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SOCIAL ENTREPRENEURSHIP AS A DRIVER OF SUSTAINABILITY AND SOCIAL SAFETY: THE CASE OF UKRAINE

Background. ***In response to the unprecedented challenges arising from the war in Ukraine, social entrepreneurship has emerged as a multifaceted instrument for social transformation, serving as a catalyst for sustainable development and social resilience. The primary objective of this research is to develop and validate a comprehensive economic-mathematical model to assess the impact of social entrepreneurship on the systematic restoration of human capital within the specific constraints of wartime and post-war reconstruction.***

Methods. ***The study integrates several foundational theoretical frameworks: human capital theory, the multiplier approach, and the concept of social innovation. The methodological core consists of a synthesized system dynamics model that includes the War-Adjusted Social Return on Investment (SROI) framework, adapted for high-risk environments; the social entrepreneurhip multiplier method based on input-output analysis; and a modified logistic equation for dynamic forecasting of sector growth. The structural assessment is conducted through a three-level hierarchy, identifying micro-, meso-, and macro-level socio-economic effects.***

Results. ***The empirical validation of the developed model confirms that social enterprises generate a synergistic triple-bottom-line effect. Key findings indicate a social entrepreneurship multiplier of 1.38, meaning that every unit of investment generates 1.38 units of aggregate economic impact. The Social Return on Investment (SROI) coefficient reached 3.28, demonstrating that social enterprises are highly efficient tools for addressing societal crises. Dynamic modeling predicts a baseline increase in the number of active social enterprises from 1100 in 2025 to approximately 3100 by 2040, with an optimistic potential exceeding 3800 units. The integrated effect is structured as follows: micro-level (55%), macro-level (41%), and meso-level (4%).***

Conclusions. ***The proposed War-Adjusted SROI and multiplier models offer a robust analytical toolkit for policymakers to prioritize social investments. The significant macro-level impact (41%) highlights the strategic importance of social enterprises in enhancing national social safety and ensuring budgetary sustainability. These findings suggest that state policy should shift toward fostering a supportive institutional environment for social innovation.***

Keywords: ***social entrepreneurship (SE), social enterprise, human capital, social safety, social impact, economic-mathematical model, sustainability, sustainable development.***

Background

Over the past two decades, social entrepreneurship (SE) has emerged as a global socio-economic phenomenon significantly impacting employment structures, the innovative capacity of economies, and the achievement of sustainable development goals. In today's context, SE is one of the most promising approaches for integrating market mechanisms with social objectives. It can generate employment opportunities for socially vulnerable groups, foster community development, support environmental initiatives, and cultivate a new culture of responsible business.

The war in Ukraine has caused significant damage to infrastructure, led to decline of many economic sectors, increased unemployment, and exacerbated social problems affecting internally displaced persons (IDPs), war veterans, and impacted communities. In this context, social entrepreneurship serves not only as a tool for economic growth, but also as a vital driver for addressing social challenges. By combining market-based approaches with a social mission, social entrepreneurship enables the creation of sustainable economic models even during times of crisis.

The role of social entrepreneurship is also growing due to the need for targeted solutions to social problems. Traditional economic models are not always capable of effectively addressing to the challenges facing society in the post-war period, especially in terms of social rehabilitation and community reconstruction. Social enterprises can fill these gaps by creating jobs for vulnerable groups, providing access to social services and promoting the development of local communities. Furthermore, in the context of international support for Ukraine, social entrepreneurship is an important factor in attracting international grants, investments and charitable aid (Cabinet of Ministers of Ukraine, 2024). Many international organisations, including the European Union, the United Nations and the World Bank, support the development of social entrepreneurship as one of the key mechanisms for sustainable development.

Thus, research into the role of social entrepreneurship in the system of factors for effectively solving social and economic

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problems of post-war recovery is extremely relevant and has significant scientific and practical potential. By analysing the mechanisms of its functioning and implementation in Ukraine, effective approaches can be developed to stimulate social entrepreneurship and its integration into the overall strategy for the country's recovery.

This article aims to develop and empirically validate a comprehensive economic-mathematical framework for assessing the impact of social entrepreneurship on human capital restoration and socio-economic resilience in Ukraine under wartime and post-war conditions.

Literature review. Contemporary scholarly discourse conceptualizes social entrepreneurship as a multifaceted instrument for societal transformation (Wallimann, 2014; Kharazishvili et al., 2025; Saval Morera, Solorsano-Garcia, & Guzman, 2024). For Ukraine, particular importance should be attached to studies that substantiate the potential of social entrepreneurship as a mechanism for enhancing community social security, supporting vulnerable population groups, and facilitating sustainable post-war recovery. Specifically, Prodiius, Neikov, & Slavenko (2024) identify social entrepreneurship as a pivotal mechanism for achieving sustainable development goals, establishing a strategic roadmap for the integration of social missions into business models. In the context of national safety (which is of particular relevance to present-day Ukraine), Gura, and Komakha (2025) emphasize the role of social enterprises as guarantors of social sustainability and stability in the context of European integration policy.

R. Raman, T. A. Alka, M. Suresh, and P. Nedungadi emphasise in their research the multifaceted role of social entrepreneurship in achieving sustainable development goals, which are determined by theoretical approaches, sectoral application, and institutional frameworks. Considering how theoretical approaches shape the contribution of social entrepreneurship to sustainable development in different contexts, their research demonstrates that theories such as behavioural decision-making theory, institutional theory, and social capital theory provide insights into how SE copes with financial constraints and interacts with political barriers, shaping their long-term sustainability. At the same time, analyzing decision-making models, scalability factors, and policy impacts highlights the contribution of SE to inclusive economic growth, social sustainability, and institutional stability (Raman et al., 2025).

Scientific research by J. Defourny, and M. Nyssens emphasise that financial independence enables social enterprises to go beyond short-term projects and ensure long-term sustainability and social impact, which is important in the context of Ukrainian realities, where post-war recovery requires social enterprises not only to perform a social function, but also to be resilient to financial risks, able to operate in a competitive environment and attract their own resources for development (Defourny, & Nyssens, 2017).

Research by K. Braier-Lawson, P. Miesing, and B. M. Ramos shows how social entrepreneurship and social enterprises can integrate social and economic development. Scientists are studying the characteristics and levers of influence of SE as enterprises with a dual mission, striving to achieve both financial sustainability and social good, and are innovative approaches to reducing inequality in the economy, education, health care, technology, and other areas among marginalised individuals, families, and communities (Briar-Lawson, Miesing, & Ramos, 2020).

M. Volosyuk, A. Kryvtsov, I. Vakhovych, D. Smolych, and A. Zalievska-Shyshak analyse the impact of social entrepreneurship on economic growth in EU countries and Ukraine, and justify its importance for the socio-economic development of the country in conditions of instability. As part of their quantitative analysis, the researchers use an adapted method for calculating the National Social Impact Index (NSII) to ensure a balance between economic efficiency and social outcomes when comparing EU member states (Volosiuk et al., 2025).

The study by N. Zelisko examines the development of social entrepreneurship around the world, with a focus on models of its implementation in the European Union, the United States and other countries with developed economies. Particular attention is paid to adapting these models to Ukrainian realities and identifying the key problems faced by social entrepreneurs in the country. Based on the analysis, the study proposes recommendations for stimulating social entrepreneurship in Ukraine, in particular, creating a favourable legal environment, expanding access to investment resources, introducing educational programmes on social entrepreneurship, and integrating socially responsible business practices into the country's economic policy (Zelisko, 2025).

