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### Social Innovations Development Modelling

Evgeny Popov<sup>1</sup>, Jol Stoffers<sup>2</sup>, Zhoomart Omonov<sup>3</sup> and Anna Veretennikova<sup>4</sup>

<sup>1,4</sup>*Institute of Public Administration and Entrepreneurship, Ural Federal University, Russian Federation*

<sup>2</sup>*Research Centre of Employability, Zuyd University of Applied Sciences, The Netherlands*

<sup>3</sup>*Corresponding author, Institute of Public Administration and Entrepreneurship, Ural Federal University, Russian Federation. Email: jomaomon@gmail.com*

<sup>1,4</sup>*Institute Economics of Ural Branch of Russian Academy of Science, Russian Federation*

#### ABSTRACT

Formation of institutional conditions for development of social innovation represents a relevant, in-demand research topic in global and domestic economic practices. However, from a theoretical viewpoint, its principles remain nascent, so this study identifies mechanisms of social innovation through simulation of developmental trends. An original interpretation of social innovation is refined, combined with a list of exogenous and endogenous factors that influence socio-innovative development. Exogenous factors include public administration, socioeconomic conditions, development of human capital, innovation infrastructure, and informal institutional environments, and endogenous factors include those that characterize processes of social innovation and those influencing the process of securing resources. Data came from the Federal State Statistics Service, and results from empirical research. A questionnaire was developed that included closed questions regarding social innovators' developmental intentions. Trends concerning advancement of social innovation were derived directly from means of multiple regression analysis, for which linear models with two or three independent variables were constructed. The authors obtained endogenous and exogenous linear models with two or three independent variables that demonstrate whether developmental features of national and regional economies influence results of social innovation activities, and effects of types of social and innovative projects on regional expansion indicators. Theoretical contributions rest in extension of the theory of innovation in relation to the public, and creation of a methodological platform for further analysis, and practical significance lies in the possibility for use by public administrators in realizing effective policies by overcoming barriers and encouraging favorable conditions for socially innovative development.

**Keywords:** Social innovation; exogenous and endogenous factors; developmental trends.

## 1. INTRODUCTION

Formation of an institutional environment conducive to socially innovative development of an economic system is a promising and relevant research direction, both theoretically and practically. Unstable economic conditions require existing institutions to be capable of rapid transformation and adaptation to new realities[1]. The crisis state of the Russian economy is reflected by the welfare of the population, thus exposing underlying social problems. Social innovations that project new rules and principles of interaction between economic agents in terms of ensuring social and cultural needs of the population, and alternative methods for producing public goods, increase social welfare[2], and are thus of interest to economists and researchers. Despite its relevance, theoretical elaboration of the economic and managerial aspects of social innovation theory has been established only partially[3]. Among researchers exploring the phenomenon of social expansion in detail are G. Mulgan, P. Koch, G. Huknes, J. Phills, M. Moore, R. Nelson, and L. Earl. Dynamic advancement of socially innovative activity is confirmed by the fact that contemporary customs were considered social innovations several decades ago. An example is the innovative character of Friedrich Froebel's pre-school education platform embodied in the first kindergarten in 1837 [4]. Another example of successful public expansion is the project of Muhammad Yunus, who won the Nobel Peace Prize in 2006. Yunus, founder of the Grameen Bank, received the award "for his efforts to combat poverty and create the foundations for social and economic growth" [5]. Popular examples of social innovation in global practice include Wikipedia, the Open University, mass education projects such as Coursera, Khan Academy, and community-owned wind farms [6]. Thus, systematic development of social innovation is a means of bringing about positive social and economic changes in society, and in these circumstances, the effectiveness of novel solutions is determined by the amount of state contribution [7].

Most sources of social innovation consist of civic initiatives [1], a phenomenon driven by internal processes and conditions for refinement of social innovation, and factors that influence the effectiveness of socially innovative development. However, economists hold disparate views regarding the extent of positive economic growth that stems from social innovations. Social innovations are perceived as deviations from market economy norms, running contrary to traditional understanding of the effectiveness of economic processes [8], but an alternative view suggests that the presence of social innovation is an indicator of civil society, filling a void between market and state[9]. It emphasizes the need to boost the activity of the poor and marginalized strata of the population, and provide these groups with the opportunity to initiate solutions to social problems, including provision of public goods—in other words, devise sustainable conditions for the creation of social innovation [1; 10; 11]. Thus, the need to study characteristics of sustainable development of social innovation initiated by citizens is sufficiently topical, resulting in a need for more detailed analyses of this area. Hence, the aim of this research is to identify exogenous and endogenous factors that influence socio-innovative development, and formatting social innovations development models.

This study identifies sustainable tendencies of social expansion conducted by citizens, and to achieve this goal, an original interpretation of social innovations is presented, a list of factors that affect their development is constructed, and an empirical study is conducted, allowing the most significant factors and trends to be identified.

