation infrastructure. National reports from the Nurlanuly & Shalbolova (2024) also confirm that rising airline operating costs and the need to subsidize domestic routes contribute significantly to tariff growth.

Overall, the existing body of literature provides a substantial understanding of the determinants of tariff changes across different modes of transport. Nevertheless, most studies adopt a sector-specific perspective, analyzing rail, bus, or aviation transport independently. As a result, the interconnections between economic, infrastructural, institutional, and technological drivers of tariff changes are not sufficiently conceptualized within a unified logistics system framework (Kabashkin & Sansyzybayeva, 2024; Mamrayeva *et al.*, 2022; Zhao *et al.*, 2023). Furthermore, the broader implications of tariff dynamics for national transport system resilience

and transit potential remain underexplored (Biró & Vasa, 2024; Palu & Hilmola, 2023; Rentschler *et al.*, 2025; Yermekbayev *et al.*, 2024).

A critical review of the literature reveals a significant gap in the comprehensive analysis of transport tariff changes within the context of integrated logistics risk systems, particularly in the case of Kazakhstan. Existing studies either generalize international experiences or focus narrowly on specific transport sectors (Bespalyy, 2023; IATA, 2023; OECD, 2023; Sultanbek *et al.*, 2024). Consequently, tariff dynamics are rarely examined as a systemic phenomenon shaped by the interaction of geopolitical, economic, infrastructural, and technological factors.

Moreover, transport tariffs are typically treated as isolated economic indicators, rather than as components of a broader framework influencing national transit resilience, logistics stability, and risk diversification strategies (Biró & Vasa, 2024; Palu & Hilmola, 2023; Rentschler *et al.*, 2025; Yermekbayev *et al.*, 2024). This limitation defines the conceptual space addressed by the present study (BNS, 2025; OECD, 2023; Sultanbek *et al.*, 2024).

This paper aims to address the identified gap by providing a comprehensive and comparative analysis of transport tariff dynamics across rail, bus, and aviation sectors within the broader context of Kazakhstan's logistics system (Christopher & Peck, 2004; Ponomarov & Holcomb, 2009; Tang, 2006). Rather than examining tariff changes in isolation, the study situates them within an integrated risk environment affecting national transport and transit stability (Mamrayeva *et al.*, 2022; Zhao *et al.*, 2023).

The main contributions of the study are as follows:

First, the determinants of tariff changes are systematically classified into economic, infrastructural, institutional, and technological categories.

Second, similarities and differences in tariff dynamics across various transport modes are identified through comparative analysis

Third, tariff changes are explicitly linked to the issue of logistics risk diversification, providing a more holistic analytical perspective.

Fourth, the study utilizes data from the period 2024–2025 to assess short-term trends in tariff dynamics and their implications for the national transport and logistics system (BNS, 2025; IATA, 2023; Nurlanuly & Shalbolova, 2024; Sultanbek *et al.*, 2024; Tazhiyev *et al.*, 2024).

The theoretical contribution of this research lies in reconceptualizing transport tariff dynamics not merely as an economic variable, but as a multifactorial phenomenon influencing the resilience of logistics systems. This approach enables the analysis of tariff policies beyond cost fluctuations, incorporating their relationships with infrastructural constraints, regulatory frameworks, digital transformation processes, and external geopolitical pressures (Kabashkin & Sansyzbayeva, 2024; Mamrayeva *et al.*, 2022; Zhao *et al.*, 2023).

By integrating tariff dynamics into the broader theory of logistics risks, the study offers a comprehensive analytical framework for understanding how tariff changes affect national transit systems (Christopher & Peck, 2004; OECD, 2023; Ponomarov & Holcomb, 2009; Tang, 2006). This perspective extends existing theoretical approaches and contributes to the advancement of logistics research in the context of emerging economies such as Kazakhstan (Biró & Vasa, 2024; Palu & Hilmola, 2023; Rygzynov *et al.*, 2023; Taisarinova *et al.*, 2020; World Bank, 2023; Yermekbayev *et al.*, 2024).

The selection of the 2024–2025 period as the focus of analysis is both theoretically and practically justified. This timeframe allows for the examination of short-term fluctuations in transport tariffs driven by fuel price volatility, infrastructure modernization, public subsidy policies, and digital reforms (BNS, 2025; Nurlanuly & Shalbolova, 2024; Sultanbek *et al.*, 2024; Tazhiyev *et al.*, 2024). It also provides an opportunity to observe immediate outcomes of policy changes and to formulate evidence-based forecasts for the near future (Biró & Vasa, 2024; Rentschler *et al.*, 2025).

The efficiency and sustainability of transport corridors depend on the interaction of infrastructure, operational processes, and system-level constraints (Kabashkin & Sansyzbayeva, 2024).

In summary, although the issue of transport tariff growth has been extensively examined in both international and national literature, a comprehensive analysis linking tariff dynamics to the broader system of logistics risks remains insufficiently developed in the context of Kazakhstan. This study seeks to fill this gap by offering an integrated, system-oriented perspective that connects tariff changes with logistics stability, risk diversification strategies, and transport policy effectiveness (Bespalyy, 2023; Kabashkin &

Sansyzbayeva, 2024; Naumov *et al.*, 2022; World Bank, 2023; Zhao *et al.*, 2023).

Methodology

This study was aimed at comprehensively assessing the risks arising within the logistics system of the Republic of Kazakhstan, identifying their internal structure, and proposing scientifically grounded mechanisms for their diversification. The methodological framework of the study is based on the principle of examining geopolitical, economic, infrastructural, and technological factors affecting the stability of the logistics system in their interconnection and continuity. Kazakhstan's location within the important transit space between Europe and Asia, the growing significance of its role in international transport corridors, and the volatile transformations in the external environment necessitate an in-depth, systemic rather than superficial analysis of logistics risks. In this regard, the study conceptualizes logistics risks not as a set of isolated factors, but as a multilayered phenomenon directly influencing the stability and efficiency of the country's transport and transit system.

