This study considers social entrepreneurship in the Republic of Kazakhstan in the context of the national innovation ecosystem. The social entrepreneurship is becoming a tool for solving socio-economic problems. The task addressed in this study is to improve ways in order to increase the sustainability of social entrepreneurship through the effective use of its institutional and technological potential and the introduction of technology transfer mechanisms.

The results have shown that social entrepreneurship has regional and sectoral inequalities, but its overall development dynamics demonstrate a steady growth. Correlation and regression analyses revealed that the relationship between the national development of social entrepreneurship and innovational and institutional factors was weak; that proved the complexity and non-homogeneity of the factors that have an impact on social business. In addition, the two-level model proposed suggests mechanisms for integrating social entrepreneurship into the national innovation environment and describes possible ways to improve the efficiency and economic effectiveness of social projects.

The results involve providing the adaptive mechanisms for integrating social entrepreneurship with technological and institutional support systems. These, in turn, contribute to the formation of technological innovations, social entrepreneurship, innovatory solutions to social problems, efficiency, the scalability, and financial sustainability. The findings have shown that the implementation of a technology transfer model in the development of social entrepreneurship could promote the design of innovative platforms that create both an economic and social value

Keywords: social entrepreneurship, innovation, technology transfer model, institutional support, social impact

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CONSTRUCTION OF A MODEL FOR THE DEVELOPMENT OF SOCIAL ENTREPRENEURSHIP BASED ON INNOVATION AND TECHNOLOGY TRANSFER

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1. Introduction

In the modern world, social entrepreneurship is seen as a tool for supporting socially vulnerable groups. At the same time, social entrepreneurship contributes to the achievement of sustainable development goals without losing the elements of entrepreneurial activity.

Research into constructing a model for social entrepreneurship based on innovation and technology transfer is necessary to formulate a scientifically sound and institutionally sustainable concept for its development. In their latest Global Innovation Index (GII) report [1], the compilers of the Global Innovation Index 2024 emphasized the importance of social entrepreneurship and social innovation for global development, as well as its special role in combating poverty, social injustice, as well as reducing environmental damage. Therefore, starting with the latest report, the GII began to include data on the socially oriented economy. Thus, in 2024, there were approximately 11 million social enterprises worldwide with 30 million employees, whose contribution to global

GDP exceeds USD 2 trillion. An analysis of the relationship between GDP and population size indicates that economic development contributes to population growth. This highlights the importance of finding a sustainable balance between economic growth and social policy measures over the long term [2]. The GII authors cite a number of successful innovative solutions for the development of social enterprises but lack any statistical data on innovation specifically in socially significant areas. This complicates the international assessment of national economic development in this area.

Scaling social enterprises requires effective tools, which may include not only government support measures but also the implementation of technology transfer in this sector because the socioeconomic resilience of states is determined by their ability to adapt to technological progress and devise innovative approaches to solving socially significant problems.

2. Literature review and problem statement

Study [3] notes that social entrepreneurship plays a significant role in reducing poverty, ensuring social justice, and maintaining environmental balance. However, although the study examined the influence of the institutional environment on social entrepreneurship, it does not identify the specific factors that drive it or how to measure their influence.

Paper [4] demonstrates that the growth of a socially oriented economy significantly contributes to social stability and inclusive development. However, the lack of uniform terminological and methodological approaches in this area complicates the measurement and comparison of social entrepreneurship.

The authors of [5] report the results of a study on the role of social entrepreneurs in innovation ecosystems. As demonstrated in the study, social entrepreneurs influence the formation of the ecosystem and its sustainable development as catalysts. However, unresolved issues relate to how to ensure the long-term development of social enterprises and effectively distribute the transfer of technology and knowledge within this ecosystem. These difficulties are caused by institutional and economic constraints, as well as insufficient interaction between ecosystem participants. Such factors hinder the independent development of social enterprises and the widespread use of innovative potential when an organization may face a choice between maintaining its economic position and continuing to solve certain social problems.

