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Gender-Oriented Human Capital and the Development of Outsourcing Services in Kazakhstan

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Abstract

The article examines the relationship between gender-oriented human capital and the development of outsourcing-related services in Kazakhstan. Outsourcing is considered not only a mechanism for improving business efficiency but also a factor influencing employment structure, flexible work arrangements, and the demand for professional and digital competencies. Since official statistics do not identify outsourcing as a separate economic activity, the empirical assessment is based on professional, scientific and technical services and related business service activities. The information base was compiled by the Bureau of National Statistics of the Republic of Kazakhstan for 2015-2024; comparable regional indicators for 2015-2023 were used for panel analysis, and forecasting was performed for the period 2025-2030. The methodological approach combines descriptive statistics, regional comparison, fixed-effects panel regression and the construction of an integral index of gender-oriented human capital. The model includes human capital, women's participation, digitalisation, gross regional product per capita and infrastructure characteristics. The results showed that the proportion of women increased from 50.0% to 51.6%, while the gender pay gap narrowed from 21.1% to 17.5%. The panel model revealed positive statistically significant associations of market volume with human capital ($\beta = 28.63$; $p < 0.001$), women's participation ($\beta = 15.42$; $p = 0.002$), digitalization ($\beta = 8.76$; $p = 0.003$) and the interaction of human capital and gender participation ($\beta = 22.15$; $p = 0.001$). The results show that the development of outsourcing services is linked to the quality of human capital, digital infrastructure, and increased participation of women in skilled employment.

Keywords: Gender, Gender Equality, Gender Pay Gap, Human Capital, Social Mobility, Employment, Digitalization

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1. INTRODUCTION

In the context of globalisation, digital transformation and increasing competition among national economies, outsourcing-related services are becoming an important component of business efficiency and labour market modernisation. Outsourcing enables organisations to reduce transaction costs, increase operational flexibility, access specialised competencies and concentrate internal resources on core activities. Contemporary outsourcing includes not only traditional administrative functions but also accounting, human resource management, information technology services, consulting, legal support, marketing, logistics and business process services.

For Kazakhstan, the development of outsourcing-related services is relevant to economic diversification, service-sector growth and the expansion of knowledge-intensive employment. The country has a relatively developed digital infrastructure, an extensive higher education system and a growing market for professional and business services. These conditions create opportunities for the further expansion of domestic outsourcing providers and the development of regional service centres. However, the competitiveness of this sector depends not only on technological and institutional conditions but also on the quality of human capital, professional competencies, digital skills, and the labour market's capacity to respond to changing business requirements.

Human capital is particularly important in outsourcing because service quality is determined primarily by employees' knowledge, qualifications, communication skills, digital literacy and ability to work in flexible and project-based environments. Unlike sectors based mainly on physical assets, outsourcing relies heavily on professional expertise and the effective organisation of intellectual labour. Consequently, investment in education, training and workforce development may directly influence the growth potential and competitiveness of outsourcing-related services.

The gender dimension is also significant. Outsourcing may expand women's access to employment through remote work, flexible schedules, project-based activities and professional opportunities in service-oriented sectors. These forms of employment may reduce some barriers related to territorial mobility and the combination of work and family responsibilities. At the same time, greater participation of women does not automatically ensure equal access to high-quality jobs, managerial positions, digital occupations or career advancement.

Gender differences in wages, occupational structure and access to leadership positions remain persistent features of Kazakhstan's labour market. Women are strongly represented in education, healthcare, trade and administrative services, while their participation in technology-intensive and higher-paid professional segments remains more limited. Similar patterns may be observed in the outsourcing market, where women may be concentrated in accounting, human resources, and administrative functions. At the same time, information technology, data analytics, and logistics remain more male-dominated.

This issue is important because women's economic contribution depends not only on employment rates but also on the quality of jobs, remuneration, professional mobility, and access to training. Therefore, the gender dimension of outsourcing should be analysed not only as a matter of social equality but also as a factor influencing the effective use of human capital. When professional opportunities are distributed unevenly, part of the available workforce may remain underutilised, reducing productivity and restricting market development.

Despite increasing research interest in digitalisation, flexible employment and professional services, the gender characteristics of outsourcing-related activities in Kazakhstan remain insufficiently studied. Existing research primarily addresses general

labour market trends, gender inequality, digital employment or outsourcing as an organisational strategy. The interaction between human capital, women's participation, digitalisation and the regional development of outsourcing-related services has received less attention.

An additional methodological challenge is that outsourcing is not identified as a separate type of economic activity in Kazakhstan's official statistics. The market, therefore, must be assessed indirectly through professional, scientific and technical activities, information and communication services, administrative support and other related business service categories. This limits measurement precision and requires careful interpretation of statistical results.

The regional dimension is also important. Kazakhstan's regions differ substantially in educational potential, digital infrastructure, wage levels, labour productivity, service-sector development and women's participation in professional employment. Almaty and Astana host a significant share of universities, financial institutions, consulting companies, information technology businesses, and qualified specialists, while many other regions have a more limited-service base. These differences may influence both the size of outsourcing-related markets and the capacity of regions to attract and retain skilled labour.

The purpose of this study is to examine the relationship between gender-oriented human capital and the development of outsourcing-related services in Kazakhstan, with particular attention to regional differences, women's participation, digitalisation and labour market transformation.

To achieve this purpose, the study analyses the dynamics of employment, wages, women's participation and market development; assesses regional differences in gender-oriented human capital; estimates a fixed-effects panel regression model; constructs an integral index of gender-oriented human capital; and develops scenario projections for the period up to 2030.

The study's scientific contribution lies in integrating human capital, gender participation, and digitalisation into a single analytical framework to examine outsourcing-related services. The study also proposes an integral index that combines education, gender balance, professional competencies and social mobility. This approach enables assessment of regional differences in the capacity to develop professional and business services.

The practical significance of the research lies in the potential to apply its results to employment policy, digital skills development, professional training, and regional service-sector support. The findings may also inform measures to expand women's participation in information technology, consulting, analytics, and other knowledge-intensive outsourcing segments.

Given the indirect measurement of the outsourcing market and the use of aggregated regional indicators, the results should be interpreted as statistical associations rather than definitive causal effects. Nevertheless, the proposed approach enables the identification of important relationships among human capital, gender participation, digitalisation, and the development of outsourcing-related services in Kazakhstan.

2. LITERATURE REVIEW

The theoretical framework of this study combines human capital theory, gender economics, labour market segmentation, outsourcing research and approaches to digital employment transformation. Such an integrated perspective makes it possible to examine outsourcing-related services not only as an organisational mechanism for transferring business functions but also as a labour market segment whose development depends on professional competencies, digitalisation and the distribution of economic opportunities between women and men.

Human capital theory provides the central conceptual basis for the analysis. Schultz (1961) interpreted human capital as the stock of knowledge, skills, health and experience

that increases labour productivity and supports economic growth. Becker (1964) further developed this approach by considering expenditure on education and vocational training as investment decisions based on expected future returns. These ideas are particularly relevant to outsourcing-related services because the competitiveness of this market depends less on physical assets than on specialised knowledge, professional accuracy, communication skills, digital literacy and the ability to adapt to changing customer requirements.