During the research process, official statistical materials, industry reports, analytical reviews, publications of international organizations, and both domestic and foreign scholarly literature were extensively employed. The information base was formed from the data of the Bureau of National Statistics of the Republic of Kazakhstan, the Ministry of Transport of the Republic of Kazakhstan, the National Bank of the Republic of Kazakhstan, and the national company Kazakhstan Temir Zholy, as well as open data from international financial and development institutions. In particular, reports and analytical materials from the World Bank, the International Monetary Fund, the Asian Development Bank, the European Bank for Reconstruction and Development, and UN system bodies related to transport and trade were used. Supply chain digitalization enhances resilience and operational performance by improving information sharing, coordination, and responsiveness across logistics networks (Zhao *et al.*, 2023).

In developing the theoretical section of the study, scholarly works devoted to logistics, transport geography, risk management, infrastructure modernization, digitalization, and the functioning of international transport corridors were employed. For the empirical analysis, open statistical and sectoral

data on exchange rate dynamics, inflation levels, changes in transport tariffs, investment activity, transit volumes, the throughput capacity of ports and railway networks, the technical condition of transport infrastructure, and the transformation of international logistics routes were systematized. The integration of such heterogeneous sources made it possible to evaluate the research object comprehensively from macroeconomic, institutional, and sectoral perspectives.

The study was conducted on the basis of data covering the period from 2021 to 2024. The selection of this period is determined by several scientific and applied considerations. First, this time span encompasses the processes of economic adaptation and recovery in the post-pandemic period. Second, it was during these years that the complication of the geopolitical situation, the intensification of sanctions pressure, the reconfiguration of international transport routes, and the volatility of commodity and energy markets exerted a substantial influence on Kazakhstan's logistics system. Third, significant institutional and infrastructural initiatives aimed at modernizing transport infrastructure, strengthening transit capacity, and digitalizing logistics processes were implemented during this period.

In addition, to clarify the current development trends of specific indicators, available statistical data from early 2025 were also taken into account as supplementary comparative and reference material. Defining the temporal boundaries in this way made it possible to reveal not only the current dynamics of logistics risks but also the specific features of their structural transformation.

The study employed a comprehensive analytical approach combining quantitative and qualitative methods. Within the framework of quantitative analysis, methods of statistical comparison, examination of time series, structural and comparative analysis, indicator-based assessment, graphical interpretation, and scientific generalization were applied. These methods made it possible to identify the trends in the temporal evolution of the main indicators affecting the logistics system, as well as their interrelationships and risk implications. In particular, such indicators as exchange rate fluctuations of the tenge, inflationary processes, changes in transport service tariffs, investment volumes, the workload of international routes, and infrastructure throughput were examined from dynamic and comparative perspectives.

Within the scope of qualitative analysis, content analysis, systems analysis, comparative-expert analysis, factor-based interpretation, and methods of risk grouping were used. Content analysis enabled the systematization of key conclusions contained in scholarly publications, strategic documents, and official reports, while systems analysis created the conditions for examining the causes of logistics risk formation and their impact on the transport and transit system in their interdependence. In addition, within the framework of the study, logistics risks were classified into geopolitical, economic, infrastructural, and technological-digital categories, and the content, channels of influence, and mechanisms of impact of each group were analyzed.

If an expert approach was employed in the study, the selection of experts was carried out on the basis of purposiveness and professional relevance. The group of experts included specialists with experience in logistics, transport infrastructure, customs regulation, digital transformation, transport economics, and transit policy. The main selection criteria included at least five years of professional experience in logistics, transport, or infrastructure; experience in managerial, analytical, or research activities related to the topic of the study; practical work experience in public, quasi-public, or private sector structures; in-depth knowledge of specific issues within the transport and logistics system; as well as competence in interpreting sectoral data and assessing risk situations.

Expert opinions were used to уточнить the degree of significance of logistics risks, to rank them according to priority, and to evaluate the practical effectiveness of measures aimed at risk diversification. When combined with statistical data, this approach enhances the substantive depth of the research results and makes it possible to align them more closely with the actual sectoral context.

The study was carried out through several interrelated stages. At the first stage, the theoretical and methodological foundations of the research were established. At this stage, scholarly literature and strategic documents concerning logistics risks, transport corridors, infrastructural constraints, digitalization, transit sustainability, and external economic influences were reviewed, and the objective, tasks, object, subject, and analytical logic of the study were clarified.

At the second stage, the empirical base was accumulated and systematized. Official statistical materials, industry reports, macroeconomic

indicators, data describing the condition of transport infrastructure, and information related to the operational characteristics of international routes were selected. At this stage, particular attention was paid to the reliability of information sources, their substantive consistency, and their comparability.

At the third stage, the collected materials were subjected to quantitative and qualitative analysis. The degree of influence of such factors as exchange rate changes, inflationary pressure, tariff growth, infrastructural congestion, investment activity, and the level of digitalization on logistics stability was determined. Dynamic and comparative analysis methods served as the principal research tools at this stage.

At the fourth stage, a systematized classification of logistics risks was developed. Risks were grouped into geopolitical, economic, infrastructural, and technological-digital categories, and their preconditions of emergence, channels of dissemination, and probable consequences were identified. Such classification made it possible to gain a deeper understanding of the internal structure of risks and to substantiate their interdependence from a scientific perspective.

At the fifth stage, based on the results obtained, the priority directions for diversifying risks within Kazakhstan's logistics system were identified. These included expanding transport routes, developing alternative corridors, modernizing infrastructure, introducing digital solutions, strengthening cybersecurity, expanding public-private partnership, and stimulating investment activity. The proposed recommendations were formulated not on the basis of general descriptive judgments, but by relying on the specific system of risk factors identified during the analysis.

The methodological approach employed in the study makes it possible to examine Kazakhstan's logistics system within a multifactor and multilevel environment. Its principal advantage lies in the integration of official statistical data, expert judgments, and systematic scientific interpretation, which together make it possible to reveal comprehensively the sources of logistics risks, the mechanisms of their influence, and the possibilities for their mitigation. This approach not only strengthens the scientific validity of the study but also enhances its practical significance.

Thus, the proposed methodology makes it possible to identify the risks inherent in Kazakhstan's transport and logistics system, assess

the dynamics of their development, and formulate scientifically grounded conclusions and recommendations aimed at strengthening the resilience of the system under conditions of both external and internal challenges.