In [6], the authors categorize social enterprises as hybrid organizations because they have a dual mission: social impact and profit generation. Thus, the work explains the nature of internal conflicts in hybrid organizations; however, the study is qualitative in nature and lacks quantitative research on how to measure the degree of "productive tensions" due to the dual mission.

In [7], a hybrid management model is proposed. However, the work does not examine the institutional environment and the role of innovation in social entrepreneurship. The effectiveness of such models requires a combination of public policy and support institutions. In this sense, partnerships between the state and business, as well as innovative and budgetary incentives, are crucial in the development of social entrepreneurship. State policy should be distinguished from socially oriented business policy, which typically addresses the internal problems of employees and their families, but does not address large-scale regional or territorial issues. Therefore, the cited work notes the budgetary component in innovation. This model is used for correlation and regression analysis of social business development factors, along with innovations driven by development institutions and innovation grants.

In [8], the authors examine the concept of "structural flexibility," whereby social enterprises must balance their social mission and entrepreneurial sustainability. The key idea of this concept is to clearly define roles, norms, organizational structure, decision-making methods, and monitoring systems. However, since the study is based on Western enterprises, there is no justification for its applicability to enterprises in developing countries. At the same time, paper [9] describes a model of "problem-oriented innovation ecosystems" for social entrepreneurship. The study analyzes how technologies can migrate to social enterprises. However, the authors provided general recommendations but did not analyze the internal mechanisms, namely, the mechanism for adapting technologies to social goals.

Study [10] analyzes the relationship between national independence and international philanthropy. The authors note that restrictions on external funding in some countries negatively impact the development of social innovation. However, under such conditions, institutional reforms and legislative incentive mechanisms play a crucial role in the development of social entrepreneurship. Therefore, an analysis of the legal status of social enterprises in the Republic of Kazakhstan is an essential element of the study.

Researchers in [11] note the importance of the availability of qualified personnel capable of innovation. The authors of [12] believe that social businesses require a workforce with technical skills in areas such as finance, accounting, and engineering, as well as knowledge of communications and public relations. At the same time, knowledge of communications and public relations is also important. However, those studies do not fully explore the specific mechanisms underlying the relationship between human resources and technology transfer. Specific methods for overcoming these contradictions through innovative management solutions are also insufficiently explored. Accordingly, as noted by the authors of [13], human capital is crucial in the development of social businesses in a country and its territory. Therefore, the aspect of human potential as a factor in the innovative development of regions of the Republic of Kazakhstan is also highlighted in the current study.

In [14], the author points to the availability of the necessary network infrastructure as a factor in social innovation in the context of African countries. That may be relevant for organizations operating in the high-tech sector. However, although African social enterprises have transformational potential, they face barriers such as infrastructure, financing, and human capital.

Study [15] notes the role of the informal economy as a driver of innovation. The informal economy allows for flexibility, adaptive solutions, and an easy start. However, such innovations are low-tech and often depend on underdeveloped institutions. It is worth noting that the author is writing about African countries and territories with extremely low levels of development, which is not typical for the regions in the Republic of Kazakhstan. Moreover, among the social enterprises of the Republic, there are no representatives of IT or similar companies from the digital technology sector.

International studies widely examine the role of social entrepreneurship in terms of institutional and social stability.

For example, the authors of [16] show that the effectiveness of social innovation largely depends on the quality of institutions and the level of ecosystem interactions. However, the effectiveness of these trends may be limited by institutional identity and the consistency of public policy.

Study [17] examines the development of entrepreneurship in the context of Ukraine as an important mechanism for post-war recovery and ensuring societal adaptation. The study showed that social innovation makes a significant contribution to strengthening economic and social stability. However, the widespread adoption of such practices is slow due to institutional and legal constraints. Similarly, paper [18] found that in European countries, social enterprises are an integral part of innovation ecosystems and are becoming drivers of sustainable development. Therefore, international experience clearly demonstrates the importance of institutional support for social entrepreneurship and the mutual coordination of innovation policies.

