INNOVATIONAL INVESTMENT DEVELOPMENT VECTOR OF RURAL TERRITORIES

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The problem of innovational investment development in Ukraine has been researched. Main peculiarities of the national socio-economic, agrarian policies have been defined on the base of results of the empiric researches. The priorities of the development of rural territories, incl. the organic production, the development of a "green economy", the restoration of traditional agriculture with the aim of sustainable development and as an important source of income of the local population has been formulated. The necessity of modeling for modern system management has been proved. The conclusion about the influence of the innovation process for national agriculture development has been made.

Key words: investments, innovations, system management, development of rural territories. JEL Codes: C38, E24, J08, O3, P28, Q18, D83, J53, Q01.

1. Introduction

Systemic changes in the structure of the population (in favor of the growth of urban residents of Ukraine) is causing growing consumption of energy and material resources, which is accompanied by dynamic changes in the spheres of energy, water and gas supply, hygiene, sanitation, education, health and other (SniP, 1974). Similar consumption trends also can be noticed with other resources. The latter is one of the causes of social tensions.

The outflow of the population (mostly young) to the cities accompanied by the emergence of problems of housing; at the same time the cities are the largest sources of waste. Big cities are consuming significantly more water, food, fuel and spew into the atmosphere a huge amount of gaseous, liquid and solid waste. Intervention in natural processes contributes changes in modes of soil and surface water, soil structure, changing the microclimate (UN, 2014). At the annual session of the Economic and Social Council of the United Nations in Geneva the solving the urgent problem of reducing the production of waste has been noticed as a priority for the researchers as well as the entire world community.

Efficient management of water, air, land and other resources should be a result of a multifunctional development of territories, which makes the pressure on agriculture low, contributes to the modernisation and improvement of labour conditions. The problem of monofunctionalism of of rural territories also limits the

possibility of accumulation of investment resources in the rural economy. Reorientation of economic activities in the spheres of tourism, energy, consumer, information and other services should reduce the negative consequences of the practical limitations of the coordinate of components of socio-economic mechanism of administrative management and insufficient capacity of local athorities to strategically-accumulation of the effect of the investment process. Thus, the modern system management approach by the means of using vector of innovational investment for development of rural territories should be create (Plotnikova, 2013).

2. Rural Development System and Theoretical Aspects of the Issues

In ukrainian and foreign economic science to solve the socio-economic problems of rural territories, of new conditions of management, of development of organic production, of revival of separate spheres and sectors of the agroindustrial sector tried: V. Andriychuk et al. (2005), O. Borodina et al. (2010), O. Skydan (2008), T. Zinchuk (2008), O. Yatsenko (2011) and others. In particular, V. Andriychuk researched theoretical and metodical features of the capitalization of rural areas; at the same time, the practical aspects of business processes within specific regions not remained (Andreychuk, 2005). O. Borodina considered the system of administration of rural development; specific features of the production of agricultural products were not presented (Borodina, 2010). Sphere of interests of O. Skidan is agricultural policy, in particular in the context of food security; regional features of development of the mechanism of management of agrarian sector hasn't been researched (Skydan, 2008; 2010). T. Zinchuk examines the specifics of foreign economic activity of the national agricultural sector and prospects for its integration into the European economic area; the mechanism of local governmental management of agrarian sector has not been investigated (Zinchuk, 2008). O. Yatsenko explores the competitiveness and specificity of beekeeping as a key factor of branch development; at the same time other sectors of the national agrarian economy remains insufficiently studied (Yatsenko, 2011).

The problem of investment development in rural sphere has been researched by I. Blank (forms of financial investments; Blank, 2009), Yu. Pravyk (innovations; Pravyk, 2013). These authors didn't pay attention to the practical implementation of the mechanism and economic-mathematical approaches of the innovational investment management.

The lack of theoretical and methodical development of the problem, of organizational-economic conditions of formation of rural territories on the basis of organic production and in coordination with vector of innovational investment development helps us to choose the theme of the research.

Purpose is to research and to justify the theoretical and methodological approaches in innovational investment management within rural territories. *Object* of research is innovational investment processes of economic entities. *Subject* of research is theoretical base and methodology of modern system management, namely

vector of innovational investment development of rural territories.