The classical human capital approach, however, pays limited attention to differences in the conditions under which women and men accumulate and use knowledge and skills. Gender-sensitive theories address this limitation by focusing on unequal access to resources, opportunities and decision-making. Sen (1990) argued that development should be understood not only in terms of income growth but also in terms of the expansion of real capabilities. Kabeer (1999) similarly proposed analysing women's empowerment through the interaction of resources, agency and achievements. Applied to outsourcing-related services, these approaches suggest that women's participation should be assessed not only by employment numbers but also by job quality, access to training, remuneration, professional mobility and representation in managerial positions.

Labour market segmentation theory also helps explain persistent gender differences. Doeringer and Piore (1971) showed that labour markets are divided into primary and secondary segments with different levels of pay, stability, working conditions and career prospects. From a gender perspective, this division may result in women being concentrated in lower-paid and less protected occupations even when their educational attainment is comparable to that of men. This issue is directly relevant to outsourcing, where high-skilled segments such as information technology, consulting and analytics coexist with routine administrative, accounting and operational services.

Research on the gender pay gap confirms that differences in earnings cannot be explained solely by education or work experience. Blau and Kahn (1997, 2003, 2006) demonstrated that occupational segregation, family responsibilities, institutional arrangements, employer practices and access to managerial positions contribute to persistent gender wage differences. Weichselbaumer and Winter-Ebmer (2005) showed that estimates of the unexplained wage gap vary with data coverage, worker characteristics, and model specification. Ciminelli et al. (2021) further emphasised the importance of the "sticky floor" and "glass ceiling", which may restrict women's advancement from lower-paid positions to higher-level professional and managerial roles.

These findings are important for analysing outsourcing-related services. An increase in women's employment in the sector does not necessarily imply gender equality if women remain concentrated in administrative functions. At the same time, technology-intensive and higher-paid activities are dominated by men. Therefore, both horizontal segregation across occupations and vertical segregation within organisational hierarchies should be taken into account.

Outsourcing research has traditionally focused on cost reduction, specialisation and organisational flexibility. Lacity and Willcocks (2001) described outsourcing as a strategic management instrument that enables organisations to transfer selected functions to external providers and concentrate on core activities. Later work showed that successful outsourcing also depends on supplier capabilities, contract governance, trust, digital infrastructure and the capacity to adapt services to changing client needs (Lacity & Willcocks, 2015).

The scope of outsourcing has expanded substantially with digitalisation. It now includes accounting, human resource management, information technology, legal services, marketing, consulting, analytics, logistics coordination and other business process services. These activities rely heavily

on intellectual labour, communication, digital tools and distributed forms of work. As a result, the outsourcing market can create opportunities for employees with specialised, transferable competencies.

International evidence suggests that outsourcing may affect women's employment and long-term human capital formation. Jensen (2012) found that the expansion of business process outsourcing opportunities in India influenced young women's employment decisions, education and family expectations. This indicates that access to new service-sector jobs may produce broader social and economic effects beyond immediate income growth.

At the same time, the effects of outsourcing are not automatically inclusive. Flexible and remote work may expand employment opportunities, but it can also reproduce insecurity, weak career progression and unequal remuneration if institutional safeguards are insufficient. Consequently, the relationship between outsourcing and gender equality depends on job quality, access to professional development, and the structure of occupations within the sector.

For Kazakhstan, these issues are especially relevant because women constitute a substantial share of the employed population but remain unevenly distributed across sectors and positions. Nyussupova et al. (2023) show that gender differences persist in employment structure, remuneration and access to managerial positions. Women are more frequently represented in education, healthcare, trade and service activities, while their participation in technology-intensive and high-income sectors is more limited. Similar patterns may be reproduced in outsourcing-related services unless targeted measures in digital education, technical training and career advancement accompany market development.

The relationship between human capital and innovation further supports the importance of professional skills for outsourcing development. Van Uden et al. (2017) show that human capital includes not only formal education but also staff development, workplace learning and organisational conditions for innovation. Danvila-del-Valle et al. (2019) similarly emphasise the importance of training for organisational competitiveness. In knowledge-intensive service markets, these factors influence firms' ability to adopt digital technologies, improve service quality, and respond to new client requirements.

Human capital is also linked to investment attractiveness and regional competitiveness. Root and Ahmed (1979), Narula (1996) and Lucas (1990) and Dunning (2014) show that the availability of qualified labour and appropriate institutional conditions can influence the location of investment and production activities. However, education alone is insufficient. Infrastructure, digital connectivity, market institutions and the compatibility of workforce skills with business needs also shape regional competitiveness.

These arguments are relevant to Kazakhstan's regional structure. Almaty and Astana are home to universities, financial institutions, consulting firms, information technology companies, and a large share of highly qualified labour. Other regions may have more limited digital infrastructure and smaller professional service markets. Therefore, regional differences in education, digitalisation, wages, women's participation and occupational structure may influence the development of outsourcing-related services.

The literature also indicates that gender equality may improve the use of human capital by expanding the available talent pool and reducing barriers to professional participation. However, this relationship should not be interpreted mechanically. A high share of women in a sector does not necessarily indicate equal pay, equal career prospects or access to managerial positions. Gender-sensitive analysis should therefore combine quantitative participation indicators with measures of job quality, remuneration, skills and social mobility.

Despite the growing literature on outsourcing, human capital, digitalisation and gender inequality, several research gaps remain. First, outsourcing-related services are rarely examined as a distinct labour market

segment in Kazakhstan. Second, existing studies generally analyse gender inequality or service-sector development separately, without considering their interaction. Third, regional differences in gender-oriented human capital and their relationship with outsourcing-related market development remain insufficiently explored. Fourth, the absence of a separate statistical category for outsourcing complicates empirical analysis and requires the use of proxy indicators.

To address these gaps, the present study combines descriptive analysis, a fixed-effects panel model and an integral index of gender-oriented human capital. The analytical framework considers education, women's participation, digitalisation, professional competencies, wages and social mobility as interconnected factors associated with the development of outsourcing-related services. The study does not attempt to establish definitive causal effects but seeks to identify statistically meaningful regional patterns that can inform future research and policy development.

3. METHODOLOGY

The empirical analysis examines the relationship between gender-oriented human capital and the development of outsourcing-related services in Kazakhstan. Because outsourcing is not recorded as a separate type of economic activity in official statistics, the study uses a proxy-based approach that combines indicators for professional, scientific, and technical activities; information and communication services; administrative and support services; accounting; consulting; human resource services; and other business-process activities. The resulting indicator should therefore be interpreted as an estimate of the outsourcing-related services market rather than as the officially recorded volume of a distinct economic sector.

The descriptive analysis covers the period from 2015 to 2024. Data for 2025 are treated as estimates and used only in the scenario section. The panel regression covers the period from 2015 to 2023, for which a more complete set of comparable regional indicators is available. The scenario forecast covers 2025–2030. This separation of periods is necessary to avoid combining observed and estimated values in the same empirical model.