## 2. LITERATURE REVIEW

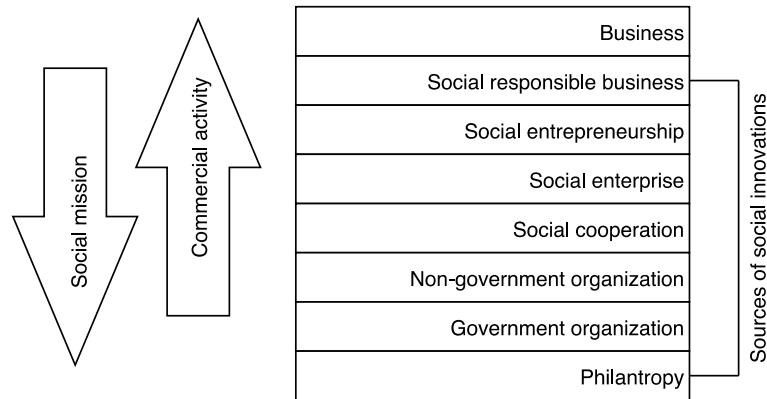
### A. Approaches to the Definition of Social Innovation

The apparent need for this study is attested by increasing numbers of forums and conferences dedicated to social innovation problems, including Social Innovation Residency (Canada), Social Innovation Summit (United States), and the Forum for Regional Social Innovation (Russia). A growing number of agencies and organizations are involved in supporting social innovation, including the Office of Social Innovation and Civic Participation in the White House in Washington, DC, the Ministry of Social Development and Social Innovation in British Columbia, Centers for Social Entrepreneurship and Social Innovation at higher education institutions (Russia), and the Agency for Strategic Initiatives (Russia). Last decade it is observed significant growth of research projects in Europe; for instance, we want to note such projects as “CRESSI”, “SIMPACT”, “ITSOIN”, “SIDrive”, “TRANSIT”, “ImPRovE”, “Third Sector Impact”, “BENISI”, “SOCIALPOLIS”, “PASHMINA”, “TEPSIE”, “SINGOCOM”, “KATARSIS”, “WILCO”. Growing interest in this subject is due to swift transformations of modern social and economic systems as a reflection of increasing technological change, acceleration of globalization, intensity of information flows, and development of net worked relationships between economic agents.

The theory of social innovation remains understudied; no consensus exists regarding interpretation of social innovation in scientific literature. We identify three approaches to the definition of the term. Proponents of the first approach [4; 12] interpret social change as innovation oriented toward attainment of social goals. For the second approach, social modernizations are characterized as innovations that occur in social spaces [7; 13], an interpretation close to that of the institute [14]. The third approach [15] suggests that social innovations include expansion into the public sector, serving as a public good. We refer to social innovation in terms of new ideas, opportunities and activities in the social space that increase the possibility of using resources to address economic, social, cultural, and environmental issues [1]. The term *social space* represents interrelated social processes, relationships, practices, and attitudes that influence activities that lead to creation of social innovations. All organizations and cooperation that have social missions and create social value may provide social innovations to society (Figure 1). Some of them more sustainable because they combine commercial activities and social mission; however, these organizations need appropriate institutional environment. Meanwhile, non-commercial non-government organizations, government organizations and philanthropy do not oriented to commercial activities; therefore, permanent financial support is vitally important.

### B. Factors During Development of the Social Innovations

It is necessary to note that social innovation presupposes reliance on innovation development theory, the primary questions of which the literature addresses in sufficient detail. The primary argument for use of provisions of the theory consist of similarities between technological and social innovations [2]. Conditions for refinement and implementation of social expansion, which are common to technological innovation, include degree of development of national and regional innovation systems, quality of national and regional innovation legislation, stability and flexibility of institutional frameworks, and availability of innovative infrastructures, hence demonstrating profound influences that social and economic advancements have—particularly the innovation system [16]—on efficient realizations of socially innovative projects.



**Figure 1: Sources of Social Innovations**

In his development of economic dynamics, and formation of the theory of economic development, J. Schumpeter considered an innovation as one stage of the lifecycle of scientific progress, along with invention and diffusion. Invention consists of creation of a prototype by applying a new method to existing knowledge. During innovation, a prototype, or model, is manufactured under market conditions. Diffusion is dissemination of innovation, which occurs either by copying or creating a similar product [17]. Building on Schumpeter’s ideas, emerging knowledge passes through phases such as invention, imitation, and adaptation. Invention includes determination of rights to knowledge, the assessment of its value, transformation into an object of knowledge, and establishment of monopoly rights to the object. Imitation ensures diffusion of innovation by copying or purchasing a finished production object. In turn, adaptation includes reworking innovation to fluctuating consumer preferences and wider social, economic, political, and technological changes[18].