Results and discussion

Diversification of logistical risks is an important task for Kazakhstan in an unstable global economy. The development of new routes, modernization of infrastructure, digitalization and cooperation with international partners will increase the sustainability of the transport industry and reduce potential threats. This will provide Kazakhstan with competitive advantages in global logistics chains and strengthen its role as a key transport hub in Eurasia (Palu & Hilmola, 2023).

Geopolitical risks

Kazakhstan depends on transit routes through neighboring countries such as Russia and China. Sanctions and trade barriers pose a threat to supply stability. In this regard, alternative routes are being developed, for example, the Trans-Caspian International Transport Route (TMTM).

Kazakhstan is located in a strategically important region and depends on transit routes through neighboring countries such as Russia, China and Central Asian countries. Geopolitical instability, sanctions, and trade barriers pose a threat to supply stability.

The main risks include:

- Sanctions restrictions. The imposition of sanctions against Russia makes it difficult to use traditional routes, requiring the development of alternative routes.
- Political tensions in neighboring countries. Conflicts or changes in the political landscape of neighboring countries can affect trade routes.
- Energy dependence. Kazakhstan exports significant amounts of oil and gas through neighboring countries, which creates risks in the event of a change in the political environment.
- The Trans-Caspian International Transport Route (TMTM). The development of alternative routes across the Caspian Sea reduces dependence on traditional routes, but requires significant investments.

Infrastructure constraints

Despite the active development of transport infrastructure, projects such as the modernization of railways (Dostyk – Moynty) and the construction of

highways (BAKAD) require significant investments. Their successful implementation reduces infrastructure risks. There are a number of problems that actively affect the logistical stability of Kazakhstan:

- Deterioration and congestion of railway networks. The main railway routes of the country require modernization. In 2022-2025, work is underway to upgrade the Dostyk–Moynty section, but overloading remains a problem.

- The lack of modern logistics hubs. Kazakhstan is actively developing logistics centers in Nur-Sultan, Almaty and Aktobe, but their number and level of equipment are still inferior to international standards.

- Limited capacity of the road network. Highways are being developed through projects such as the Greater Almaty Ring Road (BAKAD), but the lack of high-quality highways increases transportation costs.

- Port infrastructure development. Kazakhstan relies on the Trans-Caspian route, but the ports of Aktau and Kuryk require additional investments to increase capacity.

- Air logistics. Airports in Nur-Sultan and Almaty are being upgraded, but problems remain with regional airports that limit the flexibility of cargo transportation.

Economic risks

In the period from 2021 to 2024, Kazakhstan's economy faced a number of significant economic risks that significantly affected the country's logistics sector. Below is a detailed analysis of the key factors, supported by relevant graphs. Fluctuations in the tenge exchange rate, inflation and changes in freight tariffs have an impact on logistics companies and export-import operations. Diversification of financing sources and the development of private investment help to reduce these risks.

Economic factors have a significant impact on the logistics industry in Kazakhstan. Over the past four years (2021-2024), the following key risks have been identified:

- Fluctuations in the tenge exchange rate.
- Inflation.
- Increased transportation tariffs.
- Lack of investment in the industry.

Fluctuations in the tenge exchange rate

The exchange rate of the national currency, the tenge, has undergone significant changes over the specified period. In November 2024, the exchange rate exceeded 500 tenge per US dollar, which

became an important psychological frontier for the country's economy.

Data for the period 2021–2024 indicate a weakening trend of the national currency. According to the data presented in the text, in November 2024 the exchange rate of the US dollar exceeded 500 tenge, while in 2022 the tenge depreciated by 10–15%. This change was considered a key macroeconomic indicator reflecting the increase in logistics costs that depend on imports.

Assuming that in 2022 the tenge depreciated by 12%, with the base exchange rate $y_0 = 450$ tenge, the new exchange rate is calculated as follows:

$$y_t = 450 \times (1 + 0.12) = 504$$

Thus, the absolute change is:

$$\Delta y = 504 - 450 = 54$$

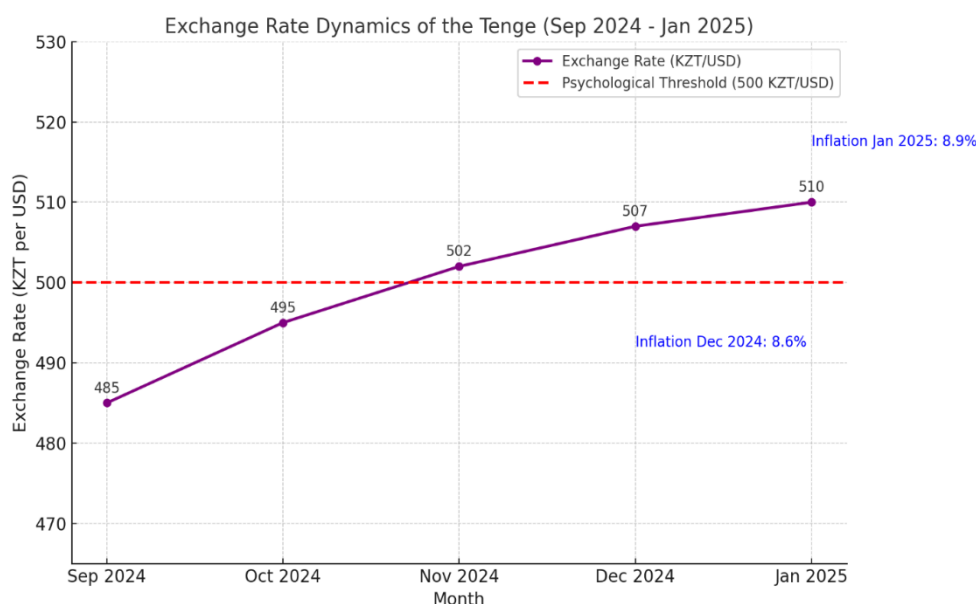
The growth rate is:

$$T_p = \frac{504 - 450}{450} \times 100\% = 12\%$$

This calculation demonstrates that the weakening of the national currency increases the cost of imported fuel, spare parts, logistics equipment, and digital solutions. Therefore, exchange rate fluctuations should be regarded not as an indirect factor, but as a direct cost-forming determinant for the logistics sector. In the case of Kazakhstan, this is especially significant for segments dependent on external supplies, imported equipment, and international transport infrastructure.