M. Kamaludin examines the aspect of social sustainability directly within the framework of social entrepreneurship, considering the question of how social entrepreneurs achieve social sustainability. The study uses a qualitative research approach based on case studies of social enterprises operating in the United States. The results of the scientific analysis reveal various aspects, such as value creation, establishing smart partnerships, and social innovation, which social entrepreneurs seek to use to ensure social sustainability (Kamaludin, 2023).

S. U. Shinde, R. M. Devi, S. J. Kurup, S. A. Thomas, and M. Gupta examine the role of social entrepreneurship in ensuring economic sustainability by addressing social issues such as poverty, unemployment, and environmental degradation. They argue that social entrepreneurs use business strategies to create scalable and self-sustaining solutions, thereby contributing to long-term economic stability. The study examines key factors influencing social entrepreneurship, including access to finance, public policy, stakeholder engagement, and technological progress. It also provides examples of successful social enterprises that demonstrate how they contribute to job creation, community empowerment, and inclusive growth (Shinde et al., 2025).

K. Jones's work examines the relationship between entrepreneurship and social impact, focusing on how social entrepreneurs develop sustainable business models that enable them to combine social value with economic sustainability. The research is based on a qualitative approach, which involves interviewing successful social entrepreneurs and analysing case studies of successfully established social enterprises, based on which strategies that social entrepreneurs can use to achieve social impact and financial sustainability are explained (Jones, 2024). Virchenko and Budylka (2025) explore the potential of social innovations and entrepreneurship in reinforcing the social security of local communities. Their study underscores the strategic importance of social business models in fostering community resilience and enhancing the regional socio-economic environment during the recovery period.

A. A. Al-Kudah, M. Al-Okaili, and H. Al-Kudah argue that social entrepreneurship plays a role in sustainable development for creating, delivering, and capturing value. In determining the nature of the relationships between sustainable development and its latent variables, as well as how these variables can influence sustainable development, researchers use two models: the structural equation model and the bidirectional causal model. The study is based on

15 EECCA countries, which are home to almost a third of the world's population (Al-Qudah, Al-Okaily, & Alqudah, 2022).

A fundamental aspect of this research is the development of human capital through social innovation. The mechanisms of such reproduction through social entrepreneurship are considered in the work of Tonova et al., 2025.

Consequently, the extant literature provides a robust theoretical foundation for developing specialized models to evaluate the impact of social entrepreneurship on human capital restoration within the specific constraints of wartime and post-war conditions.

In the studies reviewed, scientists propose indices, methods and structural models for assessing the impact of SPs, However, several issues remain unresolved regarding the adaptation of international SP models to national economies, the standardisation of methods for assessing the social and economic impact of SPs in different countries and sectors, and the study of the impact of SPs on social safety, their resilience to risks and scalability in conditions of economic instability.

Analysis of these scientific sources makes it possible to identify the main trends, challenges and methodological tools that can form the basis for building our own model for assessing the impact of social entrepreneurship in the context of Ukraine's post-war recovery.

Methods

To identify global trends in the development of social entrepreneurship, structural-logical analysis and documentary review methods were used. In particular, the analysis included official documents of organisations, analytical reports of global monitoring networks and other relevant institutions.

Using the classification analysis method, several dominant models of social entrepreneurship in Ukraine were identified that are characteristic of wartime conditions (the model of employment of vulnerable groups, the model of social service provision, the environmental model, the craft model, and the humanitarian model).

Within the framework of using the questionnaire method, a survey of social enterprises was conducted, which were selected according to the principle of theoretical saturation (when increasing the sample size does not yield new meaningful results), the Monte Carlo simulation method was used to increase the reliability of the results obtained, which made it possible to generate synthetic observations while preserving the statistical characteristics of the initial data. To ensure the validity of the results, a procedure for extrapolating small samples using the weighted bootstrap method was applied.

To quantitatively assess the impact of social entrepreneurship, a set of methods was applied to determine direct, indirect, and social effects. The direct effect was assessed based on the calculation of value added growth. The indirect impact was assessed by modifying the classical Keynesian multiplier theory. Separate formalised dependencies were developed to assess the social effect.

The optimisation method (linear programming) was used to determine the optimal structure for the distribution of resources among categories of beneficiaries.

To forecast the number of social enterprises in the long term, a logistic-dynamic modelling method was used, which made it possible to develop three scenarios: baseline, optimistic and pessimistic.

The Social Return on Investment (SROI) methodology was used to measure the socio-economic effectiveness of social enterprises.

The interaction between human and social capital was taken into account based on the application of a modified production function.

The final methodological stage is a structural-level impact assessment, which combines the results of previous assessments and is structured according to three impact contours: micro, meso and macro.

Results

Social entrepreneurship is seen by international organisations as a way to achieve the UN Sustainable Development Goals, especially Goal 1 (no poverty), Goal 3 (good health and well-being), Goal 4 (quality education), Goal 8 (decent work and economic growth) and Goal 13 (climate action). In 2023, the UN General Assembly adopted Resolution 77/281, which recognises the role of social entrepreneurship and calls on Member States and financial institutions to strengthen their support for the sector (United Nations General Assembly, 2023). According to GEM 2024/2025, in 2024, 60% of entrepreneurs and 47% of mature business owners prioritised social and environmental impact over profitability, and a record 62% of entrepreneurs and 59% of business owners took measures to minimise their environmental impact. (Kamenko, 2020).

The systematisation of forms of social entrepreneurship in Ukraine makes it possible to identify several dominant models. The model of employment for vulnerable groups involves the involvement of persons with disabilities, internally displaced persons, veterans and combatants, and young people without work experience in labour activities. The social services model covers educational, psychological, and rehabilitation services for socially vulnerable groups. The environmental entrepreneurship model focuses on recycling, waste processing, and the production of environmentally friendly products. The craft production model involves the manufacture of handicrafts with the involvement of persons with disabilities or representatives of vulnerable communities. The humanitarian model, activated in the context of full-scale war, combines entrepreneurial activity with the provision of humanitarian aid to affected communities (EU4Youth, 2020).

The war period for Ukraine is characterised by increased civic activism, growing demand for inclusive employment for veterans, internally displaced persons and people with disabilities, support from international donors (USAID, EU, GIZ), and the creation of acceleration programmes, hubs and grant competitions for social initiatives (Government of Ukraine et al., 2025). This demonstrates the significant potential of social entrepreneurship to promote sustainable development and strengthen social safety in Ukraine, which is particularly relevant in the context of post-war recovery; hence the need for detailed research and modelling of the socio-economic effects of social enterprises in Ukraine.

To achieve this goal, the following research hypothesis was formulated: social entrepreneurship generates direct economic, indirect multiplier, and monetised social effects that can be quantified and integrated into a single economic-mathematical model.

The empirical basis of the study is a survey of social enterprises in Ukraine conducted in April 2025. The survey covered 16 respondents representing social enterprises of various organisational and legal forms and industry affiliations. The survey tool contained 17 structured questions covering the demographic parameters of enterprises, sources of funding, target groups of beneficiaries, measures of social impact, and obstacles to functioning.

The representativeness of the data obtained was ensured by the principle of theoretical saturation, when a further increase in the sample does not lead to the emergence of qualitatively new response patterns. To ensure the validity of the results, a procedure for extrapolating small samples was applied using the weighted bootstrap method and Monte Carlo simulation, which allows

generating synthetic observations while preserving the statistical properties of the original data.