Narrowing the subject of research to social innovation processes, the authors of “The Open Book of Social Innovation” identify several phases, including motivation, supply, testing, maintenance, scaling, and systemic change. Social innovations are terms of an impulse that generates significant social changes [4]. In this study, phases of social and innovative processes were identified, including initiation, invention, imitation, and adaptation. At initiation, a developer establishes an idea concretely; the intention of the project is revealed, basic documentation formed, and project team assembled. During invention, the formation of the project is pieced together. The imitation stage involves dissemination of the innovation among consumers, and copying the proposed solution in other territories or through forces of other economic entities. The needs of society and characteristics of socioeconomic systems are constantly changing. It is therefore necessary for social innovations to adapt to these changes. Such a resurrection is generally implemented during the adaptation stage. When developing new ideas, the adaptation stage coincides with initiation.

Dependency that social and innovation processes have on external socioeconomic, institutional, and cultural conditions led to isolation and analysis of factors that influence development, implementation, and dissemination of social innovation. As outsiders, we understand the exogenous factors that characterize the features of institutional spaces, which develop and implement social innovation. A review of scientific literature suggests several groups, including public administration, socioeconomic conditions, development of human capital, innovation infrastructures, and informal institutional environments. Endogenous factors represent processes and relationships that occur within the organizational system of social expansion, and factors that characterize management and provision of resources were identified in this field (Figure 2).

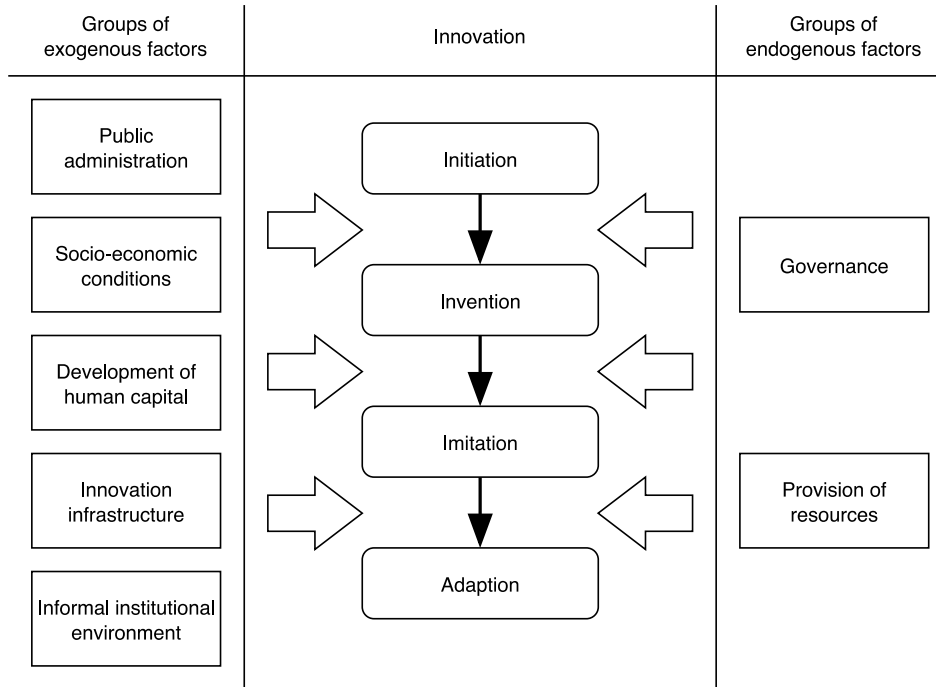


Figure 2: Exogenous and endogenous factors that influence innovation

*Public administration.* The state is a primary influence in this domain, assigning trajectories of social innovation development. At the present stage of social development, state interventions and all public policies relate to a need to eliminate market failures, produce public goods, act on externalities, control monopolies, deal with information asymmetries, and mitigate all types of market instability. Thus, the role of the state in creating social innovation is multifaceted. The state is a direct source of social modernization. One example is the Green Corridor project, which provides fast-rack documents during provision of municipal services to the population in the town of Shakhty in the Rostov oblast. The state also influences business. Social innovations arise during implementation of corporate social responsibility. The state creates conditions (e.g., infrastructure, enactment of bills, etc.) for development of societal advancements. Actions that public administrators take can be both direct and indirect. In terms of direct influences, institutions are designed to provide financial and advisory support during phases of development of social innovations, and indirect support is expressed during creation of appropriate climates for innovation.