Research covers the period from 2006 to 2012; evaluation of the results of economic activity has been based on statistical data. Theoretical base of the research is formal theory of economic systems, which reflects the application of a systemic approach to modeling the economic objects. Theoretical and methodological basis has been formed in papers of national and foreign scientists in the field of rural development and the theory of regional economy, acts, governmental decisions and ordinances, industry guidelines (the analysis of modern approaches, methods and technologies of the territories' management has been made, assessment of their effectiveness has been valued); system analysis and general theory of systems (the concept of modeling of the processes of regional development has been developed); economic-mathematical modeling and economic dynamics (conditions of effective and sustainable rural development has been investigated by using models of economic dynamics, which depends on factors of production, model of optimization of processes of rural development has been proposed).

Results of the research uses in educational process of Zhytomyr national agroecological university, and can be used with the purpose of optimization of administrative impacts on the agricultural sector on the macro-, mezo- and microeconomic levels.

3. Research Methodology of the Ukrainian Rural development

Production in specific climatic conditions is carried out in the conditions of the low level of investment activity on the territory of rural settlements and related sectors of the economy, physical and moral ageing infrastructure, loss of material and human resources. Increased social tension leaves potential sector unrealized. Continued economic decline in the agricultural sector is accompanied by processes of reducing the share of bank lending to GDP, government investment, revenues from taxes, the accumulation of internal and external debt, increasing defaults, level of shadow economy, hidden unemployment, the inability of the state to perform their social commitments, lack of effective procedures to protect the rights of the owner, a weak discipline of legislative acts, which are directed to the exit from the current situation. The question of provision of services in health, education and leisure remains insufficiently resolved. Inadequate level of financing forms the traditionally difficult conditions for building institutions of social infrastructure and cultural and recreation complex.

Diversification of economy could help to return the city dwellers to rural territories and, at the mean time, stimulates the needs of development of social infrastructure and services, creates opportunities for additional earnings for peasants, reduces the level of migration from the villages, including abroad (Baturina, 2013).

Despite these challenges, the priorities of the development of rural territories is the organic production, the development of a "green economy", the restoration of traditional agriculture with the aim of sustainable development and as an important

source of income of the local population. Main factors of development should become the introduction of certification and sales expansion of markets, including through promoting regional and own product brands, providing access to family businesses to financial services and local resources. Providing the benefits of a small (up to 10 ha) lands owning will create the conditions for the safe of biological diversity, to achieve higher quality and purity of the product. Factors of structural adjustment of the economy to be the activation of own capital of the overwhelming part of the population by providing the local community and strengthening control over her assets within rural areas.

Development of rural regions should be enforced by measures of increase the possibilities and by opening the potential of individual territories and persons living on them, on the basis of environmental protection, ecological culture with the active participation of the state in the context of the formulation of the principles of rational nature management. Multifunctional approach from the standpoint of management of socio-ecological and economic components of development of rural territories is a prerequisite for ensuring internal demand, boosting productivity, employment of rural population, guarantee of national food and economic security, enhancing international exchanges (Bogoyavlenska, 2012).

Factors associated with the possibility of impairment of assets and means of the company is risks, causes and possible negative consequences, which arises and can be evaluates on three levels – operations, innovational investment and finance (fig. 1). Risk (commercial or entrepreneurial) is formed as the summ of total risks for all types of activity, which are influenced by many factors. Operations' risks is the result of miscalculations in the manufacturing sector, suppliers' and promotional policy and can be neutralized by optimizing cash and material flows of enterprise, by the means of methods of economic-mathematical modeling and logistics analysis. Investment risk occurs during financial or innovative investment and/or related project activities of the enterprise. It can be evaluated during expert analysis of basic types of activity of the enterprise, potential areas of diversification, production volumes, sales, costs and profits. It shows trends of changes these indicators in time for the different levels of the production and management, reputation of company, etc.

Optimization of the investor's work is usually achieved by providing appropriate level of dividends to him, by guaranteeing frequency of payments, securing the right to vote, when addressing the most important issues of the development strategy of enterprises, etc. In a broad sense financial risks often associated with operational, innovational investment risks and risk of capital structures; in a narrow – risks, that is the financial and/or innovative activities, which resulted in changing the composition and structure of capital (liabilities). Thus, financial and innovational investment risks belong to a group of speculative risks, resulting in implementation which can be both a loss and a win. In practice, these risks are closely intertwined and represent a complex set of causation.