Social entrepreneurship, as a combination of an innovative approach, market mechanisms, altruistic goals, and government support, is a rapidly gaining popularity as an approach to solving various problems on a global scale. However, institutional and governance models characterizing the relationship between human capital and technology transfer remain understudied. Research in this area has primarily focused on the qualitative characteristics of social impact, but quantitative criteria and approaches to assessing economic effectiveness are still not ideal.

3. The aim and objectives of the study

The purpose of our study is to devise a conceptual model for the development of social entrepreneurship in the Republic of Kazakhstan based on the introduction of innovations and the use of technology transfer mechanisms, thereby enhancing its sustainability and socioeconomic performance.

To achieve this aim, the following objectives were accomplished:

– to analyze the current state, key trends, and institutional characteristics of social entrepreneurship development in the Republic of Kazakhstan;

– to assess the impact of technological and institutional factors on the performance of social enterprises in the Republic of Kazakhstan;

– to build and present a practical model for technology transfer in the development of social entrepreneurship.

4. The study materials and methods

The object of our study is social entrepreneurship in the Republic of Kazakhstan within the context of the national innovation ecosystem. The subject of the research is the mechanisms for implementing innovations and technology transfer in the development of social entrepreneurship.

The study's hypothesis assumes that the level of social entrepreneurship development directly depends on the degree of innovation implementation and the effectiveness of institutional support.

Assumptions were adopted within the study that allow social entrepreneurship to be considered as an integral element of the innovation system, without distinguishing individual subsectors.

The review and institutional analysis of the scientific literature allows us to examine the context of the innovative development of social entrepreneurship and systematize the theoretical foundations. A comparative analysis method was used to compare the development of social entrepreneurship in Republic of Kazakhstan with international experience [12, 16].

A correlation and regression analysis of regional indicators of innovation development and socioeconomic indicators with the development of the Balanced Scorecard across regions was also used to identify the influence of these factors on the development of social entrepreneurship.

Correlation and regression analysis was employed to assess the influence of key factors on the development of social entrepreneurship. The correlation and regression analysis of the indicator of population coverage by SEE enterprises will be carried out with the following indicators:

X1 – Innovation through development institutions;

X2 – Innovation grants;

X3 – Innovation through budgetary funds;

X4 – Share of population with incomes below the subsistence minimum (SLM);

X5 – Gini coefficient;

X6 – Fund coefficient;

X7 – HDI.

Values X1…X3 demonstrate the dependence of the number of SEEs on innovation subsidies from development institutions and budgets at various levels. This demonstrates the influence of the role of the state and state subsidies in the socialization of business structures.

X4…X6 characterize the timeliness of the emergence of SEE enterprises in the poor regions of the country that are most in need of social business. This also determines whether the dynamics of SEE correspond to actual needs at the regional level.

X7 characterizes the influence of HDI on the emergence of SEEs and the degree to which social entrepreneurship depends on the availability of qualified personnel capable of social innovation.

The research was based on the Register of social entrepreneurship entities (RSEE) [19] and statistical data from the Bureau of National Statistics at the Agency for Strategic Planning and Reforms, the Republic of Kazakhstan [20].

A conceptual modeling approach was applied in this study to describe the process of integrating social entrepreneurship into the national innovation ecosystem. This approach allowed us to demonstrate the relationship between technology transfer and institutional support for social enterprises. The model is based on a two-tier structure: enabling technologies (management and digital solutions) and core technologies (patents, research results, renewable energy sources, and agricultural technologies) [9]. The modeling approach allowed us to combine theoretical and empirical research findings and laid the foundation for a systematic analysis of the factors influencing the sustainability of social entrepreneurship.