Thus, figure 1 does not merely illustrate changes in the exchange rate; it also provides macroeconomic evidence of the growing risk of higher logistics costs.

Figure 1
Dynamics of the tenge exchange rate against the US dollar



Note: Compiled by the authors

The devaluation of the national currency increases the cost of imports and transportation services, which affects prices for end users. In 2022, the tenge weakened by 10–15% due to sanctions pressure and instability of global markets.

The tenge-US dollar exchange rate for the period 2021–2024 shows a tendency to weaken the national

currency. The main factors influencing this dynamic:

1. Global economic shocks – the impact of sanctions, inflationary processes in world economies, and market instability.
2. Oil Prices – Kazakhstan's economy is heavily reliant on commodities, making oil price

fluctuations a key factor influencing the tenge exchange rate.

3. Inflation and Monetary Policy – Rising domestic inflation and the National Bank of the Republic of Kazakhstan's interventions to regulate the money supply.

4. Geopolitical risks – sanctions against neighboring countries, changes in trade routes and investment flows.

A weakening tenge can drive up the cost of imported goods and services, including logistics. Measures are needed to diversify the economy and reduce dependence on exports of raw materials. The development of domestic production facilities and transport infrastructure can reduce the risks associated with currency fluctuations.

Inflation

According to the data collected from the research, inflation reached 14–16% in 2022–2023, while in January 2025 the annual inflation was 8.9%, inflation reached 14–16% during 2022–2023, while in January 2025 the annual inflation rate was recorded at 8.9%. In addition, the increase from 8.6% in December 2024 to 8.9% in January 2025 indicates that price pressures persisted even in the short term.

The increase in inflation between December 2024 and January 2025 is calculated as:

$$\Delta y = 8.9 - 8.6 = 0.3$$

The relative growth rate is:

$$T_p = \frac{8.9 - 8.6}{8.6} \times 100\% \approx 3.49\%$$

Structural analysis

The main components of inflation are distributed as follows:

- paid services – 13.8%
- non-food goods – 8.4%
- food products – 5.8%

The total value is:

$$13.8 + 8.4 + 5.8 = 28.0$$

Thus, the proportional shares are calculated as:
Paid services:

$$U_1 = \frac{13.8}{28.0} \times 100\% = 49.3\%$$

Non-food goods:

$$U_2 = \frac{8.4}{28.0} \times 100\% = 30.0\%$$

Food products:

$$U_3 = \frac{5.8}{28.0} \times 100\% = 20.7\%$$

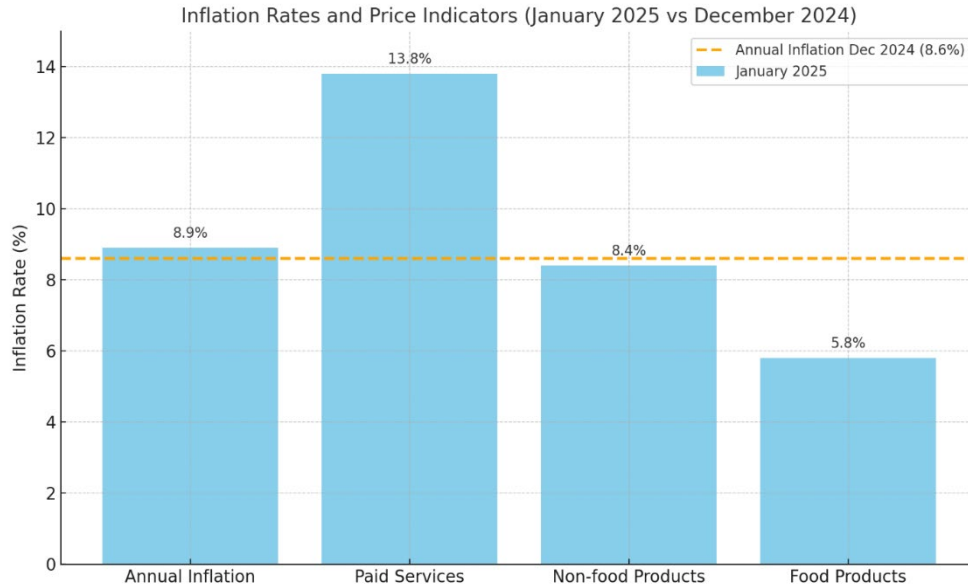
These calculations indicate that the largest share of inflationary pressure is concentrated in the paid services sector. Since logistics is directly embedded within the service economy, costs related to transportation, maintenance, technical servicing, terminal handling, and warehousing tend to increase in line with this trend.

Therefore, figure 2 demonstrates that inflation should not be viewed merely as a general macroeconomic background variable; rather, it represents a persistent driver of rising operational costs in the logistics sector. In the context of Kazakhstan, this manifests in price instability, higher delivery costs, and declining profitability for transport operators.

In 2022–2023, the inflation rate reached 14–16%, which increased the cost of transportation services, including the cost of fuel, spare parts and logistics equipment. Over the past four years, inflation in Kazakhstan has shown steady growth, factors influencing inflation:

1. Global economic trends – rising prices for energy, raw materials and food on global markets.
2. Tenge exchange rate – the weakening of the national currency leads to an increase in the cost of imports.
3. Higher fuel prices – transportation costs increase the cost of goods.
4. State monetary policy – measures to control inflation, including changes in the key rate of the National Bank.
5. Sanctions restrictions – changes in logistics chains, increase in the cost of international transportation.

Figure 2
Annual inflation in Kazakhstan



Note: Compiled by the authors

Rising inflation increases the cost of logistics services. There is a need to strengthen price control and stimulate domestic production. Investments in digitalization and optimization of logistics processes are needed to reduce costs.

Increase in transportation tariffs

Rising energy prices and inflationary pressures have driven up transport service tariffs. The analysis of changes in transport service tariffs between January 2024 and January 2025 revealed the following trends:

- rail transport: +18.6%
- urban bus transport: +10.5%
- air transport: +7.2%

These data were examined using a comparative analysis approach.