Since the progress of public administration bodies has a consequent effect on socially innovative development, a question arises regarding the necessity of formulating indicators that characterize their performance. A primary indicator is the state governance index that is calculated by the World Bank [19], which gauges the development level of a formal institutional structure. When evaluating governance, an essential factor is the innovators' degree of confidence in authorities, the quality of their interactions with authorities, and taxation and other legislation that apply to social innovators [4; 20]. The Organization for Economic Cooperation and Development [21] recommends considering the adequacy of state interventions in activities of those working to advance society. Excessive attention leads to inhibitions of innovations. In an environment in which social and innovative activity is low, there is need for financial support from the state [4; 7; 20]. Indicators used to assess public administration are shown in Table 1, including sources of data used during analysis.

**Table 1**  
**Indicators Characterising the Quality of Governance**

<i>Indicator</i>	<i>Source</i>
Index of public administration	World Governance Indicator
Confidence level in State bodies in the region (%)	
Interaction with authorities	
Time of agreement of the realizable project with the state body (days)	
Financial support in the form of start-up capital	Survey
Development level of legal framework for social innovators	
Difficulty of obtaining support from public authorities	

*Socioeconomic conditions:* Establishment of a social innovation project is determined by access to human, financial, and other types of capital to accelerate development and implementation of collective expansion [22], affirming the importance of the standard of economic development. Simultaneously, social tensions, poverty, and general insecurity of the population are motivators for social innovations that the public proposes [4; 12]. However, socioeconomic conditions act as a barrier to change [22], with specific factors including the number of people with incomes below the subsistence minimum, and the consumer price index. The Gini coefficient, which reflects the social stratification of a population, is especially relevant here. The amount of public payments to the population also serves as an indicator related to the social situation, and hence characterizes the economic security of vulnerable populations (Table 2).

**Table 2**  
**Indicators of Socioeconomic Conditions**

<i>Socio-economic Conditions</i>	<i>Source</i>
Gini Coefficient	Russian Federal State Statistics Service
Number of people with financial incomes below the minimum subsistence level as a percentage of the total population of the region	
Amount of social payments to the population and taxable incomes of the population, 1000 rubles	
Consumer price index	
Investment risk index	
Investment potential	Expert RA

*Level of human capital development:* These factors are especially important, as evidenced by both foreign [4; 23; 24; 25; 26] and Russian researchers [27; 28]. The primary role of human capital during innovation is caused by the flow of new knowledge, a sufficient degree of competent staff members, creation of positive opportunities, and increasing collaboration and networks. Generation of innovative competitiveness is also a critical component. When it comes to social innovation, human capital plays a role, starting from the initiation stage, where knowledge and skills are used to identify social problems, and design and stimulate social innovation [2; 12]. The impetus to development of human capital is policy in the sphere of education and science, with the percentage of the population with higher education or the number of personnel engaged in research and development as examples (Table 3).

**Table 3**  
**Indicators Characterising Degree of Human Capital Development**

<i>Development of Human Capital</i>	<i>Source</i>
Volume of expenditures on science from the regional budget (millions of rubles)	Russian Federal State Statistics Service
Proportion of research spending from the federal budget (%)	
Ratio of spending on science to GDP (%)	
Number of employees engaged in research and development (thousands of people)	
Budgeted expenditure on education (millions of rubles)	
Expenditure on education (% of GRP)	
Number of people employed in education (thousands of people)	
Graduates of Bachelor's, Master's, and specialist degrees (thousands of people)	
Number of organizations engaged in research and development	
Number of higher professional education institutions	

*Innovation infrastructure:* The presence of an innovation infrastructure is also a criterion of innovation development. Innovation infrastructures comprise the assortment of interconnected structures serving and ensuring implementation of innovative projects. Such infrastructures influence all stages of social innovation[12], and thus several indicators were identified as development indicators of innovation infrastructures (Table 4).

**Table 4**  
**Indicators that Characterise the Innovation Infrastructure**

<i>Innovation infrastructure</i>	<i>Source</i>
Proportion of investment funds known to the enterprise	Survey
Proportion of technological parks and techno poles, providing organizational support known to the enterprise	
Presence of an organizational form for implementation of social innovation	
Duration of project implementation (months)	

*Informal institutional environment:* According to OECD [21], one barrier to innovation consists of problems with collaboration between various economic agents, resulting from features of both formal and informal institutional environments. In these circumstances, informal institutions and social capital often act as substitutes for formal institutions [29; 30]. It is possible to isolate two basic phenomena that indicate influences of informal institutional environment. First is the degree of positive perceptions on the part of innovation communities. Researchers note [7; 12; 31] that this factor is one of the most important influences of social innovation development [32]. Second is social capital that assigns the possibility of relationships and collaboration. Fafchamps [29] argues that trust is a major measurable indicator of social capital, and thus to assess informal institutional environments, we used the indicators shown in Table 5.