Economic risk

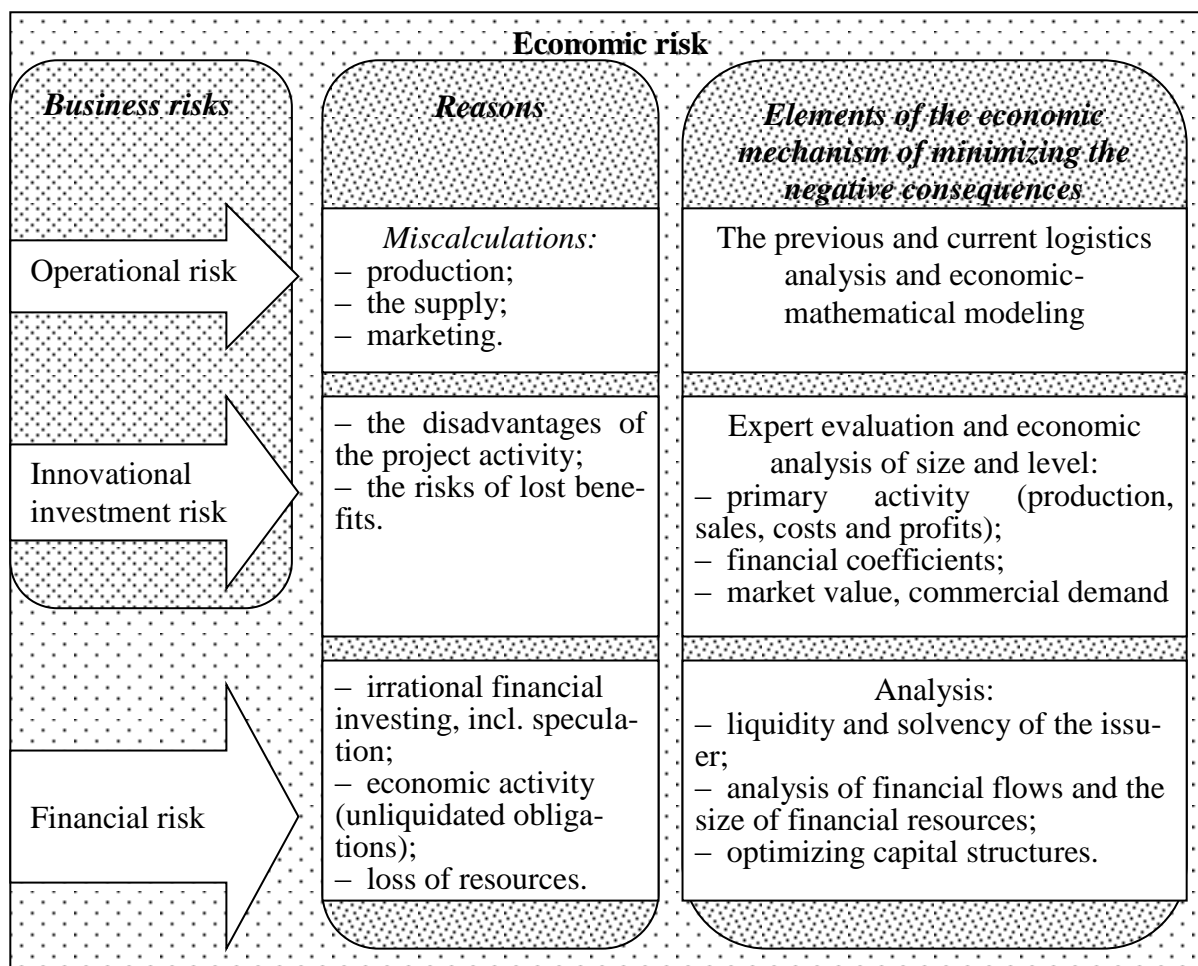| Business risks	Reasons	Elements of the economic mechanism of minimizing the negative consequences
Operational risk	*Miscalculations:* – production; – the supply; – marketing.	The previous and current logistics analysis and economic-mathematical modeling
Innovational investment risk	– the disadvantages of the project activity; – the risks of lost benefits.	Expert evaluation and economic analysis of size and level: – primary activity (production, sales, costs and profits); – financial coefficients; – market value, commercial demand
Financial risk	– irrational financial investing, incl. speculation; – economic activity (unliquidated obligations); – loss of resources.	Analysis: – liquidity and solvency of the issuer; – analysis of financial flows and the size of financial resources; – optimizing capital structures.

Fig. 1. Risks and assessment of efficiency of investment processes

The growth of exposure of risks on the effectiveness of investment activity and the results of production-economic activity of the enterprise is connected with the rapid change in the economic situation and the situation of the national market, the expansion of the sphere of social relations of the enterprises, the emergence of new technologies, investment and other factors. The risks of investing in agriculture have an objective nature through uncertain environment of enterprise. External environment includes the objective economic, social and political conditions, which carries out enterprise's activities and changes it.