1) Comparative differences by mode of transport

The difference between rail and bus transport:

$$18.6 - 10.5 = 8.1$$

The difference between rail and air transport:

$$18.6 - 7.2 = 11.4$$

The difference between bus and air transport:

$$10.5 - 7.2 = 3.3$$

2) Average tariff increase

$$\bar{x} = \frac{18.6 + 10.5 + 7.2}{3} = \frac{36.3}{3} = 12.1\%$$

3) Structural shares

Total growth value:

$$18.6 + 10.5 + 7.2 = 36.3$$

Share of rail transport:

$$U_{rail} = \frac{18.6}{36.3} \times 100\% \approx 51.2\%$$

Share of bus transport:

$$U_{bus} = \frac{10.5}{36.3} \times 100\% \approx 28.9\%$$

Share of air transport:

$$U_{air} = \frac{7.2}{36.3} \times 100\% \approx 19.8\%$$

4) Example of estimating the impact on logistics costs

If the initial cost of freight transportation by rail is 1,000,000 tenge, after a tariff increase of 18.6%, the new cost will be:

$$L_c = 1,000,000 \times \left(1 + \frac{18.6}{100}\right)$$

$$L_c = 1,000,000 \times 1.186 = 1,186,000$$

Additional cost:

$$1,186,000 - 1,000,000 = 186,000$$

Similarly, for bus transport with an initial cost of 500,000 tenge:

$$L_c = 500,000 \times 1.105 = 552,500$$

Additional cost:

$$52,500$$

For air transport with an initial cost of 2,000,000 tenge:

$$L_c = 2,000,000 \times 1.072 = 2,144,000$$

Additional cost:

$$144,000$$

These calculations clarify the key implications of Figure 3. Since the highest tariff growth is observed in rail transport, this sector generates the greatest pressure on Kazakhstan's logistics system, given its strong dependence on rail-based freight flows.

An 18.6% increase in rail tariffs does not only raise transportation costs for operators but also affects export prices, domestic market prices, warehouse turnover, and overall transit attractiveness. The rise in urban bus tariffs increases the social burden, while higher air transport tariffs elevate the cost of both international and interregional connectivity.

Thus, figure 3 demonstrates that tariff pressure is unevenly distributed across transport modes, with

the highest concentration of logistics risk occurring in the rail sector.

In 2023, tariffs for rail and road transport increased by 12-20% due to rising fuel and lubricants costs and infrastructure fees. The data show that the largest increase in tariffs was recorded in rail transportation (18.6%), followed by urban bus transport (10.5%) and the smallest increase in aviation (7.2%).

The main influencing factors:

1. Railway transport:
 - Increase in fuel and electricity costs.
 - Infrastructure deterioration requiring modernization.
 - Rising maintenance expenses for rolling stock.
- Urban Bus Transport:
 - Rising fuel and spare parts costs.
 - Higher wages for drivers.
 - Investments in environmentally friendly transport.
3. Air transport:
 - Higher prices for aviation fuel.
 - Changing the fare structure at airports.
 - The impact of international sanctions and logistical constraints.

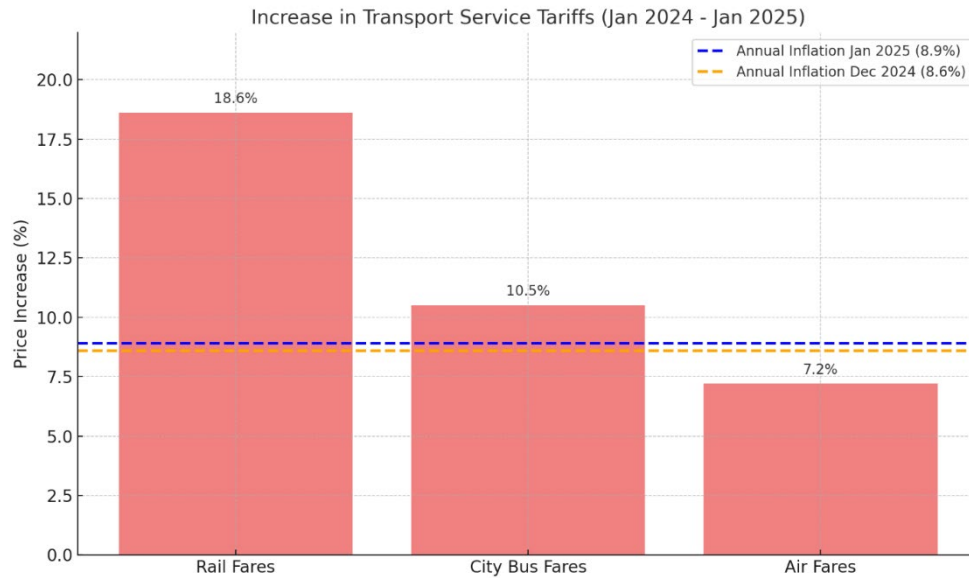
The increase in tariffs increases the transportation costs of businesses and the public. Government support measures are needed to stabilize prices. Diversification of logistics routes and cost optimization will help reduce the impact of tariff growth.

The data presented shows that insufficient investment has slowed the upgrading of logistics capacities and increased operational costs. In addition, sanctions against Russia and the slowdown of the Chinese economy have led to changes in trade flows.

Although a complete quantitative time series is not provided, the qualitative comparative analysis identifies two key conclusions:

- a shortage of investment leads to the persistence of infrastructural constraints;
- a decline in trade flows results in higher costs associated with the reconfiguration of transport routes.

Figure 3
Increase in tariffs for transportation services (January 2024 to January 2025)



Note: Compiled by the authors

These two factors demonstrate that logistics risks are not determined solely by price indicators but are also closely related to system capacity and route stability. In the context of Kazakhstan, the issue is not only the increase in tariffs, but also the limited availability of infrastructural and institutional reserves capable of absorbing these increases.

The empirical findings demonstrate that economic risks within Kazakhstan's logistics system are highly interrelated. Exchange rate depreciation increases the cost of imported inputs, inflation intensifies current operational expenditures, and tariff growth represents the cumulative manifestation of these factors within the logistics sector. In other words, tariff dynamics should not be interpreted as an isolated phenomenon; rather, they reflect the combined effects of exchange rate movements, inflationary pressures, energy costs, infrastructural constraints, and institutional limitations.