The information base includes data from the Bureau of National Statistics (2025) of Kazakhstan on employment, wages, gross regional product, fixed capital investment and the structure of economic activity. International and analytical sources on human capital, gender equality, digitalisation and the development of professional services supplement these data. Each indicator used in the analysis should be linked in the notes to the corresponding statistical table or dataset.

To construct the outsourcing-related services indicator, the study aggregates selected economic activities closely associated with business process outsourcing. The final list of included activities should be presented in a separate methodological table that shows the relevant OKED code, the economic activity, the indicator used, and the source. Activities that are only partially related to outsourcing should be included with caution, and the limitations of such approximation should be explicitly acknowledged.

The dependent variable in the panel model is the estimated volume of outsourcing-related n i, i, measured in billion tenge. It is denoted as OUTS_{it}. The main explanatory variables are the Human Capital Index, the Gender Participation Index, the Digitalisation Index and the interaction between human capital and gender participation. Control variables include gross regional product per capita and the regional infrastructure index.

The panel model is specified as formula (1):

$$OUTS_{it} = \beta_0 + \beta_1 HC_{it} + \beta_2 GENDER_{it} + \beta_3 DIG_{it} + \beta_4 (HC_{it} \times GENDER_{it}) + \beta_5 GRPPC_{it} + \beta_6 INFRA_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

where:

$OUTS_{it}$ – the estimated volume of outsourcing-related services in region $i$and year t, billion tenge;

HC_{it} – the Human Capital Index;

$GENDER_{it}$ – the Gender Participation Index;

DIG_{it} – the Digitalisation Index;

$HC_{it} \times GENDER_{it}$ – the interaction between human capital and gender participation;

$GRPPC_{it}$ – the gross regional product per capita;

$INFRA_{it}$ – the regional infrastructure index;

μ_i – the region-specific fixed effects;

λ_t – year fixed effects;

ε_{it} – the error term;

β_0 – the intercept;

β_1-β_6 – the estimated coefficients.

The Human Capital Index combines indicators of educational attainment, labour productivity, professional training and workforce skills. The exact composition of the index, the normalisation method and the weights assigned to each component should be reported in a separate table. The Gender Participation Index reflects women's participation in outsourcing-related employment and management. This variable must be coded consistently as a proportion from 0 to 1. For example, 51.8% should be entered as 0.518.

The Digitalisation Index reflects the development of regional digital infrastructure, access to broadband internet, use of digital technologies by enterprises and the spread of digital employment. The Infrastructure Index captures the broader regional conditions required for service-sector development, including communications, transport accessibility and business infrastructure.

The interaction term is included to test whether the association between human capital and market development varies depending on the level of women's participation. In the presence of this interaction, the coefficient β_1 cannot be interpreted as the overall effect of human capital. It reflects the association between human capital and outsourcing-related services when the Gender Participation Index equals zero. Similarly, β_2 reflects the association with women's participation when the Human Capital Index equals zero.

Therefore, the interpretation of the interaction should be based on marginal effects calculated at representative values of the Human Capital Index and Gender Participation Index, such as the minimum, mean and maximum levels.

A fixed-effects specification is used to control for time-invariant regional characteristics, including historical specialisation, institutional differences and persistent features of local labour markets. Year effects are included to account for common shocks affecting all regions, such as macroeconomic changes, inflation, national digitalisation policies and the effects of the pandemic.

The choice between fixed- and random-effects models is assessed using the Hausman test. The final article should report the test statistics and p-value. If the Hausman test rejects the random-effects specification, the fixed-effects model is retained. The number of regions, year and region-year observations must also be reported explicitly. If the database contains 17 territorial units observed over nine years, the balanced panel should contain 153 observations. This value should be stated only after confirmation from the final dataset.

Multicollinearity is assessed using variance inflation factors. Values above conventional thresholds indicate that the explanatory variables may be strongly correlated. Serial correlation is examined using the Wooldridge test for panel data, while heteroscedasticity is assessed using an appropriate modified Wald or White-type test. Where these problems are detected, cluster-robust standard errors at the regional level should be applied.

The study also constructs an Integral Gender-Oriented Human Capital Index, denoted as $IGHC_i$. The general formula is (2):

$$IGHC_i = \Sigma(w_j \times z_{ij}), for\ j = 1, \dots, m \quad (2)$$

where:

z_{ij} – the normalised value of indicator j for region i;

w_j – the weight assigned to indicator j;

m – the number of indicators included in the index.

The gender pay gap is calculated as the relative difference between the average salary of men and women. This indicator is used in the study as an indicator of structural inequality in the labour market and is determined by the formula (3):

$$IGHC_i = 0.30EDU_i + 0.25GB_i + 0.25PC_i + 0.20SM_i \quad (3)$$

where:

EDU_i – the educational component;

GB_i – the gender-balance component;

PC_i - the professional-competencies component;

SM_i - the social-mobility component

The educational component includes women's participation in higher and vocational education. The gender-balance component includes women's share in outsourcing-related employment and management. The professional-competencies component reflects women's participation in skilled and technology-intensive service activities. The social-mobility component captures women's career advancement, representation in leadership positions and the inverse value of the gender pay gap.

All indicators are normalised using the min–max method. For indicators with a positive relationship to gender-oriented human capital, direct normalisation is applied as formula (4): The weights are derived using expert assessment and the analytic hierarchy process. The methodology should report the number of experts, their selection criteria, the pairwise comparison matrix, and the consistency ratio. A consistency ratio below 0.10 is generally considered acceptable. Without this information, the weighting procedure cannot be independently evaluated.

The scenario forecast for 2025–2030 is based on three trajectories. The baseline scenario assumes the continuation of recent trends in market growth, digitalisation and women's participation. The optimistic scenario assumes faster improvement in the IGHC, wider participation by women in technology-intensive services, and a reduction in the gender pay gap. ttttttttttt The pessimistic scenario assumes slower progress in digital skills, persistent occupational segregation and limited institutional change.

The forecasting method must be stated explicitly. If the forecast is based on compound annual growth rates, the following formula should be used as formula (5):

$$OUTS_t = OUTS_0 \times (1 + g)^n \quad (5)$$

where:

$OUTS_0$ – the initial market value;

g – the assumed annual growth rate;

n – the number of forecast years

If the forecast is generated using the panel regression coefficients, the assumptions regarding future values of HC, GENDER, DIG, GRPPC, and INFRA should be provided for each scenario. The annual growth path should remain internally consistent and should not contain unexplained jumps.

The study has several limitations. First, the outsourcing-related services market is measured indirectly through a group of related economic activities. Second, the composition of these activities may include services that are not exclusively outsourced. Third, some regional indicators are available only in aggregated form. Fourth, the IGHC depends partly on expert-defined weights. Fifth, the panel model identifies statistical associations but does not fully rule out reverse causality or omitted-variable bias. Sixth, scenario estimates depend on the assumptions used and should not be interpreted as precise predictions.