5. Results of investigating the current state, factors, and models of technology transfer in the development of social entrepreneurship

5. 1. Analysis of the current state, main trends, and institutional features of the development of social entrepreneurship in the Republic of Kazakhstan

In recent years, social entrepreneurship has become a trend and a key factor in the socio-economic well-being of

the Republic of Kazakhstan, and this area is rapidly evolving. The main goal of this area is to improve the quality of life of people and ensure inclusive development by addressing social problems in society. Social entrepreneurship is aimed at supporting socially vulnerable groups, reducing inequality, and achieving certain sustainable development goals.

In Republic of Kazakhstan, the system of support for social entrepreneurship is being institutionally strengthened. On June 30, 2023, Order No. 130 of the Minister of National Economy of the Republic of Kazakhstan approved the rules for supporting social entrepreneurship development initiatives, including setting up a unified register of social entrepreneurship entities (RSEE). Almost a year and a half later, as of early December 2024, only 802 organizations were listed in RSEE (out of 2.29 million registered organizations in the Republic). Of these, 227 were limited liability companies (LLCs), 45 were public associations (primarily disabled persons' societies), and 472 were individual entrepreneurs (IEs).

The situation by type of economic activity as of the beginning of December 2024 is illustrated in Table 1.

As Table 1 shows, educational services account for approximately 40% of all social enterprises in the country. Of these, 105 organizations provide preschool education. Note that other 17 provide cultural education, and 18 are special education centers (primarily for children). Other 105 organizations are involved in industrial production.

Other public organizations account for 6.9% (55 units), almost all of which are represented by societies for the disabled.

In accordance with Order No. 140 of the Minister of National Economy of the Republic of Kazakhstan, the classification of social entrepreneurship entities includes four categories, covering employment and support for socially vulnerable groups, the production of social goods and services, ensuring equal opportunities for participation in public life, and the provision of educational, cultural, and environmental services. According to the existing classification, the majority of social enterprises in the Republic of Kazakhstan operate in the fourth category, providing educational services.

To support social entrepreneurship, the state has established various financial mechanisms. The main directions were approved by joint order No. 33681, registered with the Ministry of Justice on November 27, 2023. The general direction and aspects of assistance aimed at the development of socially oriented business are given in Table 2.

State support mechanisms are an important foundation for the institutional development of social entrepreneurship. However, their effectiveness is closely tied to the actual distribution of social enterprises in the regions. Therefore, the following table describes the regional structure of social entrepreneurship (Table 3).

The structure and regional distribution of social entrepreneurship indicate uneven growth rates and that institutional support is provided at different levels across regions. This situation necessitates a comprehensive analysis of the factors influencing the development of social entrepreneurship.

Table 1

The number of social entrepreneurship entities in the Republic of Kazakhstan as of December 30, 2024, broken down by types of economic activity

Sector	Quantity	Share, %
Education	319	39.8
including preschool	105	13.1
Manufacturing and industry	105	13.1
Trade	58	7.2
Activities of other public organizations	55	6.9
including societies for the disabled	46	5.7
Healthcare	54	6.7
Sports activities	46	5.7
Recreation and entertainment activities	40	5.0
Provision of social services to senior citizens and the disabled (including rehabilitation)	21	2.6
Transportation	6	0.7
Repairs	5	0.6
Other	93	11.6
TOTAL	802	100

Note: calculated based on [19].

Table 2

Measures of state support for social entrepreneurship, regulated by a joint order registered with the Ministry of Justice of the Republic of Kazakhstan under No. 33681 dated November 27, 2023

Area	Description, main points
Portfolio subsidies	Except for retail, rental, and other sectors. A loan of up to USD 44,400 is available for investments, with a 7% interest rate only for SEEs. Financing amount: up to 50% of the loan amount
Subsidizing a portion of the loan interest rate	For SEEs, the loan is for investments of up to USD 3,330,000 for a term of up to 5 years. For working capital replenishment (WCR), the amount of funds allocated is no more than USD 1,110,000 for a term of up to 5 years. The rate is determined as the base rate of the National Bank of the Republic of Kazakhstan + 5%
State grants for business ideas	The main condition: the grant recipient must co-finance at least 20% of the implementation costs, and the creation of new jobs is also mandatory. Grant amount: up to USD 11,000
Unified comprehensive program	Priority economic sectors (for SEE): up to USD 3,330,000. Guarantee of up to 85% of the loan: investments, POS, loan refinancing
	SEE: amount up to USD 3,330,000, 5-year term, final interest rate for SEE 7%, purpose: investments, POS
State grants for SEE	SEE: up to USD 11,000, 5-year term, final interest rate for SEE 7%, purpose: investments, working capital replenishment

Note: based on [20].