The results indicate that tariff increases are particularly pronounced in the railway sector. This is of critical importance for Kazakhstan's economy, as the country's freight turnover and transit capacity are largely dependent on rail infrastructure. Consequently, rising railway tariffs pose a direct risk to the overall stability of the national logistics system.

The structural composition of inflation, characterized by a high share of paid services, further reinforces the upward trend in transport and

logistics costs. This increases the likelihood of long-term cost instability within the sector. At the same time, the depreciation of the national currency raises the prices of imported equipment, spare parts, and digital systems, thereby increasing the overall cost of logistics modernization.

Taken together, these findings confirm the multi-level nature of logistics risks in Kazakhstan: at the macro level – exchange rate volatility, inflation, and geopolitical pressures; at the meso level – sectoral tariffs and investment shortages; at the micro level – operational costs and routing decisions of firms.

Conclusion

The empirical analysis conducted in this study demonstrates that the risks affecting Kazakhstan's transport and logistics system should not be viewed as isolated or independent phenomena; rather, they constitute an interconnected set of systemic factors. The findings indicate that tariff growth is largely driven by the combined influence of macroeconomic change, inflationary pressure, volatility in the national currency exchange rate, rising energy costs, and infrastructural constraints. From this perspective, transport tariff dynamics should be interpreted not merely as a sector-specific issue, but as a complex risk indicator reflecting the resilience of the national logistics system.

The results also reveal that the level of risk is uneven across transport modes. The greatest tariff pressure was observed in the railway sector, which can be explained by its dominant role in Kazakhstan's freight turnover structure, the high degree of infrastructure deterioration, and the substantial share of energy-related costs. These conditions justify treating railway transport as the principal concentration point of national logistics risks. In urban bus transport, tariff increases intensify the social burden and directly affect public access to transport services, whereas in the aviation sector, tariff growth influences interregional connectivity and the spatial cohesion of the domestic market.

The analysis further confirms that inflation and exchange-rate fluctuations exert a direct impact on logistics costs. Depreciation of the national currency increases the cost of imported fuel, spare parts, transport equipment, and digital technologies. At the same time, inflationary pressure raises the current operating costs of transport services. As a result, the cost base of transport operations expands, creating the preconditions for further tariff increases. Therefore, measures aimed at reducing logistics risks should be considered not only at the sectoral governance level, but also within the broader framework of macroeconomic stabilization.

Based on the discussion of the research findings, several practical recommendations can be proposed to strengthen the resilience of Kazakhstan's transport and logistics system. First, in the railway sector, it is necessary to implement long-term investment programs aimed at modernizing trunk infrastructure. Such measures would increase network capacity, reduce repair costs, and mitigate the tariff pressure associated with infrastructure wear and degradation. In addition, targeted subsidy mechanisms should be introduced to reduce carriers' operating costs, support energy expenditures, facilitate rolling stock renewal, and maintain socially significant transport services.

Second, in urban passenger transport, the social consequences of fare increases require a reconsideration of public transport subsidy policy. Subsidy instruments should be redesigned on the basis of a flexible model that takes into account the interests of specific social groups as well as the expenditure structure of transport operators. At the same time, improving fuel compensation mechanisms, renewing the vehicle fleet on a phased basis, and promoting a transition toward environmentally

sustainable modes of transport would strengthen the long-term stability of the urban mobility system.

Third, in the air transport sector, stronger measures are needed to preserve the affordability of domestic flights, including selective subsidization and support for strategically important regional routes. In addition, optimizing the structure of airport charges, revising service tariffs, and implementing managerial solutions aimed at improving airlines' operational efficiency are essential. These measures would not only reduce the cost of air transport but also help ensure the continuity of regional connectivity.

Fourth, at the level of general logistics policy, priority should be given to the diversification of transport routes. In this regard, the development of the Trans-Caspian International Transport Route, the expansion of alternative transit corridors, and the reduction of dependence on external markets are of strategic importance. At the same time, the introduction of digital platforms, the use of Big Data-based analytical tools, and the development of intelligent transport systems can enhance transparency in transport processes and reduce operational inefficiencies. To strengthen the digital resilience of the logistics system, investment in cybersecurity infrastructure and the training of sector-specific digital professionals should also be treated as priority directions.

Thus, the results of the study show that the risks inherent in Kazakhstan's transport and logistics system are complex and multi-level in nature, and that their mitigation requires an integrated and coordinated policy approach. The practical measures proposed in this paper are aimed at reducing the negative effects associated with rising transport tariffs, improving the operational efficiency of the logistics system, and strengthening Kazakhstan's transit and infrastructural resilience. In turn, this would enhance the country's competitiveness within international supply chains and contribute to long-term economic stability.

Acknowledgments

The authors would like to express their gratitude to the experts and professionals in the transport and logistics sector who provided valuable insights and practical perspectives for this study. The authors also acknowledge the use of official statistical data and analytical reports that contributed to the empirical analysis. This research did not receive any specific funding.

Funding

The authors report that this study was conducted without receiving any specific financial or institutional support.

Conflict of Interest

The authors declare that there are no conflicts of interest that could have influenced the results of the study or their interpretation.

Author Contributions

NKhM & AKB: conceptualization, methodology, software, validation, project administration.

LShK: formal analysis, data curation, project administration.

ABA: investigation, resources, writing – original draft preparation, writing – review & editing, visualization.

All authors have read and agreed to the published version of the manuscript.

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Received: 17 February 2026

Accepted: 20 September 2026

АВТОРЛАРҒА АРНАЛҒАН АҚПАРАТ

Авторлар болуы мүмкін:

- докторанттар, жетекшісімен соавторлықта;
- ғылыми дәрежесі бар тұлғалар;
- ғылыми-педагогикалық қызметпен айналысатын тұлғалар.

Магистранттармен бірлескен авторлықтағы мақалалар жариялауға жіберілмейді.

ҚазҰУ Хабаршысы. Экономика сериясында материалдарды жариялау Open Journal System, онлайн жіберу және рецензиялау жүйесі арқылы жүзеге асырылады.

Корреспонденция авторы журналға жариялау үшін ілеспе хат ұсынуға міндетті.