Despite these limitations, the proposed methodology provides a structured framework

for analysing the relationship between human capital, women's participation, digitalisation and the regional development of outsourcing-related services. Its reliability depends on transparent reporting of the underlying data, index composition, model diagnostics and forecasting assumptions.

4. ANALYSIS AND RESULTS

The empirical analysis identified the main trends in the development of outsourcing-related services in Kazakhstan, changes in women's participation and remuneration, regional differences in gender-oriented human capital, and the associations between market development, human capital, digitalisation and gender participation. Since outsourcing is not recorded as a separate type of economic activity in official statistics, the reported indicators represent estimates based on professional, scientific, technical, information, administrative and related business services. Therefore, the results should be interpreted as an approximation of the outsourcing-related services market rather than as official statistics for a separately classified sector.

The data for 2015–2024 are treated as observed indicators, whereas the values for 2025 are estimated using trend extrapolation. Table 1 presents the dynamics of employment, women's participation, average wages, the gender pay gap and the estimated market volume.

Table 1. Dynamics of outsourcing-related services and gender indicators in Kazakhstan, 2015–2025

Indicator	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Employment, thousand persons	285.4	298.6	305.2	312.6	328.4	315.8	348.2	365.4	378.6	385.7	398.4
Women employed, thousand persons	142.8	149.8	153.8	158.3	167.2	161.2	178.5	187.8	194.8	198.6	206.4
Share of women, %	50.0	50.2	50.4	50.6	50.8	51.0	51.3	51.4	51.5	51.6	51.8
Women's monthly wage, KZT thousand	156.4	168.5	182.3	198.7	215.4	208.6	220.2	245.8	268.5	285.4	312.6
Average monthly wage of men, KZT thousand	198.3	212.5	228.4	245.6	265.8	258.4	281.2	305.4	328.6	345.8	375.4
Gender pay gap, %	21.1	20.7	20.2	19.1	18.9	19.3	21.7	19.5	18.3	17.5	16.8
Market volume, KZT billion	45.2	52.8	61.5	72.3	85.6	78.4	92.5	108.3	125.6	142.8	158.5

Note: compiled by the authors

Employment in professional and related business services increased from 285.4 thousand people in 2015 to 385.7 thousand in 2024. The estimated value for 2025 is 398.4 thousand people. Over the observed period, the number of women employed in these activities increased from 142.8 thousand to 198.6 thousand, while their share rose from 50.0% to 51.6%. These dynamics indicate gradual growth in women's participation, although the limited change in the percentage share suggests that the gender structure of employment remained relatively stable.

The estimated market volume increased from KZT 45.2 billion in 2015 to KZT 142.8 billion in 2024. A temporary decline was recorded in 2020, when the estimated market volume fell from KZT 85.6 billion to KZT 78.4 billion. This reduction coincided with the disruption of business activity during the pandemic. From 2021 onward, the market returned to growth, supported by the expansion of remote services, digital business processes and demand for professional functions that could be provided externally.

Nominal wages increased for both women and men. At the same time, the gender pay gap narrowed from 21.1% in 2015 to 17.5% in 2024. The decline was not continuous, as the gap increased to 21.7% in 2021 before subsequently decreasing. The narrowing of the aggregate gap should be interpreted with caution because the available data do not control for occupation, qualifications, working hours, managerial status, or enterprise characteristics. Figure 1 demonstrates that the expansion of outsourcing-related services generally coincided with a gradual increase in women's participation and a reduction in the gender pay gap.

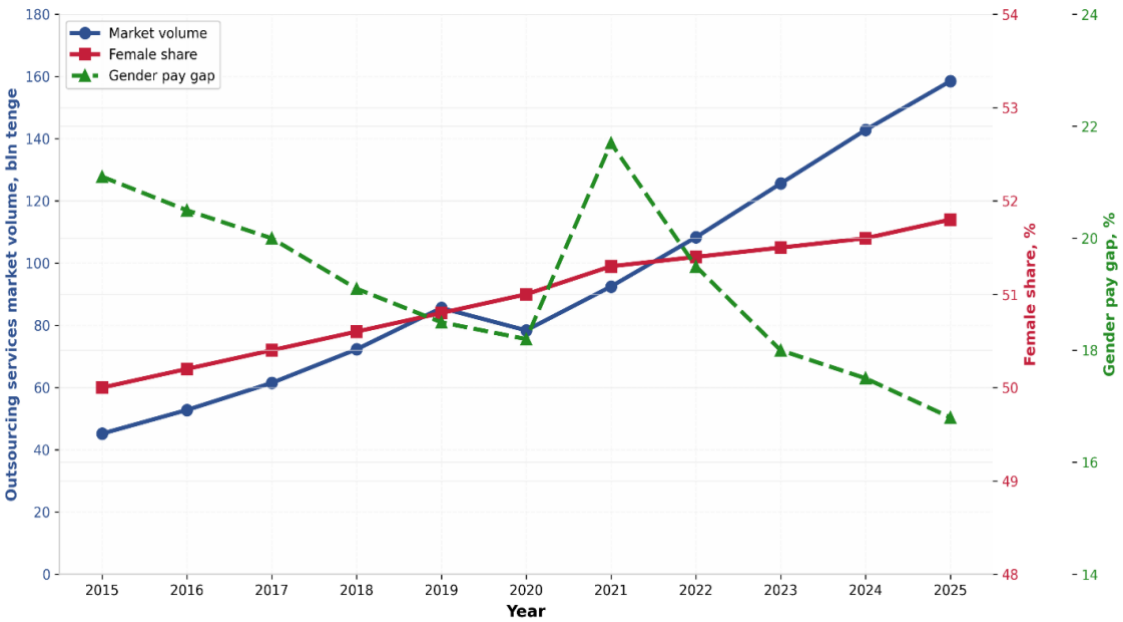

Figure 1. Dynamics of outsourcing services market development and gender indicators of Kazakhstan for 2015-2025

The interruption observed in 2020–2021 shows that market growth and gender indicators did not change uniformly. The regional comparison was conducted for 2025 to ensure consistency with the study period and to reflect the current regional structure of the outsourcing-related services market and gender-oriented human capital.

Table 2 presents the results for selected territorial units.

Almaty and Astana recorded the highest IGHC values in 2025, at 0.85 and 0.82, respectively. These cities also demonstrated the largest outsourcing-related services markets, amounting to KZT 65.8 billion in Almaty and KZT 58.4 billion in Astana. Their leading positions may be associated with the concentration of universities, financial institutions, consulting companies, information technology firms, developed digital infrastructure and highly qualified labour. Shymkent occupied an intermediate position, with an IGHC value of 0.75 and a market volume of KZT 23.9 billion.