Table 3

The number of social entrepreneurship entities in the Republic of Kazakhstan as of December 1, 2024, by region

Region	Quantity	Share, %	Population of the region, people	Residents per 1 SEE
A	1	2	3	4
Abay Region	49	6.1	607589	12400
Akmola Region	48	6.0	787976	16416
Aktobe Region	37	4.6	939405	25389
Almaty Region	34	4.2	1531167	45034
Atyrau Region	20	2.5	704074	35204
West Kazakhstan Region	85	10.6	693261	8156
Zhambyl Region	20	2.5	1222593	61130
Zhetysu Region	8	1.0	697987	87248
Karaganda Region	14	1.7	1135351	81097
Kostanay Region	40	5.0	829984	20750
Kyzylorda Region	40	5.0	841929	21048
Mangystau Region	0	0.0	786837	–
Pavlodar Region	12	1.5	753933	62828
North Kazakhstan Region	13	1.6	530089	40776
Turkestan Region	11	1.4	2142172	194743
Ulytau Region	17	2.1	221582	13034
East Kazakhstan Region	16	2.0	727053	45441
Astana City	196	24.4	1430117	7297
Almaty City	122	15.2	2228677	18268
Shymkent City	20	2.5	1222066	61103
TOTAL	802	100	20033842	24980

Note: calculated based on [19, 20].

5. 2. Assessing the impact of technological and institutional factors on the efficiency of social enterprises in the Republic of Kazakhstan

The assessment was conducted using correlation and regression analysis and aimed to identify the relationship between indicators characterizing the level of development of social entrepreneurship entities and innovative and socio-institutional variables.

The qualitative parameters of the regression models are summarized in Table 4.

Table 4

Qualitative indicators of regression models of the influence of various factors on the emergence of social entrepreneurship entities in the Republic of Kazakhstan

Model	Correlation coefficient	Coefficient of determination	F-significance	F-test (F > Ft)	Model evaluation (quality of relationship)
Y-X1	0.17	0.03	0.49	no	bad
Y-X2	0.27	0.07	0.25	no	bad
Y-X3	0.11	0.01	0.64	no	bad
Y-X4	0.41	0.17	0.07	no	unsatisfactory
Y-X5	0.08	0.01	0.74	no	bad
Y-X6	0.12	0.01	0.62	no	bad
Y-X7	0.21	0.04	0.38	no	bad

Note: calculated based on [19, 20].

The regression model results given in Table 4 indicate the absence of statistically significant correlations between social entrepreneurship development (Y) and the analyzed independent variables (X1–X7). The correlation coefficients in all models are low (ranging from 0.08 to 0.41). None of the F-tests indicate statistical significance (F < F critical).

In particular, the coefficients of determination (R^2) are below 0.20 for all variables, with the highest value observed for the Y-X4 model ($R^2 = 0.17$), which corresponds to the share of the population living below the subsistence level.

5. 3. Construction and representation of a practical model of technology transfer in the development of social entrepreneurship

Our qualitative and quantitative research results have made it possible to build and present a model of technology transfer in the development of social entrepreneurship. Application of this model will not only enable social enterprises to provide high-quality services but will also drive the development of innovation and technology.