**Table 5**  
**Indicators that Characterize the Quality of the Informal Institutional Environment**

<i>Informal institutional environment</i>	<i>Source</i>
Level of trust between the partners in the region (%)	Survey
Level of positive perception of the institutional environment (%)	

Endogenous factors also influence advancement of public change [4; 25]. Salient signals when analyzing conditions for creation and dissemination of social innovations are shown in Table 6. A review of factors allowed a basis for further empirical analysis of institutional conditions for socio-innovative development.

**Table 6**  
**Indices that Characterize Endogenous Conditions for Development of Social Innovations**

<i>Index</i>	<i>Data source</i>
<i>Management</i>	
Engagement of external consultants	Survey
Number of employees participating in implementation of social innovation	
Information promotion of the social innovation project	
Extent of coverage of the realizable social innovation project	
<i>Provision of resources</i>	
External sources of funding	Survey
Financial support for current activities	
Possibility to make a profit from sales of the SI	
Proportion of own funds (%)	
Proportion of budget for the development of the SI project (%)	

### 3. RESEARCH METHODOLOGY

Sociological, economic, and statistical analyses were used to identify sustainable development trends of social innovations that citizens initiated. In addition to data obtained from the empirical study, the study also used data provided by the Federal State Statistics Service. Financial metrics are important indicators of public expansion, and the dynamics of these indicators reflect not only the financial stability of social innovation, but also the degree of refinement incorporated. Since most have combined sources of funding, both from individuals and public/governmental funds, the basic financial indicator of development was the project's budget. Budget figures reflect demand for social innovation, not only by citizens, but also the state. The authors constructed a questionnaire comprised of closed questions concerning the income and expenditures of social innovators, sources of support, number of personnel, and level of confidence in authorities, partners, etc. The study involved 18 social enterprises, including publicly oriented non-profit organizations operating in the Sverdlovsk region. Social projects participating in the study were divided into three groups according to the size of their budget—small-, medium-, and large-scale innovations. The first group included organizations with a budget of up to 100 thousand rubles per year, the second 100 to 300 thousand rubles per year, and the third over 300 thousand rubles.

Multiple regression analysis, which included six stages, was conducted to distinguish the features of the development of social innovations. In the first stage, all variables were checked using the graphic distribution method to identify the appropriate type of regression model. Next stage was the correlation analysis to study dependences of variables that demonstrates how Gauss-Markov conditions works, which is a precondition to the least square method. There should not be a significant dependence between factors according to Gauss-Markov condition. In the third stage, irrelevant factors were removed; this stage includes following steps:



1. Analysis the correlation coefficients between factors;
2. Analysis of the significance of the dependence between factors and dependent variable.

Hence, factors with zero dependence to the variable were removed first. Factors with weak dependence were checked using the  $\beta$  coefficient. Factors were removed if the  $\beta$  coefficient was too low.

In the fourth stage, the models' multicollinearity were verified according to the previous procedures. In the fifth stage, a part of establishing the quality of the model is to determine the degree of interrelation of factors with the dependent variable, and accuracy of the model coefficients, to test samples for absence of statistical outliers, and eliminate auto correlation of residuals. In order to demonstrate the robustness of the models, we present all indicators of the quality of the models in application.

Econometric models obtained while analyzing data are discussed next. When attempting a repetition of patterns obtained in this study, results might vary due to reliance on data specific to the sample. However, we predict general trends to be close to those presented.

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## 4. RESULTS

### A. Trends during Development of Social Innovations

#### *Small-scale Social Innovations*

For small-scale societal expansion, a positive correlation between budget and number of personnel engaged in research and development in the region, and degree of social payments obtained, was found

$$\text{SSI} = -631,350.95 + 32.96 \times \text{NP} + 0.032 \times \text{WP} \quad (\text{R}^2 = 0.92, \text{prob.} = 0.021) \quad (1)$$

where, SSI is a small-scale social innovation budget, NP is the number of personnel engaged in research and development, and WP is the amount of welfare payments to the population and taxable incomes of the population (in thousands of rubles). Analysis of internal factors suggests that refinement of social innovation is influenced by three factors: share of equity in the project, informational promotion of the project, and scope of the current project.

$$\text{SSI} = 92,468.38 + 860.69 \times \text{AOF} + 30,532.44 \times \text{IPP} + 25.44 \times \text{SP} \quad (\text{R}^2 = 0.64, \text{prob.} = 0.00) \quad (2)$$

where, SSI is the social innovation budget, AOF is the amount of own funds in the project budget, IPP is the informational promotion of project, and SP is the scope of the realized project.