Table 2. Regional differentiation of indicators of the outsourcing services market and gender-oriented human capital in 2025

Region	IGHC	Share of women in outsourcing-related services, %	Average monthly wage, thousand KZT	Market volume, KZT billion	Gender pay gap, %
Almaty	0.85	53.6	458.7	65.8	13.1
Astana	0.82	55.1	489.4	58.4	12.4
Shymkent	0.75	50.6	361.8	23.9	17.2
Almaty region	0.72	49.7	342.5	16.3	18.4
Karaganda region	0.70	47.8	331.2	13.6	19.1
Akmola region	0.69	48.5	323.7	11.1	19.8
East Kazakhstan region	0.67	46.4	317.5	10.3	20.9
Aktobe region	0.66	47.1	309.8	9.2	21.6
West Kazakhstan region	0.63	45.6	291.4	7.4	22.8

Note: compiled by the authors

The selected regions with lower IGHC values generally demonstrated smaller outsourcing-related services markets and wider gender pay gaps. The gender pay gap ranged from 12.4% in Astana to 22.8% in the West Kazakhstan region. These results indicate a positive regional association between gender-oriented human capital and the development of outsourcing-related services. However, this relationship should not be interpreted as causal. Large urban economies may simultaneously have stronger infrastructure, higher incomes, denser business networks, more diversified service markets and better access to professional education. These factors may influence both the level of gender-oriented human capital and the size of the outsourcing-related services market.

Figure 2 demonstrates a positive relationship between gender-oriented human capital and the regional development in 2025.

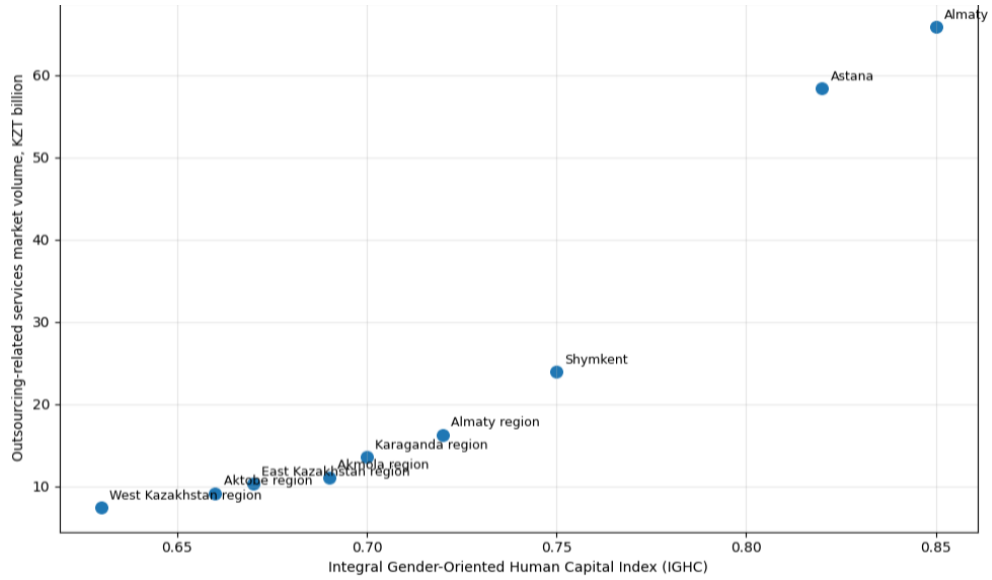

Figure 2. Regional outsourcing market and gender-oriented human capital in 2025

Almaty and Astana recorded the highest IGHC values and the largest market volumes, while Shymkent occupied an intermediate position. Regions with lower IGHC values generally had smaller outsourcing-related services markets, indicating that education, gender balance, professional competencies and social mobility are closely associated with the development of professional and business services.

Nevertheless, the identified relationship should be interpreted as a statistical association rather than a causal effect, since regional infrastructure, income levels, business concentration, digital development and the availability of qualified labour may also influence market size. The gender structure and remuneration patterns across selected outsourcing-related service segments are presented in Table 3.

Table 3. Gender structure and remuneration in the outsourcing-related services sectors of Kazakhstan in 2025

Outsourcing services sector	Share of women, %	Average monthly wage of women, thousand KZT	Average monthly wage of men, thousand KZT	Gender pay gap, %
Human resources outsourcing	69.8	336.5	397.8	15.4
Accounting outsourcing	73.6	365.2	438.4	16.7
Information technology outsourcing	38.4	492.6	548.7	10.2
Consulting services	47.8	448.5	507.4	11.6
Legal outsourcing	54.3	352.8	414.2	14.8
Marketing outsourcing	60.2	318.6	369.2	13.7
Logistics outsourcing	31.5	294.7	348.3	15.4

Note: compiled by the authors

Women had the highest representation in accounting and human resources outsourcing in 2025, accounting for 73.6% and 69.8% of employees, respectively. Their participation was substantially lower in information technology and logistics outsourcing, where women represented 38.4% and 31.5% of employees. This distribution indicates the persistence of horizontal gender segregation within outsourcing-related services.

The smallest gender pay gap was observed in information technology outsourcing, at 10.2%, despite the relatively low share of women in this segment. Consulting services also demonstrated a comparatively narrow gender pay gap of 11.6%. These results may be associated with more standardised qualification requirements, stronger competition for skilled professionals and a closer relationship between remuneration and measurable professional competencies.

In accounting outsourcing, where women constituted the largest share of employees, the gender pay gap remained at 16.7%. A similar pattern was observed in human resources outsourcing, where the gap amounted to 15.4%. This demonstrates that women's numerical predominance in a service segment does not automatically ensure equal remuneration, equal access to senior positions or comparable career advancement opportunities.

Legal and marketing outsourcing occupied an intermediate position in terms of women's participation. Women represented 54.3% of employees in legal outsourcing and 60.2% in

marketing outsourcing, while the gender pay gaps amounted to 14.8% and 13.7%, respectively. The results confirm that gender differences in remuneration persisted across all analysed outsourcing-related service segments in 2025.

Figure 3 presents women's participation and gender wage differences across the seven outsourcing-related service segments.

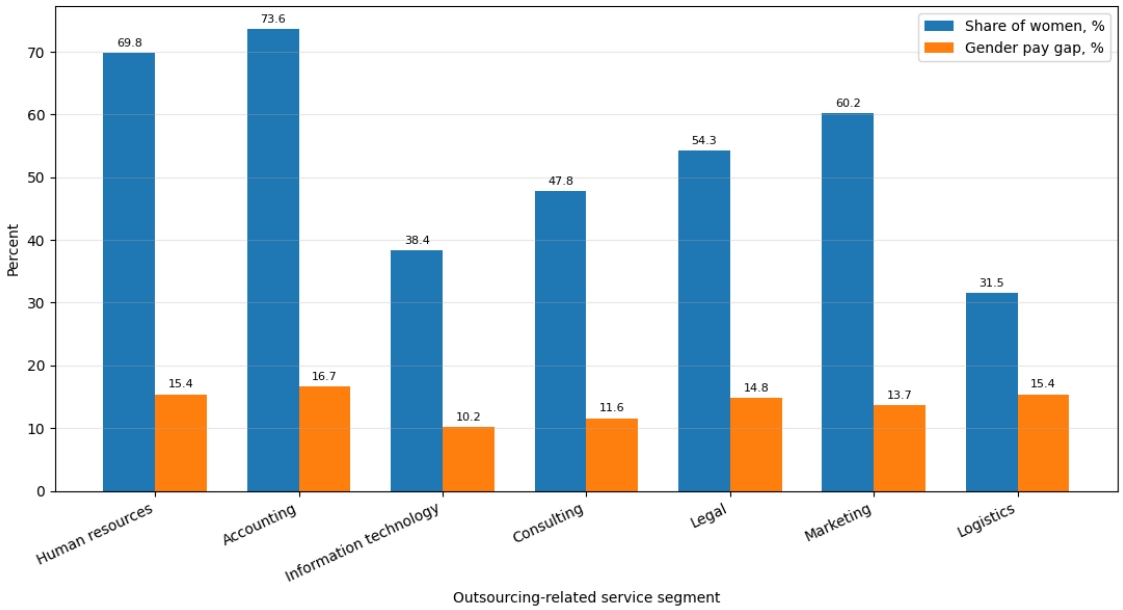

Figure 3. Women's participation and gender wage differences across outsourcing-related service segments in Kazakhstan in 2025