The model was constructed using the principles of systemic and structural analysis, demonstrating the relationship between innovation and organizational factors. The model's modules are grouped according to the results of a correlation analysis determining the relationship between the factors. The first module (innovation) contains indicators that determine the technological development of social entrepreneurship, i.e., the amount of funding for development organizations, grant programs, and the share of innovations implemented with public funds. These indicators were considered the primary means of increasing the innovative potential of social enterprises. The second module (institutional-social) is filled with factors that determine social stability: the level of income and poverty of the population, the Gini coefficient and reserves, parameters of human potential, which made it possible to assess the impact of social entrepreneurship on social efficiency and the level of inequality in society.

Thus, the model's logic relies on two interconnected systems: stimulating (innovative) technologies as a means of increasing the growth potential of social enterprises; and core (institutional) technologies and social factors as the fundamental conditions that ensure the long-term sustainability of social entrepreneurship.

In this regard, a practical model of technology transfer in SE for the Republic of Kazakhstan is proposed (Fig. 1). The model is based on the results of empirical analysis and demonstrates the interrelationship between institutional and technological factors in the development of social entrepreneurship.

The model in Fig. 1 distinguishes between enabling and core technologies as transfer channels from universities, research centers, innovation infrastructure, and government programs to social enterprises. In addition to creating social impact (employment, inclusion, environmental protection, education), social enterprises provide feedback and demand

signals to innovation actors, enhancing the dynamism of a problem-oriented innovation ecosystem.

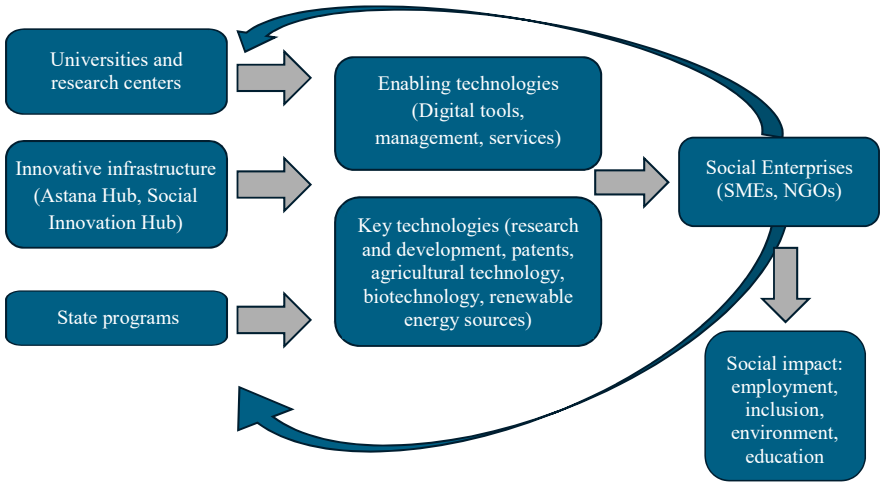

Fig. 1. Conceptual model of technology transfer in the development of social entrepreneurship in the Republic of Kazakhstan

6. Discussion of results of investigating the current state, factors, and models of technology transfer in the development of social entrepreneurship

The empirical data obtained revealed key trends and relationships in the regional and institutional development of social entrepreneurship.

At the current stage of development in the Republic of Kazakhstan, a significant discrepancy can be noted between the actual and registered number of social enterprises, even for disabled persons' societies, of which there are five times more registered than those listed in the SEE registry. It is worth noting that there are other 528 disabled persons' societies among non-governmental organizations. Thus, the majority of these are NGOs. Only about a third are business entities engaged in economic activity.

Analyzing Table 1, it is worth noting that healthcare, trade, sports, recreation, and entertainment enterprises account for at least 40 enterprises each. However, such a socially significant area as the provision of social services to senior citizens and persons with disabilities is represented by only 12 RSEE enterprises. It is likely that the actual number of organizations in this field is significantly higher than the number listed in the registry. The issue of its timely completion is quite pressing. Furthermore, as shown in Table 1, the share of public organizations (6.9%) remains low, and most of them are societies for the disabled. This means that only 5.7% of them are included in the register of social entrepreneurship entities. This discrepancy indicates weak outreach efforts and the slowness of social organizations in formalizing their status. Consequently, social entrepreneurship has potential, but its legal and informational infrastructure still needs to be improved.