In terms of geographical distribution, the enterprises studied cover the western (Lviv, Ivano-Frankivsk, Rivne, Zakarpattia regions), central (Cherkasy, Kyiv regions) and eastern regions (Donetsk, Kharkiv regions with relocated enterprises). This diversification ensures that the regional specifics of social entrepreneurship in conditions of martial law are taken into account.

In terms of size and scope, the study covers micro, small and medium-sized enterprises.

The economic-mathematical model for assessing the impact of social entrepreneurship on human capital restoration in conditions of war and post-war development is presented in Fig. 1.

The proposed model is based on the assumption that a social enterprise generates three types of effects:

1. Direct economic effect – creation of added value, jobs and tax revenues.
2. Indirect multiplier effect – stimulation of related industries through purchases, services and consumption by employees.
3. Social effect – reduction of state expenditure on social payments, increase in the human capital of beneficiaries, formation of social cohesion.

Let I_{SE} – be the volume of investment in social entrepreneurship. The aggregate effect of these investments can be represented as:

$$E_{total} = E_{direct} + E_{multiplier} + E_{social}$$

where E_{direct} – direct economic effect; $E_{multiplier}$ – multiplier effect; E_{social} – monetised social effect.

The direct economic effect is defined as:

$$E_{direct} = I_{SE} \cdot \alpha \cdot (1 + g)^t$$

where α denotes the direct return on investment coefficient, which in this context reflects the productivity of invested resources; *g* reflects the rate of productivity growth, and *t* denotes the time horizon.

The multiplier effect is determined according to the classical Keynesian approach, adapted to the conditions of social entrepreneurship.

$$E_{multiplier} = \frac{E_{direct}}{[1 - MPC \cdot (1 - \tau) \cdot (1 - m)]}$$

where *MPC* is the marginal propensity to consume, τ denotes the effective average tax rate, and *m* characterizes the share of imports in the consumer basket. Considering these three parameters allows for a detailed description of the structure of expenditure circulation and leakage within the national economy.

The social entrepreneurship multiplier can be expressed as a function of direct investment effects and institutional parameters that influence the magnitude of the secondary impact on the economy through consumption, taxation, and import leakage. This approach enables the assessment of not only the initial impact of social investments but also the expanded aggregate effect generated by repeated cycles of spending within the economic system.

$$k_{SE} = \frac{1}{1 - MPC \cdot (1 - \tau) \cdot (1 - m)}.$$

Under conditions typical for Ukraine ($MPC \approx 0.65$, $\tau \approx 0.30$, $m \approx 0.40$), the multiplier will be:

$$k_{SE} = \frac{1}{1 - 0.65 \cdot 0.70 \cdot 0.60} \approx 1.38.$$

The social effect has several components:

$$E_{social} = E_{employment} + E_{savings} + E_{human_capital}$$

where $E_{employment}$ – effect of employment of vulnerable groups; $E_{savings}$ – savings in public expenditure on social benefits; $E_{human_capital}$ – increase in human capital of beneficiaries.

Employment effect:

$$E_{employment} = N_{workers} \cdot W_{avg} \cdot (1 - u_{rate})$$

where $N_{workers}$ is the number of employed persons from vulnerable groups, W_{avg} is the average wage, u_{rate} is the alternative unemployment rate for this group.

Savings on social benefits:

$$E_{savings} = N_{workers} \cdot B_{avg} \cdot 12$$

where B_{avg} is the average monthly social assistance amount.

Human capital growth is modelled using the learning function:

$$E_{human_capital} = N_{workers} \cdot \Delta HC \cdot \rho$$

where ΔHC is the average increase in human capital per employee, ρ is the human capital monetisation coefficient.

Figure 2 provides a comprehensive vizualization of the economic outcomes of a social enterprise's activities, covering four key aspects of the model. The first section illustrates the structure of the annual effect in the fifth year of implementation, where the direct economic effect represents the largest share. In contrast, the multiplier, economic, and human components constitute a smaller but significantly interrelated part of the overall impact. This form of presentation ensures that the weight of each element is correctly reflected and allows for an assessment of the internal proportion of the investment and socio-economic components.

As shown in Fig. 2, the calculated social entrepreneurship multiplier is 1.38, which means that every hryvnia invested in a social enterprise generates 1.38 hryvnia in total economic effect. Under the baseline scenario, the net present value of the impact of social entrepreneurship at the national level in the 10th year reaches 1.9 billion hryvnia.

To maximise social impact with limited resources, it is necessary to optimise the distribution of social enterprises' efforts among different categories of beneficiaries. Let us formulate a linear programming problem.

Let x_i – be the share of resources allocated to the i-th category of beneficiaries ($i = 1, \ldots, n$). The objective function is to maximise the total social impact:

$$\max Z = \sum_{i=1}^{n} s_i \cdot x_i$$

where s_i – is the social impact coefficient for the *i*-th category.

Constraints:

1. $\sum_{i=1}^{n} x_i = 1$(normalisation);
2. $x_i \geq x_{i,\min}$(minimum coverage level for each group);
3. $x_i \leq x_{i,\max}$(minimum coverage level for each group);
4. $\sum_{i=1}^{n} c_i \cdot x_i \leq B$ (budget constraint).

A generalised graphical analysis allows for a comprehensive assessment of the patterns of optimal resource allocation among beneficiary categories and the associated structural characteristics. As shown in Fig. 3, the optimal distribution of resources involves increasing the focus on veterans (from 13% to 25%) and young people (from 17% to 30%), while reducing the focus on IDPs (from 37% to 27%).

To forecast the sector's development, a method of logistical-dynamic modelling of social entrepreneurship development was applied, taking into account institutional constraints and external shocks:

$$\frac{dN}{dt} = r \cdot N \cdot \left(1 - \frac{N}{K}\right) - \delta \cdot N + \phi(t)$$

where $N(t)$ – number of social enterprises at time t; r – internal growth rate; K – capacity of the environment (maximum number of social enterprises); δ – market exit coefficient; $\phi(t)$ – external influence function (grants, regulatory changes).