The sectoral analysis confirms that women's participation and remuneration patterns differed substantially across outsourcing-related services in 2025. However, descriptive indicators alone do not explain the factors associated with the regional development of the market. Therefore, the next stage of the analysis examines the relationship between outsourcing-related services, human capital, women's participation, digitalisation, regional income and infrastructure using panel data.

The fixed-effects panel regression was estimated using comparable regional data for 2015–2023. This period was retained because a complete and methodologically consistent set of regional indicators required for econometric estimation was available through 2023. Using a shorter panel period than the descriptive analysis prevents the inclusion of non-comparable or incomplete observations in the regression model. The dependent variable is the regional volume of outsourcing-related services. In contrast, the explanatory variables include the Human Capital Index, Gender Participation Index, Digitalisation Index, the interaction between human capital and gender participation, gross regional product per capita and the Infrastructure Index. Regional fixed effects were included to account for persistent differences among territorial units. Table 4 presents the results of the fixed-effects panel regression.

The regression results show that all explanatory variables included in the model have positive and statistically significant coefficients. The Human Capital Index has a coefficient of 28.63 and is statistically significant at the 1% level. This result indicates that improvements in education, professional

Table 4. Fixed-effects panel regression results

Variable	Coefficient	Robust standard error	T-statistic	P-value	Significance
Constant	−12.45	3.28	−3.80	<0.001	***
Human Capital Index	28.63	5.14	5.57	<0.001	***
Gender Participation Index	15.42	4.87	3.17	0.002	***
Digitalisation Index	8.76	2.93	2.99	0.003	***
Human Capital × Gender Participation	22.15	6.32	3.50	0.001	***
Gross regional product per capita	0.003	0.001	3.00	0.003	***
Infrastructure Index	4.28	1.56	2.74	0.007	***

Note: compiled by the authors

competencies, labour productivity and workforce skills are positively associated with the development of outsourcing-related services.

The Gender Participation Index also has a positive and statistically significant coefficient of 15.42. However, because the model includes an interaction term, this coefficient represents the conditional association between women's participation and market volume when the Human Capital Index equals zero. Therefore, it should not be interpreted as an unconditional average effect.

The positive coefficient of the interaction term, equal to 22.15, indicates that the association between human capital and outsourcing-market development becomes stronger as women's participation increases. This finding suggests that the effective use of women's professional and educational potential may reinforce the contribution of human capital to the development of knowledge-intensive services.

The Digitalisation Index has a positive coefficient of 8.76 and is statistically significant at the 1% level. This confirms that the development of digital infrastructure, broadband access, enterprise use of digital technologies and digital forms of employment is closely associated with the expansion of outsourcing-related services.

Gross regional product per capita and the Infrastructure Index also demonstrate positive and statistically significant relationships with market volume. These results reflect the importance of regional purchasing power, business demand, communications infrastructure and the broader institutional environment for the development of professional and business services.

The model explains 84.7% of the variation in the dependent variable. For the fixed-effects specification, this value should be interpreted as the within R^2, reflecting the proportion of changes in the regional volume of outsourcing-related services over time explained by changes in the included explanatory variables. The relatively high explanatory power of the model indicates that human capital, women's participation, digitalisation, regional income and infrastructure jointly account for a substantial part of the observed regional dynamics.

Because the regression includes an interaction term, the coefficients of the Human Capital Index and the Gender Participation Index should be interpreted conditionally. The marginal association of human capital with the outsourcing-related services market is calculated as follows:

Marginal association of HC = 28.63 + 22.15 × GENDER.

Accordingly, the relationship between human capital and market development becomes stronger as the level of women's participation increases. Similarly, the marginal association of women's participation is calculated as follows:

Marginal association of GENDER = 15.42 + 22.15 × HC.

This means that the relationship between women's participation and the volume of

outsourcing-related services becomes stronger in regions with higher levels of human capital. The positive interaction coefficient therefore reflects the complementary relationship between professional competencies and the effective participation of women in knowledge-intensive service activities.

At the same time, the regression results should not be interpreted as definitive causal effects. Reverse causality may exist because regions with larger outsourcing-related services markets may invest more actively in education, digitalisation and infrastructure. In addition, unobserved institutional, demographic and business-environment factors may influence both the explanatory variables and market development. The results should therefore be understood as statistically significant conditional associations.

The Integral Gender-Oriented Human Capital Index was calculated for 2025 to assess the extent to which women's educational potential, professional competencies, participation in economic activity and opportunities for social mobility were realised in the labour market. The index combines four components: education, gender balance, professional competencies and social mobility. Table 5 presents the structure and calculation of the national index.

Table 5. Structure and calculation of the Integral Gender-Oriented Human Capital Index for Kazakhstan in 2023

Component	Weight	Included indicators	Normalised value	Weighted value
Education	0.30	Women with higher education: gender parity in vocational education	0.72	0.216
Gender balance	0.25	Women's participation in outsourcing-related services; representation in management	0.65	0.163
Professional competencies	0.25	Women's labour productivity, skill level, and participation in knowledge-intensive services	0.58	0.145
Social mobility	0.20	Career advancement, leadership participation, and the inverse gender pay gap	0.38	0.076
Total IGHC	1.00	-	-	0.600

Note: compiled by the authors

The estimated national IGHC value is 0.600. The educational component has the highest normalised value, indicating relatively strong formal educational participation among women. The social-mobility component has the lowest value, suggesting that educational attainment is not fully translated into equal remuneration, career advancement and managerial representation.

The international IGHC ranking included in the original version should be removed unless the values for all countries are calculated using identical indicators, weights, normalisation ranges and reference years. Without a transparent and reproducible database, the comparison would create a false impression of precision.

Table 6 shows scenario projections of the outsourcing-related services market in Kazakhstan.