Table 2 analyzes state support measures for social entrepreneurship in the Republic of Kazakhstan. This analysis reveals that the state uses six separate support mechanisms, regulated by a ministerial order registered with the Ministry of Justice on November 27, 2023 (No. 33681). However, their structure is primarily focused on large organizational entities. The majority of the country's social enterprises are individual entrepreneurs (IEs). This situation highlights the mismatch between policy and the structure of the real sector, as described in [5]. As a result, there is a lack of equally accessible financial mechanisms for small social entrepreneurship entities.

The main current model of state support is preferential lending terms for social enterprises (SEs) with an interest rate of 7%, which is well below standard business interest rates. The availability of financing in this area of up to USD 3,330,000 (in most programs) reflects the government's desire to promote capital-intensive activities, particularly in priority areas that meet national development goals. However, the scale and structure of these instruments favor larger organizational forms, particularly limited liability partnerships, rather than sole proprietors, who constitute the majority of officially registered joint ventures in Kazakhstan. This discrepancy raises concerns about the equal availability of support across the sector. Although sole proprietors play a fundamental role in providing social services, the financial instruments available to them (such as targeted grants of up to USD 11,000) are more limited in scope and scale.

Next, an analysis of social entrepreneurship entities in the Republic of Kazakhstan was conducted by region. Table 3 demonstrates significant unevenness in the distribution of social entrepreneurship organizations across Kazakhstan's regions. The highest number (24.4%) and density (one enterprise per 7,297 residents) are observed in the capital. A similar density of SEE is found in the West Kazakhstan Region (one per 8,156 residents). However, in Turkestan, for example, there is one SEO organization for almost 200,000 residents. And in the Mangystau Region, not a single social business organization is registered. This regional inequality indicates insufficient informational, outreach, and support work by regional akimats, as well as a lack of awareness among potential entrepreneurs of legal opportunities.

The qualitative indicators of the regression models given in Table 4 demonstrate a virtually complete lack of correlation between the development of social entrepreneurship and objective territorial factors: government support, the socio-economic level of development, and the human potential of the regions. Mathematical and statistical analysis revealed that the role of objective factors influencing the development of social entrepreneurship was weak and statistically insignificant. Furthermore, the data showed that, with $R^2 = 0.17$, social enterprises in low-income regions average one enterprise per 12,000–20,000 people. This indicates a higher concentration of socially oriented enterprises in regions with high social significance and regional relevance.

In other words, social entrepreneurship in the country is currently developing without reference to statistical indicators characterizing the demand and necessity of this type of activity in a specific region. These results reveal trends similar to those associated with the ecosystem instability of social enterprises described in [9].

A slight correlation is observed only with the share of the population with incomes below the subsistence level (the higher the income, the greater the need for social assistance),

which is consistent with the overall logic of the study. This uncorrelated result is explained by the dependence of social entrepreneurship entities on the official registry and the incomplete accounting of regional indicators.

Thus, the combination of these factors predetermines the need to build a systemic model explaining the emergence and development of social entrepreneurship. Fig. 1 proposes an adapted two-tier model of technology transfer for social entrepreneurship, distinguishing between supporting and core technologies. The proposed model is based on identified empirical relationships between technological and institutional factors, which allows us to justify its applicability to the Republic of Kazakhstan.

The model demonstrated the existence of two interdependent levels in ensuring the sustainability of social entrepreneurship:

– an innovation level, which ensures technological renewal and increases the growth potential of social enterprises;

– an institutional level, which shapes the long-term effectiveness of social entrepreneurship through government support, the legal framework, and the quality of human capital.