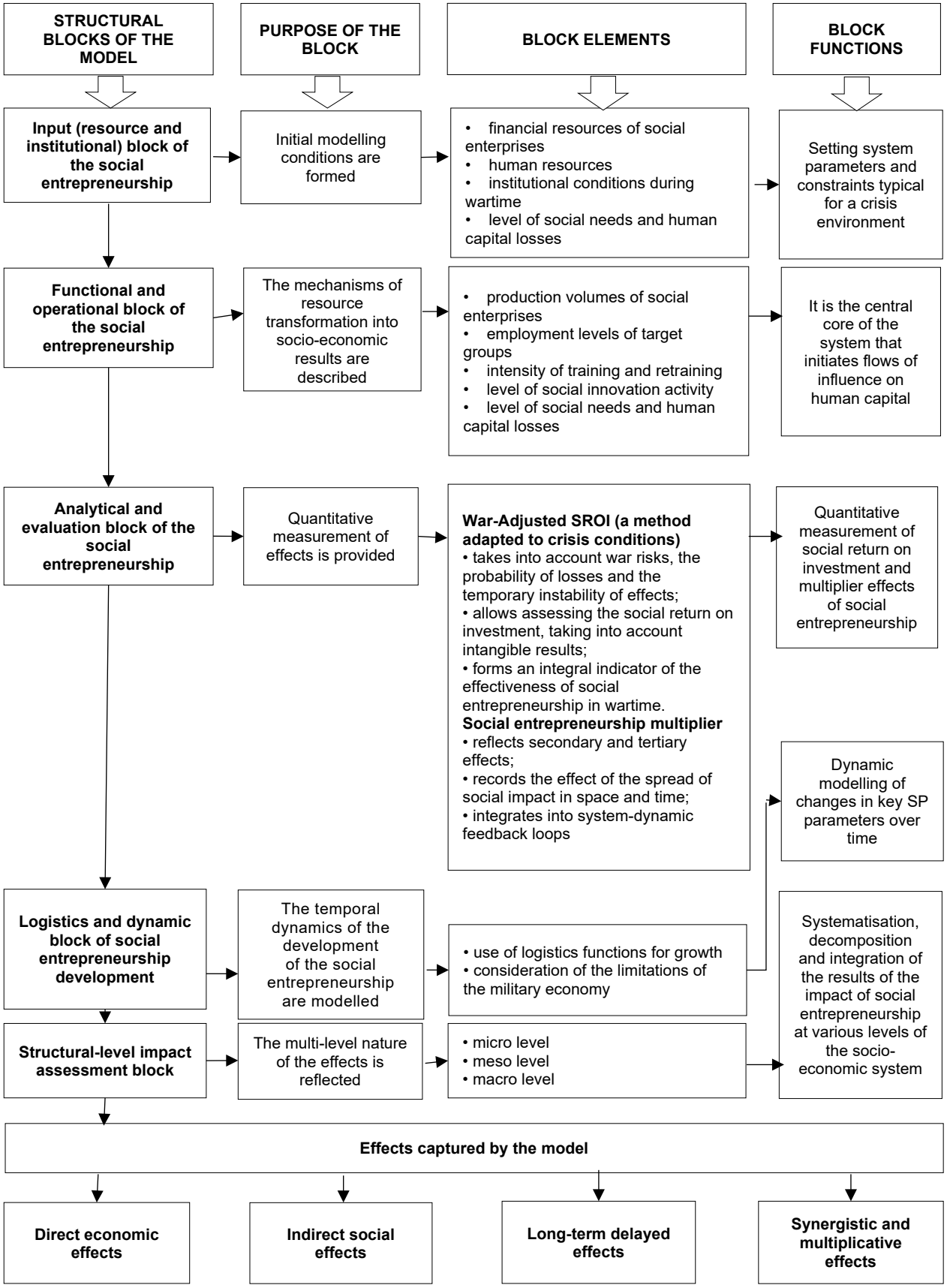


Fig. 1. Economic-mathematical model for assessing the impact of social entrepreneurship on human capital restoration in conditions of war and post-war development

Source: compiled by the authors.