Table 6. Scenario projections of the outsourcing-related services market in Kazakhstan, 2025–2030, KZT billion

Scenario	2025	2026	2027	2028	2029	2030
Baseline	158.5	184.9	215.7	251.7	293.7	342.6
Optimistic	158.5	193.1	235.3	286.8	349.4	425.8
Pessimistic	158.5	178.3	200.5	225.6	253.7	285.4

Note: compiled by the authors

The difference between the optimistic and baseline trajectories widens progressively throughout the forecast period. By 2030, the optimistic scenario exceeds the baseline by 24.3%. This result illustrates the potential market implications of faster human capital development, wider women's participation, improved digital competencies and a narrower gender pay gap. However, the forecast should be interpreted as a scenario-based estimate rather than a precise prediction. Figure 4 displays the recalculated baseline, optimistic and pessimistic trajectories.

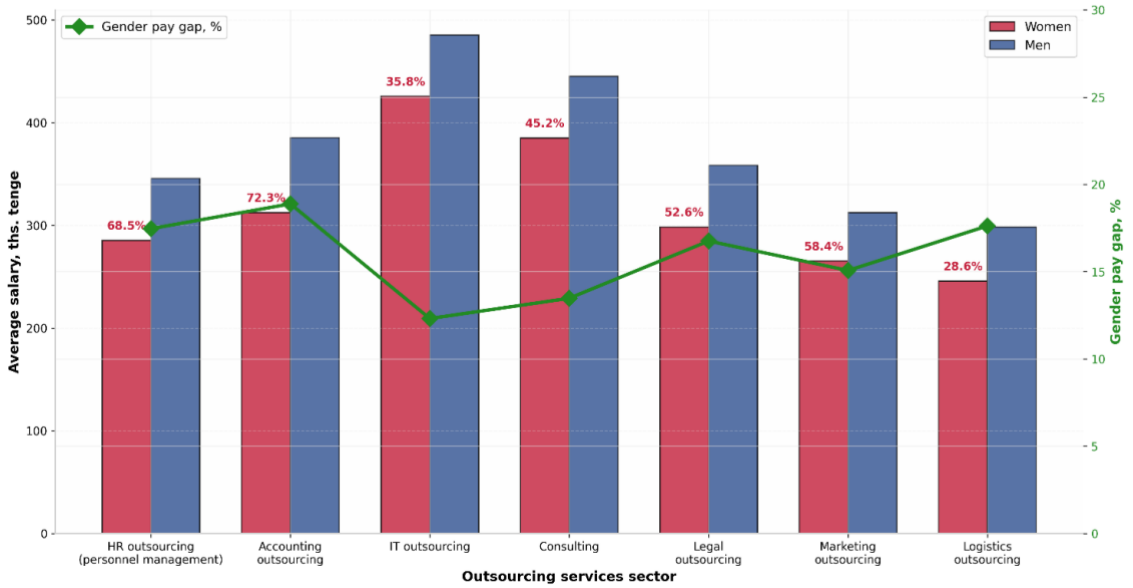

Figure 4. Scenario projections of the outsourcing-related services market in Kazakhstan for 2025–2030

The shaded area may represent the range between the optimistic and pessimistic scenarios. The annotation should indicate that the optimistic scenario assumes wider women's participation, a reduction in the gender pay gap and stronger investment in professional and digital education. Overall, the results indicate that the development of outsourcing-related services in Kazakhstan is positively associated with human capital, women's participation, digitalisation, regional income and infrastructure. At the same time, substantial regional differences, horizontal occupational segregation and gender wage disparities remain. The indirect measurement of the outsourcing market, the construction of composite indices and the scenario-based nature of the forecast require cautious interpretation. The findings should therefore be understood as evidence of statistical associations and development trajectories rather than definitive causal effects.

5. DISCUSSION

The results show that the development of outsourcing-related services in Kazakhstan is associated with the quality of human capital, digitalisation, regional infrastructure and women's participation in professional employment. At the same time, these relationships should be interpreted with caution because outsourcing is measured indirectly through related economic activities, and the empirical model does not fully eliminate reverse causality or omitted-variable bias.

The growth in employment and market volume observed between 2015 and 2024 indicates that professional and business services are becoming an increasingly important component of Kazakhstan's service economy. The temporary decline in 2020 and subsequent recovery also demonstrate the sector's sensitivity to macroeconomic disruptions and its capacity to adapt through remote work, digital platforms, and electronic business processes.

These findings are consistent with human capital theory. Schultz (1961) and Becker (1964) emphasised that education, skills and professional training increase labour productivity and economic returns. In outsourcing-related services, this relationship is especially important because service quality largely depends on specialised knowledge, communication, digital competencies, and the ability to respond to changing client requirements.

The positive association between the Human Capital Index and the estimated market volume supports the view that regions with stronger educational and professional capacity are better positioned to develop business services. However, the presence of the interaction term means that the role of human capital cannot be assessed independently of women's participation. The positive interaction coefficient suggests that the association between human capital and market development becomes stronger in regions where women are more actively represented in professional service activities.

This finding is consistent with capability-based and empowerment approaches. Sen (1990) argued that development depends not only on the availability of resources but also on people's ability to use them. Kabeer (1999) similarly linked empowerment to resources, agency and achievements. Applied to outsourcing-related services, these approaches imply that educational attainment alone is insufficient if women have limited access to technology-intensive occupations, managerial positions and professional advancement.

At the same time, the interaction coefficient should not be interpreted as definitive proof of a causal synergistic effect. Regions with higher women's participation may also have larger urban markets, stronger educational institutions, higher incomes, more developed digital infrastructure and greater business demand. These conditions can influence both gender participation and market expansion. Therefore, the results indicate a statistically positive relationship but do not establish that higher women's participation alone causes outsourcing-market growth.

The analysis of service segments reveals persistent horizontal gender segregation. Women are highly represented in accounting and human resource outsourcing, while their participation is considerably lower in information technology and logistics services. This pattern corresponds to labour market segmentation theory, according to which workers may be concentrated in occupational segments with different levels of remuneration, stability and career prospects (Doeringer & Piore, 1971).

Women's concentration in administrative and accounting functions may reflect educational specialisation, employer expectations, professional traditions and unequal access to technical training. By contrast, lower participation in information technology and logistics may be associated with gender differences in digital education, occupational choice, career networks and access to technical positions.

The results also show that a high share of women does not automatically ensure wage equality. Accounting outsourcing has the highest representation of women, but also a comparatively large gender pay gap. This finding is consistent with research showing that wage differences cannot be explained only by educational attainment or labour-force participation. Occupational hierarchy, managerial access, working hours and employer practices also influence earnings (Blau & Kahn, 1997, 2003, 2006; Weichselbaumer & Winter-Ebmer, 2005).

The relatively small wage gap in information technology outsourcing should also be interpreted with caution. It may reflect more standardised skill requirements, stronger competition for qualified specialists or a closer relationship between wages and measurable technical competencies. However, the available aggregated data do not permit direct testing of these explanations. A more reliable assessment would require individual-level information on occupation, education, experience, working hours and managerial status.

Regional differences further demonstrate that outsourcing-related services remain spatially concentrated. Almaty and Astana have the highest IGHC values and the largest estimated market volumes. The concentration of universities, financial institutions, consulting firms, digital infrastructure and qualified labour supports their position. These cities also offer denser professional networks and greater demand for specialised business services.