Авторларға қойылатын талаптар: Редакциялық коллегия журналдың ғылыми бағыттары бойынша бұрын жарияланбаған мақалаларды қабылдайды. Мақала журналдың функционал сайтына жүктеу арқылы ғана (Open Journal System) электронды форматта (doc, .docx, .rtf форматында) қабылданады. Шрифт кеглі – 12 (андатпа, түйін сөздер, әдебиеттер тізімі – 10, кесте мәтіні – 9-11), шрифт – Times New Roman, мәтін беттің ені бойынша тегістеу арқылы теріледі, аралығы – бір, абзац бойынша шегініс – 0,8 см, шеттері: үстіңгі және астыңғы – 2 см, сол және оң жақ – 2 см. Сурет, кесте, графика, диаграмма және т.б. мәтін ішінде нөмір және атаумен белгіленеді (мысалы, 1-сурет – Сурет атауы) және және ескерту түрінде дереккөз көрсетіледі (мысалы, Ескерту – ... дереккөзі негізінде автормен құрастырылған). Суреттердің, таблица, графика мен диаграммалардың саны мақала көлемінің 20% -нан (кейбір жағдайда 30%) артық болмауы керек. Мақала көлемі (атауы, авторлар бойынша ақпарат, андатпа, түйін сөздер, әдебиеттер тізімін қоспағанда) әлеуметтік және гуманитарлық бағытта 3 000 сөзден кем емес, 7 000 сөзден артық емес болуы шарт.

Мақаланы жариялау үшін ақы төлеу тәртібі мен құнын «Қазақ университеті» баспасы белгілейді және оны рецензенттер мен ғылыми редактор мақұлдағаннан кейін автор жасайды.

Мақала құрылымы: Бірінші бет: Бірінші жол – FTAXP нөмірі, мәтін беттің сол жақ шетімен тегістеледі, қаралау шрифт. Мақала автор(лар)ы – аты-жөнінің бірінші әріптері және тегі, жұмыс істейтін орны (аффилиация), қала, мемлекет, e-mail, ORCID ID – орыс, қазақ және ағылшын тілдерінде жазылады. Авторлар туралы ақпарат қалыпты шрифтті кіші әріптермен жазылып, беттің ортасында тегістеледі.

Мақала атауы (Тақырып) мақаланың мәні мен мазмұнын көрсетіп, оқырманның назарын аудару керек. Тақырып қысқа әрі ақпараттық, жаргондар мен аббревиатурасыз жазылуы тиіс. Тақырыптың орташа ұзындығы 5-7 сөз (кей жағдайда 10-12 сөз). Мақаланың тақырыбы орыс, қазақ және ағылшын тілдерінде берілуі керек. Тақырып қаралау шрифтті кіші әріптермен, беттің ортасымен тегістеледі. Андатпа көлемі – 150 сөзден кем емес, 300 сөзден артық емес орыс, қазақ, ағылшын тілдерінде жазылады.

Андатпа құрылымында келесі ақпарат міндетті түрде болуы керек: Зерттеу тақырыбы бойынша кіріспе сөз; Ғылыми зерттеудің мақсаты, негізгі бағыттары мен идеялары; Жұмыстың ғылыми және практикалық маңыздылығы бойынша қысқа ақпарат; Зерттеу әдістемесі бойынша қысқа ақпарат; Ғылыми зерттеудің негізгі нәтижелері, талдау және тұжырымдама; Жүргізілген зерттеу жұмысының маңыздылығы (аталған жұмыстың ғылымның сәйкес саласына енгізген үлесі); Жұмыс қорытындысының практикалық маңыздылығы.

Түйін сөздер/сөз тіркестері – орыс, қазақ, ағылшын тілдерінде 3-5 сөз аралығында.

Кіріспе келесіде берілген негізгі элементтерден тұрады: Таңдалған тақырыптың негіздемесі; тақырып өзектілігі мен зерттеу проблемалары. Таңдалған тақырыптың негіздемесінде алдыңғы зерттеушілердің тәжірибелері негізінде проблемалық жағдайдың (зерттеу жұмыстарының жоқтығы, жаңа зерттеу нысанының пайда болғаны және т.б.) бар екендігі айтылады. Тақырыптың өзектілігі аталған зерттеу нысанының қойылған сұрақтарға толық жауаптардың болмаған жағдайда, тақырыптың теориялық және практикалық маңыздылығы арқылы дәлелденіп жалпыға ортақ мүдде арқылы анықталады. Жұмыстың нысанын, пәнін, мақсаттарын, міндеттерін, тәсілдерін, әдістер, гипотезасын анықтау. Зерттеудің мақсаты тезисті дәлелдеумен, яғни зерттеу тақырыбын автор таңдаған аспектімен көрсетумен байланысты.

Әдебиеттерге шолу бөлімінде – зерттеу тақырыбы бойынша ағылшын тілінде шетелдік авторлардың іргелі және жаңа еңбектер (кемінде 15 жұмыс), оларды ғылыми үлесі тұрғысынан талдау, сондай-ақ сіздің мақаланызда толықтырылған зерттеу кемшіліктері беріледі.

Әдістеме – материалдар мен жұмыс барысының сипаттамасынан, сондай-ақ қолданылатын әдістердің толық сипаттамасынан тұруы керек.

Нәтижелер мен Талқылау бөлімінде сіздің зерттеу нәтижелеріңізді талдауы және талқылауы беріледі. Зерттеу барысында алынған нәтижелер туралы қорытынды беру арқылы негізгі мәні айқындалады. Бұл мақаланың маңызды бөлімдерінің бірі болып саналады. Онда жұмысыңыздың нәтижелерінің талдауы және алдыңғы жұмыстармен, талдаулармен және тұжырымдамаларымен салыстыру арқылы сәйкес нәтижелерді талқылау беріледі.

Қорытынды – жұмыстың осы кезеңдегі нәтижелерін жалпылау және қорытындылау; автор алға қойған тұжырымның растығын және алынған нәтижелерді ескере отырып, ғылыми білімнің өзгеруі туралы автордың қорытындысын растау. Қорытынды абстрактілі болмауы керек, оларды ұсыныстарды немесе одан әрі жасалатын жұмысты сипаттай отырып белгілі бір ғылыми саладағы зерттеу нәтижелерін жалпылау үшін қолдану керек.