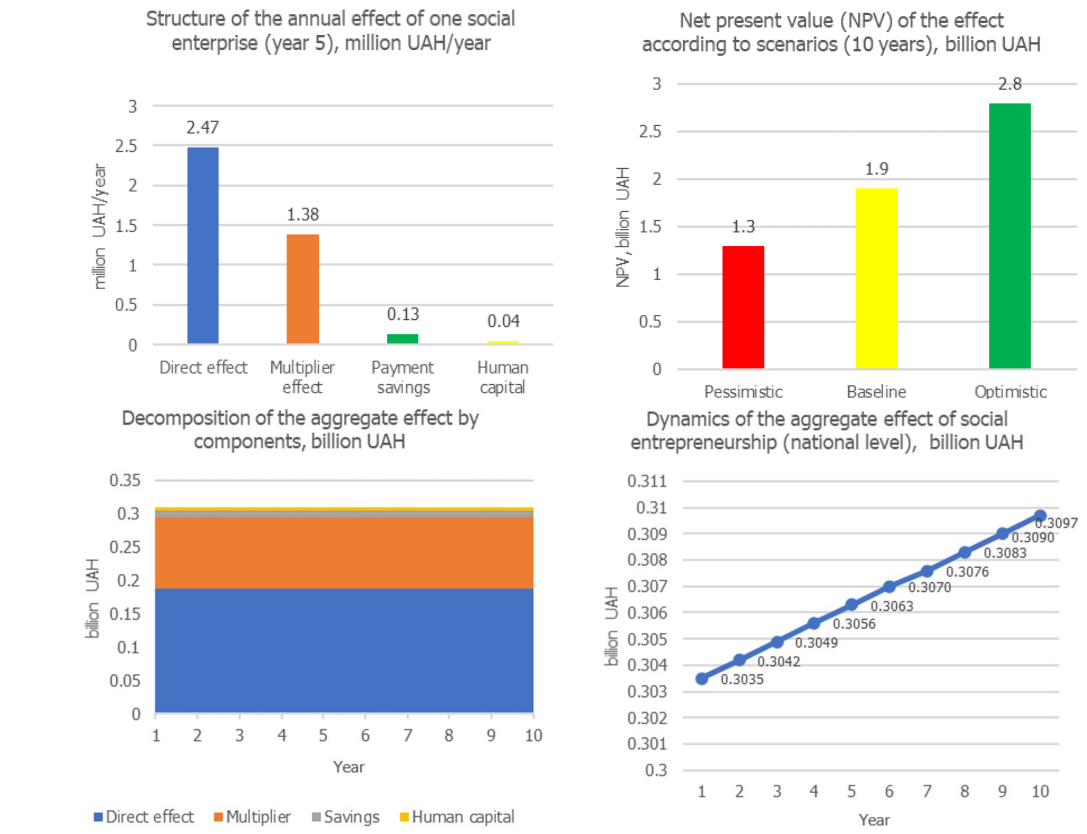


Fig. 2. Analysis of the effects of social entrepreneurship

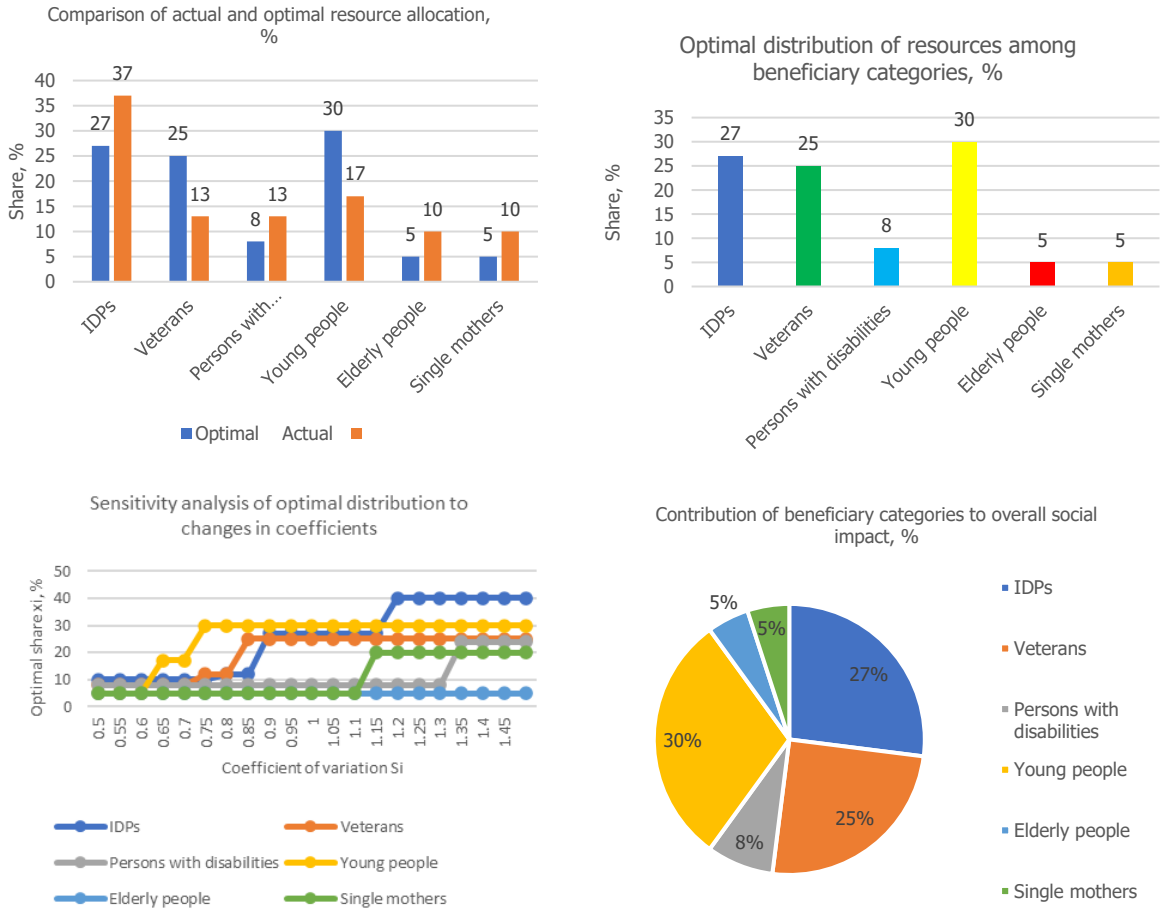


Fig. 3. Optimisation of resource allocation for social enterprises

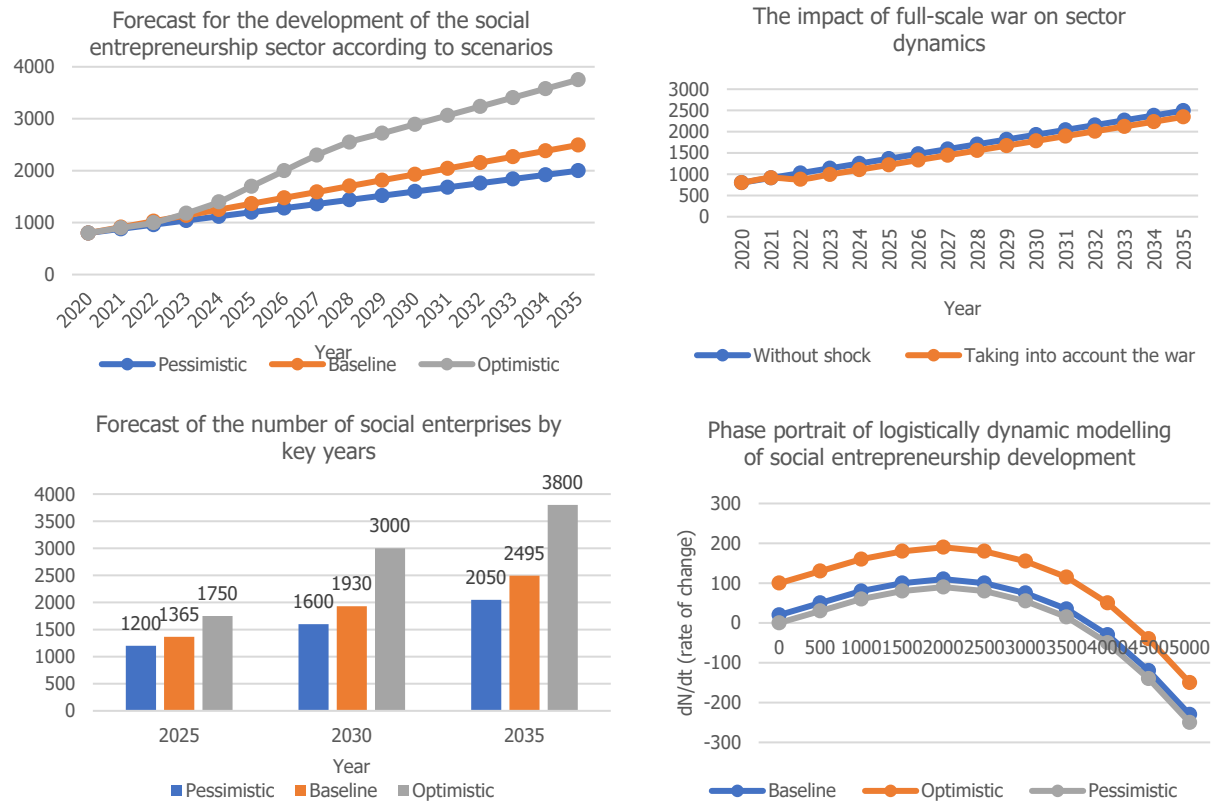


Fig. 4. Forecasting the development of social entrepreneurship

The projected results of SE development, taking into account institutional constraints and external shocks, are presented in Fig. 4.

As shown in Fig. 4, the dynamics of the social enterprise sector's development vary significantly depending on the scenario chosen. Under the baseline scenario, the number of social enterprises grows from approximately 800 in 2020 to around 2500 in 2035, reflecting moderate but steady expansion of the sector under the current institutional framework and level of support. The optimistic scenario shows a much more rapid trajectory: the number of social enterprises could increase to over 3800 in 2035, corresponding to the intensive development of the sector in the context of formal recognition of the status of social enterprises, the activation of grant programmes and the expansion of state and international financing instruments. The pessimistic scenario, despite lower growth intensity, also shows a gradual positive trend: the number of social enterprises increases from approximately 800 in 2020 to about 2000 in 2035. This result reflects a scenario in which structural constraints, economic instability and reduced support slow down development but do not block the overall trend towards expansion of the sector.

To comprehensively assess the effectiveness of social enterprises, the Social Return on Investment (SROI) methodology was applied, which makes it possible to monetise social outcomes and compare them with the resources invested (Fig. 5).

The SROI ratio is calculated using the following formula:

$$SROI = \frac{\sum_{i=1}^{n} V_i \cdot Q_i}{\sum_{j=1}^{m} C_j}$$

where V_i – is the monetised value of the *i*-th social outcome, Q_i– is the social outcome, C_j – is the *j*-th category of expenditure, n – is the number of identified social outcomes, m – is the number of categories of expenditure.

As shown in Fig. 5, the integrated social return on investment (SROI) indicator for the social entrepreneurship sector in Ukraine is 3.28. This means that every hryvnia invested in the activities of social enterprises generates approximately 3.3 hryvnia in social value, which indicates the high efficiency of the resources involved. A comparison of the amount of expenditure and the social value created confirms the significant multiplier effect inherent in this model.

The structure of the contribution of individual categories of results shows that the largest share of social value is generated by the employment of internally displaced persons (25%), followed by the employment of veterans (14%), programmes for persons with disabilities (11%), training and educational activities (6%), psychological support (3%) and other effects (41%). This distribution highlights the leading role of employment as a factor in shaping social returns and demonstrates the greatest socio-economic potential of measures aimed at integrating vulnerable groups into the labour market.

According to research on the interconnection between human and social capital of enterprises and their impact on the development of communities and society as a whole, modelling the impact of social entrepreneurship requires consideration of synergistic effects. Social enterprises simultaneously increase human capital (through training, employment, rehabilitation) and social capital (through the formation of horizontal networks of trust and the strengthening of communities) (Grishnova, Bereziuk, & Bilan, 2021; Azmuk, Grishnova, & Kuklin, 2022; Tonova et al., 2025).