#### *Medium-scale Social Innovations*

Development of medium-scale social innovations was influenced by welfare payments and the number of personnel engaged in research and development. However, the influence of these factors was more significant.

$$\text{MSI} = -2,286,247.83 + 117.68 \times \text{NP} + 0.09 \times \text{WP} \quad (\text{R}^2 = 0.80, \text{prob.} = 0.06) \quad (3)$$

where, MSI is the medium-scale social innovation budget, NP is the number of personnel engaged in research and development, and WP is the amount of welfare payments to the population and taxable incomes of the population (in thousands of rubles). From exogenous elements, a relationship was found between the proportion of known innovators to social investment funds, and the scope of the realized project.

$$\text{MSI} = 15,961.43 + 26,169.09 \times \text{PKF} + 85.41 \times \text{SP} \quad (\text{R}^2 = 0.80, \text{prob.} = 0.01) \quad (4)$$

where, MSI is the medium-scale social innovation budget, PKF is the proportion of investment funds known to the enterprise, and SP is the scope of the realized project.

### **Large-scale Social Innovations**

Evaluation of the third group of social changes demonstrated the most significant connections with factors such as the investment potential of the region and the number of personnel engaged in research and development.

$$\text{LSI} = -12,814,422.86 + 445.72 \times \text{NP} + 1590780 \times \text{IP} \quad (\text{R}^2 = 0.85, \text{prob.} = 0.03) \quad (5)$$

where, LSI is the large-scale social innovation budget, NP is the number of personnel engaged in research and development, and IP is the regional investment potential. Considering external influences, a correlation between the level of positive perceptions of the project on the part of the population and engagement of external consultants was identified.

$$\text{LSI} = 287,242 + 7,408.73 \times \text{PL} + 284,018 \times \text{OC} \quad (\text{R}^2 = 0.80, \text{prob.} = 0.06) \quad (6)$$

where, LSI is the large-scale social innovation budget, PL is the level of positive perception on the part of the population, and OC is the engagement of external consultants.

### **B. Social Innovation and Growth of the Region**

Activities of social innovators depended on various indicators that characterized economic processes in a region. Medium- and large-scale social innovations particularly influenced per capita income in the region.

$$\text{I} = 0.012 \times \text{MSI} + 0.0075 \times \text{LSI} \quad (\text{R}^2 = 0.93, \text{prob.} = 0.07) \quad (7)$$

where, I is the average per capita income, MSI is the budget of the medium-scale social innovation, and LSI is the large-scale social innovation budget. Development of large-scale social expansion has a positive effect on unemployment rates.

$$\text{UR} = 13.05 - 0.0000025 \times \text{LSI} \quad (\text{R}^2 = 0.81, \text{prob.} = 0.001) \quad (8)$$

where, UR is the unemployment rate and LSI is the large-scale social innovation budget. However, a population's economic activities were affected only by medium- and large-scale social innovations.

$$\text{LEA} = 65.69 + 0.0000017 * \text{MSI} + 0.00000091 \times \text{LSI} \quad (\text{R}^2 = 0.99, \text{prob.} = 0.000) \quad (9)$$

where, LEA is the level of economic activity of the population in the region, MSI is the medium-scale social innovation budget, and LSI is the large-scale social innovation budget. Analyzing the relationship between social innovation and internal regional productivity, a positive trend was observed with budgets applied to medium-sized socially innovative projects.

$$\text{GRP} = 2.09 \times \text{MSI} \quad (\text{R}^2 = 0.99, \text{prob.} = 0.000) \quad (10)$$

where, GRP is the gross regional product and MSI is the budget of a medium-scale social innovation.

## 5. DISCUSSION

The study and identification of patterns of social innovations provide understanding of drivers of social innovations, and their barriers. In the case of societal changes that are comprised of civic initiatives, the influence of barriers and drivers vary according to the types of projects. We draw a conclusion about the significance of social modernization on the overall development of a region. Small-scale social innovations take the form of initiatives with a narrow scope. This segment of public innovations is characterized by the small number of people involved with table group composition. Dependencies demonstrate that the number of staff members employed in research and development affects advancement of small social innovations. This selected body plays a role in generating new ideas when launching social innovations and providing stability during implementation.

The second most important factor is the amount of social payments. Social payments are a type of state intervention in the market by means of which public support is provided to vulnerable people. Thus, the dynamics of social benefits reflect the government's response to social tensions, and serve as a tool for solving public issues. Generally, the vector of advancement of small-scale social innovation is determined by the level of human capital development and social tensions in society. Medium-scale social innovations progress according to the criteria discussed above, but they interact with mentioned factors more closely. Since this group of innovations has a wider scope, the influences that the factors have are correspondingly stronger. Analysis of large-scale social innovations demonstrates the effect of the number of personnel engaged in research and development, but in contrast to small- and medium-sized innovations, a secondary factor is the investment potential of the region, calculated by a rating agency expert. This rating quantitatively considers nine groups of indicators—natural resources, labor, production, innovation, institution, infrastructure, finance, consumerism, and tourism. Consequently, essential aspects of development of large-scale social innovations are conditions that ascertain the economic progress of a region, and conditions for investment. Consequently, large-scale social innovations that produce positive socioeconomic changes are impossible absent an integrated regional development infrastructure.