Пайдаланылған әдебиеттер тізімі немесе библиографиялық тізім жаратылыстану және техникалық бағыттарға кем дегенде 15 атаулардан тұрады, ал ағылшын тіліндегі жалпы атаулар саны 50%-дан кем болмауы керек. Егер сілтемелер тізімінде кириллицада берілген еңбектер болса, сілтемелер тізімін екі нұсқада ұсыну қажет: біріншісі – түпнұсқада, екіншісі – романизацияланған алфавитте (транслитерация – translit-online.ru).

Әлеуметтік және гуманитарлы бағыттағы мәтіндерде дәйексөз келтірілген сілтемелер жұмыстың бірінші авторы, шыққан жылы: бет нөмір(лер)і жақша ішінде көрсетіліп беріледі. Мысалы, (Залеский, 1991). Әдебиеттер тізімінде бір автордың бір жылда жарық көрген бірнеше жұмысы келтірілген жағдайда, шыққан жылдың тұсына «а», «б» және т.б. әріптерді қосып жазу керек. Мысалы, (Садуова, 2001а: 15), (Садуова, 2001б, 22)

ИНФОРМАЦИЯ ДЛЯ АВТОРОВ

Авторами могут быть:

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- лица, имеющие ученую степень;
- лица, занимающиеся научно-педагогической деятельностью.

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Порядок оплаты и стоимость за публикацию статьи устанавливается издательским домом «Қазақ университеті» и производится автором после одобрения рецензентами и научным редактором.

Структура статьи Первая страница: Первая строка – номер МРНТИ, выравнивание – по левому краю, шрифт – полужирный; Автор(ы) статьи – Инициалы и фамилия, ученая степень, звание, место работы (аффилиация), город, страна, e-mail, ORCID ID – на русском, казахском и английском языках. Сведения об авторах представляются обычным шрифтом строчными буквами, выравнивание – по центру;

Название статьи (Заголовок) должно отражать суть и содержание статьи и привлекать внимание читателя. Название должно быть кратким, информативным и не содержать жаргонизмов или аббревиатур. Оптимальная длина заголовка – 5–7 слов (в некоторых случаях 10–12 слов). Название статьи должно быть представлено на русском, казахском и английском языках. Название статьи представляется полужирным шрифтом строчными буквами, выравнивание – по центру.

Аннотация объемом не менее 150 и не более 300 слов на русском, казахском и английском языках. Структура аннотации включает в себя следующие обязательные пункты: Вступительное слово о теме исследования; Цель, основные направления и идеи научного исследования; Краткое описание научной и практической значимости работы; Краткое описание методологии исследования; Основные результаты и анализ, выводы исследовательской работы.

Ключевые слова/словосочетания – количеством 3–5 на русском, казахском и английском языках;

Введение состоит из следующих основных элементов: Обоснование выбора темы; актуальность темы или проблемы. В обосновании выбора темы на основе описания опыта предшественников сообщается о наличии проблемной ситуации (отсутствие каких-либо исследований, появление нового объекта и т.д.).

Актуальность темы определяется общим интересом к изученности данного объекта, но отсутствием исчерпывающих ответов на имеющиеся вопросы, она доказывается теоретической или практической значимостью темы.

Определение объекта, предмета, целей, задач, методов, подходов, гипотезы и значения вашей работы. Цель исследования связана с доказательством тезиса, то есть представлением предмета исследования в избранном автором аспекте.

В секции обзор литературы – должны быть охвачены фундаментальные и новые труды по исследуемой тематике зарубежных авторов на английском языке, анализ данных трудов с точки зрения их научного вклада, а также пробелы в исследовании, которые Вы дополняете в своей статье.

Методология – должны состоять из описания материалов и хода работы, а также полного описания использованных методов.

В разделе Результаты и Обсуждение – приводится анализ и обсуждение полученных вами результатов исследования. Приводятся выводы по полученным в ходе исследования результатам, раскрывается основная суть. И это один из самых важных разделов статьи. В нем необходимо провести анализ результатов своей работы и обсуждение соответствующих результатов в сравнении с предыдущими работами, анализами и выводами.

Заключение – обобщение и подведение итогов работы на данном этапе; подтверждение истинности выдвигаемого утверждения, высказанного автором, и заключение автора об изменении научного знания с учетом полученных результатов. Выводы не должны быть абстрактными, они должны быть использованы для обобщения результатов исследования в той или иной научной области, с описанием предложений или возможностей дальнейшей работы.

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Introduction consists of the following main elements: Justification of the choice of topic; relevance of the topic or problem. In substantiation of the choice of topic based on the description of the experience of predecessors, the presence of a problem situation (the absence of any research, the emergence of a new object, etc.) is reported.

The relevance of the topic is determined by the general interest in the knowledge of this object, but the lack of comprehensive answers to the questions, it is proved by the theoretical or practical significance of the topic.

In the literature review section, fundamental and new works on the subject matter of foreign authors in English should be covered (at least 15 works), analysis of the given works in terms of their scientific contribution, as well as research gaps that you supplement in your article.

Methodology should consist of a description of the materials and the progress of the work, as well as a complete description of the methods used.

In the Results and Discussion section an analysis and discussion of the research results you received is provided. The conclusions on the results obtained during the study are given, the main essence is revealed. And this is one of the most important sections of the article. It is necessary to analyze the results of their work and discuss the relevant results in comparison with previous works, analyzes and conclusions.

Conclusion – synthesis and summarizing the work at this stage; confirmation of the truth of the statement put forward by the author, and the author's conclusion on the change of scientific knowledge, taking into account the results obtained. Conclusions should not be abstract, they should be used to summarize the results of research in a particular scientific field, with a description of the proposals or opportunities for further work.

References consists of at least 15 titles, and from the total number of titles in English must be at least 50%. style of the list of references – American Psychological Association (<http://www.apastyle.org/>). The list of references is presented in alphabetical order, and ONLY those works that are cited in the text. References to cited works in the text are given in brackets, indicating the first author of the work, year of publication: the number of pages. For example, (Zalesky, 1991).

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