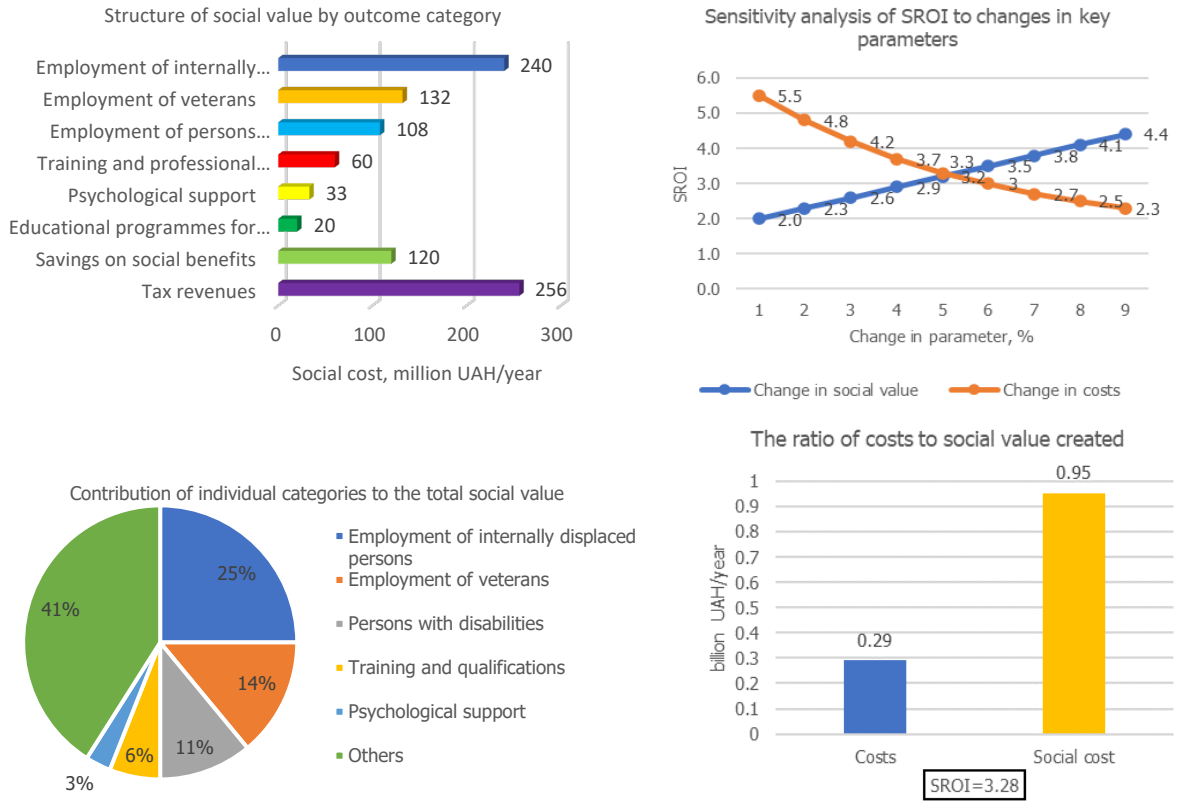


Fig. 5. Social Return on Investment (SROI) analysis

To forecast the development of the social entrepreneurship sector in Ukraine, a method of logistically dynamic growth modelling was applied, taking into account external shocks and institutional changes. This method was chosen because the development of any sector is limited by market capacity, resource capabilities, and institutional barriers.

The synergistic effect can be formalised through a multiplicative function:

$$Y = A \cdot K^{\alpha} \cdot L^{\beta} \cdot H^{\gamma} \cdot S^{\delta}$$

where Y – aggregate result; A – technological coefficient (resource efficiency); K – physical capital; L – labour; H – human capital; S – social capital; α, β, γ, δ – elasticities of the production function.

As shown in Fig. 6, the extended forecast for the development of the social entrepreneurship sector (2020–2040) refines and supplements the trends presented in Fig. 4 for the period up to 2035. Under the baseline scenario, the number of social enterprises grows from approximately 850 in 2020 to about 2550 in 2035 (consistent with the conclusions drawn from Fig. 4), after which it continues along the same trajectory, reaching approximately 3000 enterprises in 2040. This result indicates that extending the time axis by five years does not change the nature of growth, but only reflects its logical continuation.

The military shock of 2022–2024, modelled in Fig. 6, causes a short-term deviation from the baseline curve, characterised by a temporary slowdown in growth and the accumulation of losses in the sector. However, the curve shows a return to the baseline trend within approximately 5–7 years due to a gradual recovery in demand, stabilisation of the institutional environment, and reactivation of entrepreneurial activity in 2023–2024.

The final stage of economic and mathematical modelling is a structural and level assessment of impact, which combines all the previous components: multiplier effect, SROI, sector dynamics and capital synergy. The assessment is structured according to three impact contours.

The microcontour covers effects at the level of an individual enterprise: job creation, provision of social services, and added value formation. The overall effect of the microcontour:

$$E_{micro} = \sum_{i=1}^{N} (W_i + S_i + V_i)$$

where W_i – is the wage fund of the *i*-th enterprise, S_i – is the cost of social services provided, and V_i – is the added value.

The meso-contour reflects the effects at the community level: strengthening social cohesion, local economic development, and the formation of horizontal networks of trust. The meso-contour effect:

$$E_{meso} = \alpha_1 \cdot N_{localities} + \alpha_2 \cdot \Delta SC$$

where $N_{localities}$ – is the number of communities covered by social enterprises, ΔSC – is the increase in social capital, α_1, α_2 – are monetisation coefficients.

The macro-contour integrates systemic effects: the multiplier effect on GDP, savings in the state budget, and the increase in the nation's human capital. The macro-contour effect:

$$E_{macro} = k \cdot E_{micro} + \Delta B + \Delta HC$$

where k – is the multiplier, ΔB – is the budget savings on social payments, and ΔHC – is the increase in human capital.

As shown in Fig. 7, the aggregate economic effect of social entrepreneurship under the baseline scenario will grow from UAH 5.8 billion in 2025 to UAH 29 billion in 2040. The cumulative contribution to post-war recovery needs by 2040 will be approximately 1.7%. Micro-contracting will account for the largest share of the effect (55%).