Endogenous factors consist primarily of factors that influence management of social innovation. This study demonstrates the importance of the share of equity in the project, informational promotion of the project, and the scope of a current project during development of small-scale social innovations. Management effectiveness during socially innovative small-scale projects relies on personal investments from project managers. An important variable during this type of initiation consists of the ability to promote

information about it. The fact that the scope of a social innovation depends on its budget requires no explanation. In the second group of social innovations, interrelations of such factors as the proportion of funds known to a developer and the scope of arealized project are shown, and thus, the existence of an innovation infrastructure is an important aspect for advancement of such publicly expansive projects.

Analysis of the dynamics of major social innovations reveals a correlation between positive perceptions of a project by a population and engagement of external consultants. Since the third group comprises the most ambitious social innovations, it is natural that the degree of positive perceptions the public has about a project is highly significant. Hence, we argue that the introduction of novel social projects raises the need for public awareness and creation of positive perceptions of a project. Ordinary citizens who initiate social innovations often do not possess competencies for effective management of large-scale social innovations, and a question of engaging external consultants arises. This study corroborates the influence of social innovations on economic development of a region—they affect unemployment and economic activities of a population. This phenomenon confirms international experience during socio-innovative development. According to European Commission estimates, the social sector supports 11 million jobs in Europe alone [33]. Generally, social innovation is rapidly transforming under the external needs of society, and is growing quickly consequently, hence the importance of social innovation during development of social aspects of a region.

It can be concluded that there is a bilateral dependence between socio-economic development and social innovation. Firstly, the development of social share, where the indicator is the amount of the welfare payment by the government, influences the development of social innovation. Secondly, innovative economic politics through the development of personnel engaged in research and development also influences the social innovation. On the other hand, stable economic development is not possible without development of the social innovations, which confirms the dependence of the economic indicators of the development of the region on the budget of social innovation. It is also important to note that social and innovative projects with medium-scale and large-scale budgets have a special impact on the development of the region.

The results have demonstrated that the development of small-scale social innovative projects is often realized by citizens; however, the development of the scale of these projects requires such additional sources as investment, information support, legal support etc.

## **6. CONCLUSION**

Isolation and systematization of factors during development of social innovation was attained through characterization of both exogenous and endogenous conditions for socially innovative development. The influence of factors was identified during development of social innovators, and exogenous and endogenous development models of social innovation were developed that demonstrate the effects of types of social and innovative projects on regional development indicators. The theoretical significance of this study is extension of the theory of innovation in relation to the public sector, and creation of a methodological platform for further analyses. The practical significance of the results lies in the possibility of use by public administrators when developing policies to overcome barriers and create favorable conditions for socially innovative development. These developments are of great importance to social entrepreneurs, non-profit organizations, and governments involved in initiating social and innovative projects, and investors who fund such projects.

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### *Appendix Application*

$$SSI = -631,350.95 + 32.96 \times NP + 0.032 * WP$$

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
C	-631351.0	142493.5	-4.430737	0.0214
NP	32.95747	6.874477	4.794178	0.0173
WV	0.032129	0.010456	3.072807	0.0544
R-squared	0.921902	Mean dependent var		59208.33
Adjusted R-squared	0.869837	S.D. dependent var		10679.91
S.E. of regression	3853.113	Akaike info criterion		19.65800
Sum squared resid	44539450	Schwarz criterion		19.55388
Log likelihood	-55.97401	F-statistic		17.70664
Durbin-Watson stat	1.519520	Prob(F-statistic)		0.021825

*Social Innovations Development Modelling*

$$SSI = 92,468.38 + 860.69 \times AOF + 30,532.44 \times IPP + 25.44 \times SP$$

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
C	92468.38	12879.08	7.179733	0.0000
AOF	860.6921	142.3842	6.044858	0.0000
IPP	30532.44	13283.52	2.298520	0.0298
SP	25.44446	7.170832	3.548327	0.0015
R-squared	0.635851	Mean dependent var		160766.7
Adjusted R-squared	0.593834	S.D. dependent var		55637.18
S.E. of regression	35458.20	Akaike info criterion		23.91366
Sum squared resid	3.27E+10	Schwarz criterion		24.10049
Log likelihood	-354.7049	F-statistic		15.13314
Durbin-Watson stat	1.465352	Prob(F-statistic)		0.000007