Several innovation platforms are rapidly developing in the Republic of Kazakhstan, including technology parks, business incubators, the Astana Hub, the Social Innovation Hub, Nazarbayev University research centers, and university-based commercialization offices. These institutions represent important channels for technology transfer. Social enterprises in the Republic of Kazakhstan primarily work in areas such as employment for vulnerable groups, the environment, and education. Although they often lack technical equipment, this indicates a high demand for supporting technologies (digital skills, IT solutions, online platforms). At the same time, significant opportunities exist for the transfer of core technologies in projects related to renewable energy, waste recycling, agricultural technology, and inclusive services.

The proposed model could be implemented through a national support system for innovative and social enterprises, particularly through the integration of social enterprises into the Astana Hub programs and technology parks. The expected outcome is increased efficiency in the use of innovation, stronger social inclusion, and a reduction in regional disparities. Therefore, the integration of social enterprises into the national innovation ecosystem is considered an effective mechanism that combines social and technological development factors.

The study's limitations include the following. First, since the data are based on an official registry, informal social initiatives were not taken into account. Second, the regression model used includes only quantitative variables and cannot fully capture the qualitative characteristics of social factors.

Among the limitations of the study is the lack of a methodology for measuring the actual social impact of social enterprises. To address this issue, it would be advisable to use mixed methods – surveys, focus groups, and situational analysis – to address this issue.

Further research should focus on developing institutional and technological relationships within the social entrepreneurship ecosystem through quantitative modeling. The main challenges in this area relate to insufficient data and the need for coordination at the regional level. Furthermore, the development of new indicators for assessing the effectiveness of social innovation and technology transfer mechanisms is a pressing issue.

7. Conclusions

1. Our analysis of the current status, key trends, and institutional characteristics of social entrepreneurship development in the Republic of Kazakhstan has revealed both regional and sectoral imbalances in this area. However, the development of social entrepreneurship is showing positive trends. Most social enterprises operate in the fields of education, inclusion, and services. Many enterprises rely on grant funding, which impacts their long-term sustainability. Our study has confirmed the need to implement innovative business models for development and strengthen support mechanisms for social entrepreneurship.

2. An assessment of the impact of technological and institutional factors on the effectiveness of social enterprises reveals that the level of development of social enterprises is associated with innovation, financial performance, and infrastructure. However, the results of a correlation and regression analysis indicate that this relationship is weakly demonstrated and requires further clarification. This is due to the limited statistical sample and variability of regional data. Nevertheless, government and institutional mechanisms are potential factors for the stability and growth of social enterprises.

3. The constructed and implemented practical technology transfer models include a two-stage system for integrating social entrepreneurship into the country's innovation ecosystem. The goal of this model is to enhance innovative potential, improve resource efficiency, and ensure the long-term sustainability of social enterprises. The proposed model could be applied not only to the Republic of Kazakhstan but also to other countries with similar institutional parameters. This is due to the fact that the model is based on adaptive mechanisms for integrating social entrepreneurship into innovation policy and takes into account the interdependence of social and technological factors.

Conflicts of interest

The authors declare that they have no conflicts of interest in relation to the current study, including financial, personal, authorship, or any other, that could affect the study, as well as the results reported in this paper.

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Data availability

All data are available, either in numerical or graphical form, in the main text of the manuscript.

Use of artificial intelligence

In this paper, the authors used Claude 3.5 Sonnet and Gemini 2.5 Pro for grammatical, linguistic, and stylistic correction. The authors manually checked and edited the material and confirm that the AI tools were only auxiliary and were not used for generating and formulating the hypothesis, methodology, analyses of the results, or drawing conclusions.

Authors' contributions

Madina Mukanova: Conceptualization, Methodology, writing – original draft; **Aigul Mukhamejanova**: Supervision, Writing – review & editing, Validation; **Nazym Nurpeisova**: Supervision, project administration, Writing – review & editing; **Zaure Zambinova**: Investigation, data curation, Visualization; **Kuralay Yeltayeva**: Resources, data curation, Formal analysis; **Daryika Tugolbaeva**: Methodology, Validation, Visualization.

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