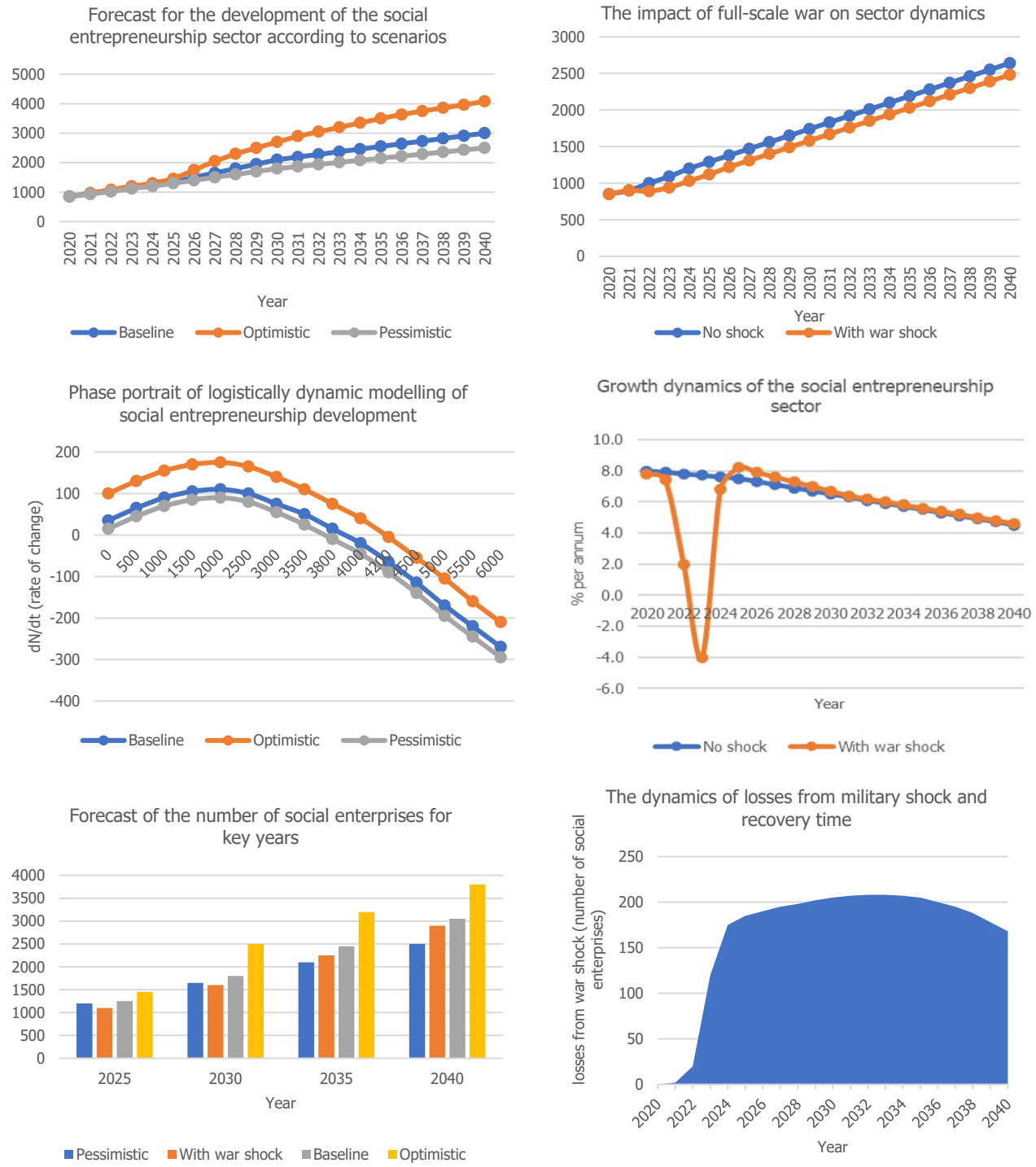


Fig. 6. Forecasting the development of social entrepreneurship, taking into account institutional constraints and external shocks

Economic and mathematical modelling of the impact of social entrepreneurship on Ukraine's post-war recovery has made it possible to formulate several scientifically based conclusions:

1. The social entrepreneurship multiplier is 1.38, which means that every hryvnia invested in a social enterprise generates 1.38 hryvnia of aggregate economic effect through a chain of sequential expenditures and revenues in related sectors of the economy.

2. The social return on investment (SROI) ratio is 3.28, confirming the high effectiveness of social enterprises as a tool for solving social problems. Each hryvnia spent generates 3.28 hryvnia of monetised social value, taking into account the effects of employment, training, psychological support and savings in public expenditure.

3. A dynamic model based on a modified logistic equation predicts an increase in the number of social enterprises from 1100 in 2025 to 3100 in 2040 under the baseline scenario. The military shock of 2022–2024 led to a

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temporary contraction of the sector, but the time to recover to the baseline trajectory is estimated at 5–7 years.

4. The integrated model demonstrates that the aggregate economic effect of social entrepreneurship is formed by three contours: micro (employment and services – 55%), meso (local development and social capital – 4%) and macro (multiplier, budget savings, human capital – 41%).

5. The cumulative contribution of social entrepreneurship to meeting the needs of Ukraine's post-war recovery (estimated by the World Bank at $486 billion) will average about 0.9% over a 15-year horizon, depending on the scenario, and will be about 1.7% by 2040. Despite their relatively small share, social enterprises play a critical role in the employment of vulnerable groups and the formation of social cohesion at the local level.

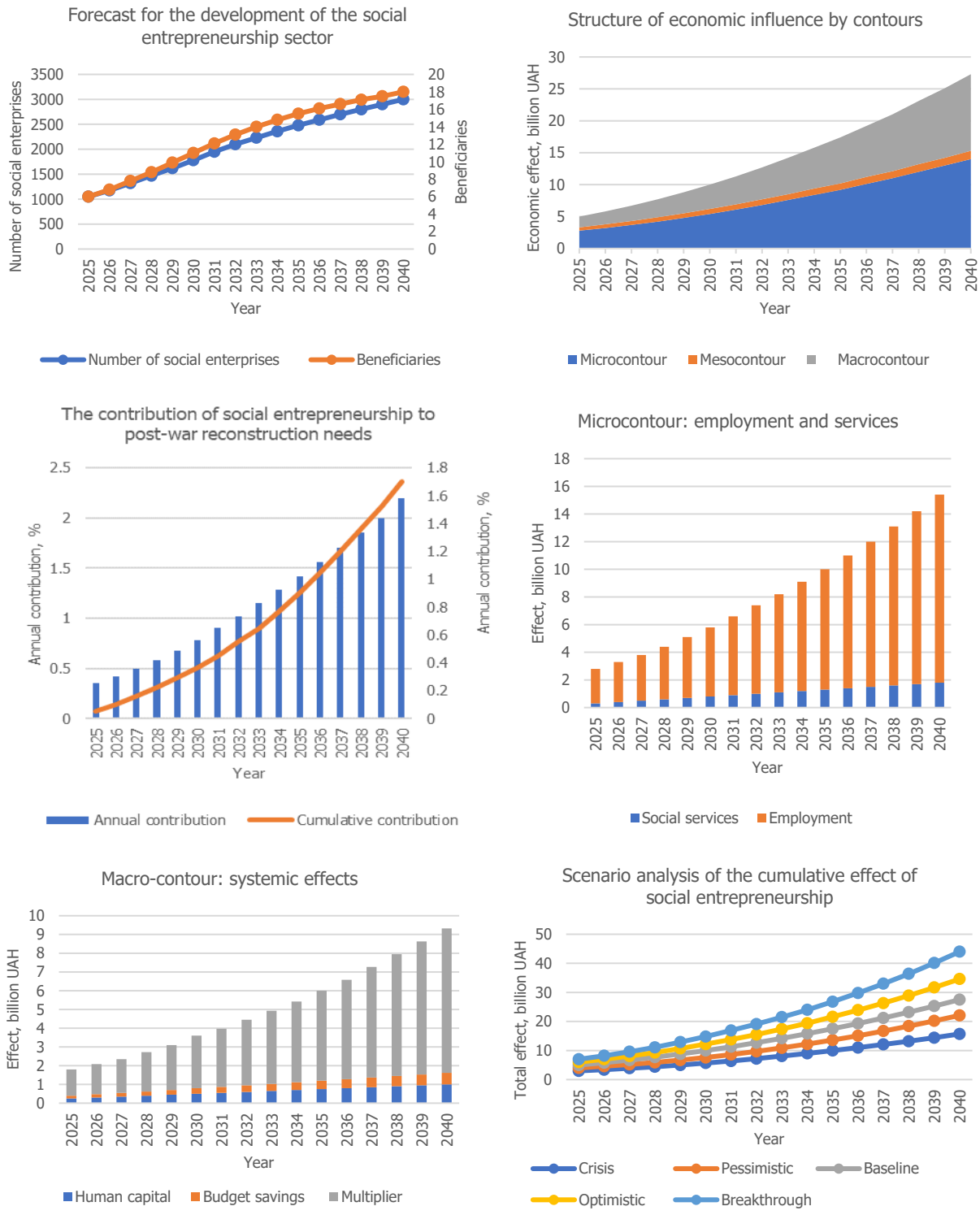


Fig. 7. Structural-level assessment of the impact of social entrepreneurship on Ukraine's post-war recovery