Regions with lower IGHC values generally demonstrate smaller market volumes and larger gender pay gaps. This suggests that the development of outsourcing-related services depends on a broader regional ecosystem rather than on any single variable. Digital connectivity, education, business demand, labour mobility, and institutional support interact to shape regional market capacity.

The results, therefore, support the development of regional business service centres outside the largest cities. Such centres could combine digital infrastructure, professional training, remote-work facilities and advisory support for small and medium-sized enterprises. Expanding remote employment may help reduce the territorial concentration of service-sector opportunities, although infrastructure and digital-skills gaps must first be addressed.

The estimated national IGHC value indicates that women's educational participation is stronger than their social mobility and managerial advancement. This difference is important because it shows that formal education does not automatically translate into equal economic outcomes. The weak social-mobility component reflects persistent limitations in career progression, leadership participation and remuneration.

The structure of the index is consistent with the distinction between human capital accumulation and its effective use. Women may have high educational attainment but remain underrepresented in senior positions or technology-intensive activities. Therefore, policy should focus not only on increasing education levels but also on improving pathways from education to employment and on career advancement and management.

The scenario analysis illustrates how different assumptions regarding digital skills, women's participation and gender equality may influence future market trajectories. Under the optimistic scenario, the estimated market volume exceeds the baseline by KZT 83.2 billion in 2030. This result should not be treated as a precise forecast but as an illustration of the potential economic difference between alternative development paths.

The optimistic scenario assumes that higher professional competencies accompany broader women's participation, improved digital education, narrower wage gaps and stronger infrastructure. Therefore, the additional market volume cannot be attributed solely to gender participation. It reflects the combined effect of several institutional and human-capital changes.

From a policy perspective, the results support expanding digital and technical training for women, especially in information technology, data analytics, digital consulting, and logistics services. Training programs should be connected to labour market demand and include practical experience, certification, mentoring, and employer partnerships.

Measures are also needed in segments where women already constitute the majority. In accounting, human resource and administrative services, the main challenge is not only increasing participation but also improving remuneration, career mobility and

access to managerial positions. Transparent pay systems, regular gender pay monitoring, and formal promotion criteria may help reduce vertical inequality.

For employers, gender-inclusive human resource policies may expand the available talent pool and reduce shortages of qualified specialists. Flexible work arrangements can improve access to employment, but they should not result in weaker social protection or reduced career opportunities. Remote and project-based workers should have access to training, performance evaluation and promotion on comparable terms.

The study also has methodological implications. Because official statistics do not identify outsourcing as a separate activity, future research should develop a more transparent statistical framework based on specific OKED categories, firm-level surveys and administrative data. A national register or regular survey of outsourcing providers would improve estimates of market size, employment structure and export potential.

Future studies should also calculate marginal effects from the interaction model and report them at representative values of human capital and women's participation. Panel models with lagged explanatory variables, alternative specifications and additional controls would help assess the robustness of the identified relationships.

6. CONCLUSION

The study examined the relationship between gender-oriented human capital and the development of outsourcing-related services in Kazakhstan. The analysis combined descriptive statistics, regional comparison, a fixed-effects panel model, an Integral Gender-Oriented Human Capital Index and scenario projections. The results indicate that the expansion of professional and business services is associated with human capital, digitalisation, regional infrastructure and women's participation in skilled employment.

Between 2015 and 2024, employment in professional and related business services increased, the estimated market volume expanded substantially, and women's participation rose gradually. At the same time, the gender pay gap narrowed, though the reduction was uneven, with temporary reversals. These trends suggest that outsourcing-related services may contribute to employment modernisation and create additional opportunities for women, but market growth alone does not eliminate wage disparities or occupational segregation.

The analysis of service segments revealed that women are highly represented in accounting and human resource outsourcing but remain less represented in information technology and logistics services. This indicates the persistence of horizontal gender segregation. The results also show that a high share of women in a service segment does not necessarily ensure equal remuneration, career mobility or access to managerial positions.

Regional differences are also substantial. Almaty and Astana demonstrate the highest values of gender-oriented human capital and the largest estimated outsourcing-related service markets. Their position is associated with the concentration of universities, qualified labour, digital infrastructure, financial institutions and business demand. Regions with lower index values generally have smaller service markets and wider gender pay gaps, which indicates that outsourcing development depends on the broader regional ecosystem.

The fixed-effects panel model identified positive associations between the estimated market volume and the Human Capital Index, Gender Participation Index, Digitalisation Index, gross regional product per capita and infrastructure. The positive interaction between human capital and women's participation suggests that the relationship between human capital and market development becomes stronger where women are more actively represented in professional services.

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However, these coefficients should not be interpreted as definitive causal effects. However, these coefficients should not be interpreted as definitive causal effects. Therefore, the econometric findings should be understood as conditional statistical relationships.

The Integral Gender-Oriented Human Capital Index for 2023 indicates that women's educational participation is stronger than their social mobility and managerial advancement. This difference shows that formal education does not automatically translate into equal career opportunities and remuneration. Improving the use of women's human capital, therefore, requires attention not only to education but also to professional mobility, access to leadership, and workplace practices.

The scenario analysis illustrates the possible divergence of market trajectories under different assumptions. Under the optimistic scenario, which combines wider women's participation, stronger digital competencies, a narrower gender pay gap and higher investment in professional education, the estimated market volume may exceed the baseline scenario by KZT 83.2 billion in 2030. This result should be regarded as a scenario-based illustration rather than a precise forecast.

The practical implications of the study relate to employment policy, professional education, digitalisation and regional service-sector development. Policy measures should support women's access to information technology, analytics, digital consulting and logistics, where their representation remains limited. This requires targeted training, mentoring, certification, internship opportunities and cooperation with employers.

In service segments where women already constitute the majority, including accounting and human resource services, policy and corporate measures should focus on remuneration, career advancement and managerial representation. Transparent pay systems, regular gender pay monitoring, and formal promotion criteria may help reduce persistent inequalities.

Regional policy should also support the establishment of business-service centres outside Almaty and Astana. Such centres could combine digital infrastructure, remote-work facilities, vocational training and advisory services. This would help expand employment opportunities and reduce the spatial concentration of professional services.

The study has several limitations. Outsourcing-related services are estimated using a set of related economic activities rather than being observed as a separate official sector. The regional comparison covers only those territorial units for which a complete set of indicators was available. The construction of the IGHC relies in part on expert-defined weights, whereas the panel model does not fully address endogeneity. Scenario projections are sensitive to the assumed growth rates and institutional conditions.

Future research should use firm-level and individual-level data, specify the exact OKED activities included in the outsourcing proxy and examine the export component of business services. It would also be useful to estimate alternative panel specifications, include lagged explanatory variables, calculate marginal effects for the interaction term and test the sensitivity of the IGHC to alternative weights.

Overall, the results suggest that outsourcing-related services can support economic diversification, employment modernisation and the development of knowledge-intensive activities in Kazakhstan. Their sustainable expansion depends on the quality of human capital, digital infrastructure, regional inclusion and women's access to professional development, technology-intensive occupations, equal remuneration and managerial opportunities.

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