$$MSI = -2,286,247.83 + 117.68 \times NP + 0.09 \times WP$$

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
C	-2286248.	797778.3	-2.865768	0.0643
NP	117.6845	38.48815	3.057683	0.0551
WP	0.091104	0.058540	1.556265	0.2175
R-squared	0.809489	Mean dependent var		174750.0
Adjusted R-squared	0.682482	S.D. dependent var		38283.81
S.E. of regression	21572.43	Akaike info criterion		23.10307
Sum squared resid	1.40E+09	Schwarz criterion		22.99895
Log likelihood	-66.30922	F-statistic		6.373576
Durbin-Watson stat	1.801500	Prob(F-statistic)		0.083153

$$SI = 15,961.43 + 26,169.09 \times PKF + 85.41 \times SP$$

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
C	15961.43	5644.359	2.827855	0.0127
PKF	26169.09	3742.308	6.992768	0.0000
SP	85.40998	40.50345	2.108709	0.0522
R-squared	0.796766	Mean dependent var		48833.33
Adjusted R-squared	0.769668	S.D. dependent var		25527.95
S.E. of regression	12251.62	Akaike info criterion		21.81572
Sum squared resid	2.25E+09	Schwarz criterion		21.96411
Log likelihood	-193.3414	F-statistic		29.40320
Durbin-Watson stat	1.590373	Prob(F-statistic)		0.000006

$$LSI = -12,814,422.86 + 445.72 \times NP + 1590780 \times IP$$

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
C	-12814423	3415738.	-3.751583	0.0331
NP	445.7230	107.1375	4.160289	0.0253
IPP	1590780.	616184.9	2.581660	0.0817
R-squared	0.852944	Mean dependent var		646916.7
Adjusted R-squared	0.754906	S.D. dependent var		100912.9
S.E. of regression	49958.89	Akaike info criterion		24.78264
Sum squared resid	7.49E+09	Schwarz criterion		24.67852
Log likelihood	-71.34792	F-statistic		8.700185
Durbin-Watson stat	2.160571	Prob (F-statistic)		0.056393

$$LSI = 287,242 + 7,408.73 \times PL + 284,018 \times OC$$

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
C	287242.3	64815.41	4.431697	0.0002
PL	284017.8	97307.36	2.918770	0.0082
OC	7408.725	1260.573	5.877266	0.0000
R-squared	0.645454	Mean dependent var		621666.7
Adjusted R-squared	0.611687	S.D. dependent var		280704.3
S.E. of regression	174920.2	Akaike info criterion		27.09852
Sum squared resid	6.43E+11	Schwarz criterion		27.24577
Log likelihood	-322.1822	F-statistic		19.11531
Durbin-Watson stat	1.164678	Prob(F-statistic)		0.000019

$$I = 0.012 \times MSI + 0.0075 * LSI$$

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
MSI	0.011609	0.004720	2.459407	0.0697
LSI	0.007488	0.001287	5.816707	0.0043
R-squared	0.933798	Mean dependent var		27540.07
Adjusted R-squared	0.917247	S.D. dependent var		4181.755
S.E. of regression	1202.956	Akaike info criterion		17.28415
Sum squared resid	5788413.	Schwarz criterion		17.21474
Log likelihood	-49.85246	Durbin-Watson stat		3.161243

$$UR = 13.05 - 0.0000025 * LSI$$

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
C	13.05451	1.525281	8.558757	0.0010
LSI	-2.46E-06	5.84E-07	-4.219189	0.0135



R-squared	0.816527	Mean dependent var	6.683333
Adjusted R-squared	0.770659	S.D. dependent var	1.099848
S.E. of regression	0.526713	Akaike info criterion	1.816880
Sum squared resid	1.109707	Schwarz criterion	1.747467
Log likelihood	-3.450640	F-statistic	17.80156
Durbin-Watson stat	2.534737	Prob(F-statistic)	0.013486

$$LEA = 65.69 + 0.0000017 \times MSI + 0.00000091 \times LSI$$

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
C	65.69113	0.140271	468.3169	0.0000
MSI	1.73E-06	1.90E-07	9.093670	0.0028
LSI	9.15E-07	7.21E-08	12.68707	0.0011

R-squared	0.995857	Mean dependent var	69.26667
Adjusted R-squared	0.993094	S.D. dependent var	0.581951
S.E. of regression	0.048360	Akaike info criterion	-2.913431
Sum squared resid	0.007016	Schwarz criterion	-3.017552
Log likelihood	11.74029	F-statistic	360.5249
Durbin-Watson stat	2.406852	Prob(F-statistic)	0.000267

$$GRP = 2.09 \times MSI$$

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
SI2	2.090427	0.114147	18.31348	0.0000

R-squared	0,992628	Mean dependent var	1480116.
Adjusted R-squared	0,985311	S.D. dependent var	274709.2
S.E. of regression	199311.7	Akaike info criterion	27.39414
Sum squared resid	1.99E+11	Schwarz criterion	27.35943
Log likelihood	-81.18242	Durbin-Watson stat	2.343785