Discussion and conclusions

Based on the economic and mathematical model developed in the study to assess the impact of social entrepreneurship on human capital restoration in conditions of war and post-war development, it has been substantiated and empirically proven how social entrepreneurship can act as a catalyst for economic and social transformation. The results of the study show that the formation of a favourable ecosystem for social enterprises can significantly increase their ability to solve social problems while ensuring economic stability. The advantages over existing studies are provided by the following results:

1. An approach to impact assessment using multidimensional indicators (social, economic) could form the basis for developing Ukraine's own analytical framework.

2. Statistical methods combine quantitative and qualitative analysis, which allows for a more in-depth interpretation of the results.

3. Social impact assessment is a key element of social change management, as it allows not only to monitor the effectiveness of activities, but also to build trust between social enterprises, the state and the public.

4. The identification of resource-institutional, functional-operational, analytical-evaluative, logistical-dynamic and structural-level blocks for assessing the impact of social entrepreneurship in an economic-mathematical model makes it possible to identify effective practices and formulate recommendations for the development of the sector.

Despite the significant analytical depth and multidimensional nature of the assessment of the impact of social entrepreneurship, the results of the study have certain limitations that must be taken into account when interpreting the conclusions: the data are based on respondents' self-assessment, which may lead to socially desirable responses; significant structural changes in the economy and constant shocks (energy, regional, safety) can rapidly change the operating conditions of social enterprises; the sample does not cover social enterprises in temporarily occupied territories, which structurally limits the analysis of social impact in regions with the highest level of losses.

Thus, based on the constructed economic-mathematical model for assessing the impact of social entrepreneurship on human capital restoration in conditions of war and post-war development, the study proved the hypothesis that social entrepreneurship is capable of generating quantifiable direct economic, indirect multiplier, and monetised social effects. The results are based on three fundamental theoretical concepts: the theory of human capital, which made it possible to explain the economic benefits of investing in the development of the competencies and skills of representatives of vulnerable groups; the multiplier approach, which provided a toolkit for calculating the indirect economic effects that arise from increased employee income and increased inter-sectoral links; the concept of social innovation, which views social enterprises as agents of institutional change and catalysts for transformational processes in communities. The results of the analysis showed that social entrepreneurship can be not only part of the country's economic recovery, but also an effective tool for overcoming current challenges in the social sphere. In other words, social enterprises are not just businesses, but a mechanism for rebuilding the country that combines economic efficiency with social safety. In this context, social enterprises are one of the key mechanisms for achieving sustainable development goals. They are not simply profit-oriented, but create a long-term positive impact on society, which is in line with the concept of sustainable development.

SE can be a powerful tool not only for economic recovery but also for solving acute social problems. Innovative social business models help to quickly meet the critical needs of the population: create jobs for vulnerable groups, establish new educational platforms, mobile medical centres, and cultural initiatives for community reintegration, attract investment in social projects, assist war veterans and affected communities, and promote economic resilience through the development of local businesses, etc.

Support for social entrepreneurship through government programmes, international grants and partnerships with businesses could become an important mechanism for rebuilding and developing Ukraine's social sphere in the post-war period, solving social and economic problems, and mitigating the challenges of post-war recovery.

Ukraine's losses due to the war are so significant that future studies must take a comprehensive approach to compensate for them, including housing reconstruction, education, healthcare, and social protection. Social entrepreneurship should become an integral part of the recovery strategy, as it provides sustainable economic solutions to overcome social challenges and should be the subject of deeper scientific analysis and state support. In addition, the concept of social entrepreneurship fits harmoniously into the strategic directions of development in the social, economic, and environmental spheres, which are declared in the Sustainable Development Goals, opening up opportunities for further interdisciplinary research.

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СОЦІАЛЬНЕ ПІДПРИЄМНИЦТВО ЯК ДРАЙВЕР СТІЙКОСТІ ТА СОЦІАЛЬНОЇ БЕЗПЕКИ: ПРИКЛАД УКРАЇНИ

В с т у п . ***В умовах безпрецедентних викликів, спричинених війною в Україні, соціальне підприємництво стало багатофункціональним інструментом соціальної трансформації, каталізатором сталого розвитку та соціальної стійкості. Основною метою цього дослідження є розроблення та валідація комплексної економіко-математичної моделі для оцінювання впливу соціального підприємництва на системне відновлення людського капіталу в умовах воєнного та післявоєнного періоду.***

М е т о д и . ***Дослідження інтегрує низку базових теоретичних підходів: теорію людського капіталу, мультиплікативний підхід та концепцію соціальних інновацій. Методологічну основу становить синтезована системно-динамічна модель, що включає: модифіковану для умов підвищеного ризику модель соціальної віддачі на інвестиції (War-Adjusted SROI); мультиплікатор соціального підприємництва, побудований на основі міжгалузевого аналізу "витрати–випуск"; а також модифіковане логістичне рівняння для динамічного прогнозування розвитку сектору. Структурне оцінювання здійснюють за трирівневою ієрархією, що охоплює мікро-, мезо- та макрорівневі соціально-економічні ефекти.***

Р е з у л ь т а т и . ***Емпірична верифікація розробленої моделі підтверджує, що соціальні підприємства формують синергічний ефект "потрійної результативності". Ключові результати свідчать, що мультиплікатор соціального підприємництва становить 1,38, тобто кожна одиниця інвестицій генерує 1,38 одиниці сукупного економічного ефекту. Коефіцієнт SROI досяг значення 3,28, що підтверджує високу ефективність соціальних підприємств як інструмента подолання суспільних криз. Динамічне моделювання прогнозує зростання кількості активних соціальних підприємств із 1100 у 2025 р. до приблизно 3100 у 2040 р., з потенціалом перевищення 3800 одиниць за оптимістичним сценарієм. Інтегрований ефект розподіляється так: мікрорівень – 55 %, макрорівень – 41 %, мезорівень – 4 %.***

В и с н о в к и . ***Запропоновані моделі War-Adjusted SROI та мультиплікатора формують надійний аналітичний інструментарій для прийняття управлінських рішень щодо пріоритезації соціальних інвестицій. Значна частка макрорівневого впливу (41 %) підкреслює стратегічну роль соціальних підприємств у забезпеченні соціальної безпеки держави та бюджетної стійкості. Отримані результати свідчать про необхідність трансформації державної політики у напрямі формування сприятливого інституційного середовища для розвитку соціальних інновацій.***

К л ю ч о в і с л о в а : ***соціальне підприємництво, соціальне підприємство, людський капітал, соціальні пріоритети, соціальна безпека, корпоративна соціальна відповідальність, соціальний вплив, економіко-математична модель, стійкість, сталий розвиток.***

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