According to the program of development of investment and innovation activity in Ukraine, priority development of the national economy is ensuring competitive advantages on the innovation basis. A crucial condition for the effectiveness of investment processes in the agricultural sector is the formation of investment attractiveness of the sector of the economy and the availability of investment resources for objects of investment. Evaluation of investment processes in the system of interaction between the investor and the entities can be represented as follows:

1) in case of absence of interactions, for example: the increase in production is proportional to the nested resources, when the last are unlimited, an investor interested in the related field of activity:

$$\begin{cases} \dfrac{dx}{dt} = \alpha x, \\ \dfrac{dy}{dt} = \beta y. \end{cases} \qquad (1)$$

where x, y − correspond the production volumes and the applicable resource; α, β − correspond the rates of growth of volumes of manufacture and consumed resources; t − time.

2) in the case of synergy interaction of investor and an investment:

$$\begin{cases} \dfrac{dx}{dt} = \alpha y, \\ \dfrac{dy}{dt} = \beta x. \end{cases} \qquad (2)$$

Graphical model of described situation presents in Fig. 2 (a, b).

In the case of formation of investment priorities in the alternative sector/region economy or in competitive in relation to the researched subject entities, a third model of investment processes formes:

3) model of the demand for factors of production, in the absence of competition:

$$\begin{cases} \dfrac{dx}{dt} = \alpha y, \\ \dfrac{dy}{dt} = -\beta x. \end{cases} \qquad (3)$$

where x − the production volumes; y − the demand for factors of production.
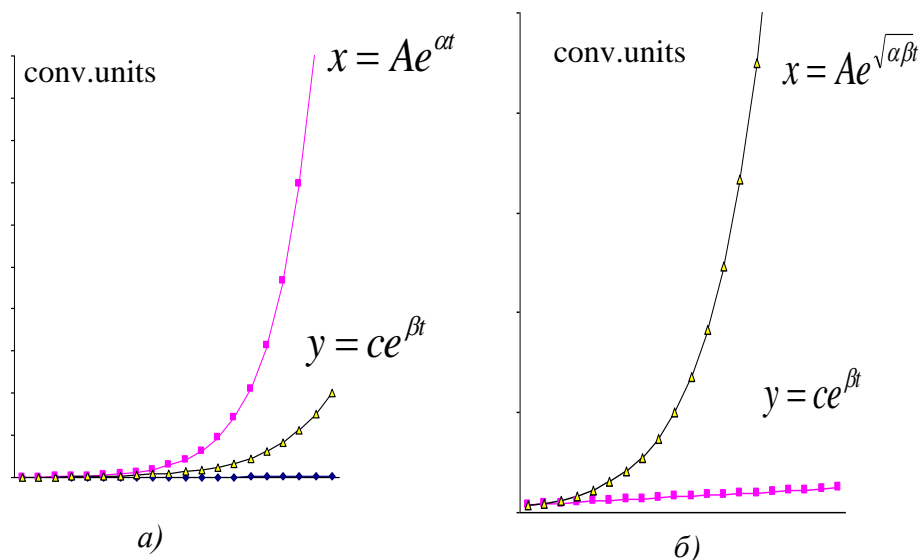
a) unlimited flow of resourses , б) the synergetic interaction

Fig. 2. The dynamics of the production volumes and consumed resources

Solving a system of equations by finding the first derivative, we get the following expression:

$$\begin{cases} \dot{x} = \alpha y, \\ \dot{y} = -\beta x. \end{cases} \Rightarrow \ddot{x} = \alpha \dot{y} \Rightarrow \ddot{x} + \alpha \beta x = 0$$

Cyclical nature of technology in the agricultural sector let us show the model of production as follows:

$$x = A \sin\left(\sqrt{\alpha\beta} t + \varphi\right) + C$$

where φ – the scale of production; C – minimum level of production.

In the conditions of competition both between the consumers of the factors of production and between investors, model suggestions for investment resources can be represented as follows:

$$\begin{cases} \dfrac{dx}{dt} = \alpha y + \gamma x, \\ \dfrac{dy}{dt} = -\beta x. \end{cases} \Rightarrow x = A e^{kt} \sin\left(k_1 t_1 + \varphi\right) \qquad (4)$$

A graphical model is presented in Fig. 3. Such a system more resistant to external influences, but is characterized by large amplitude fluctuations that do not have a central axis.
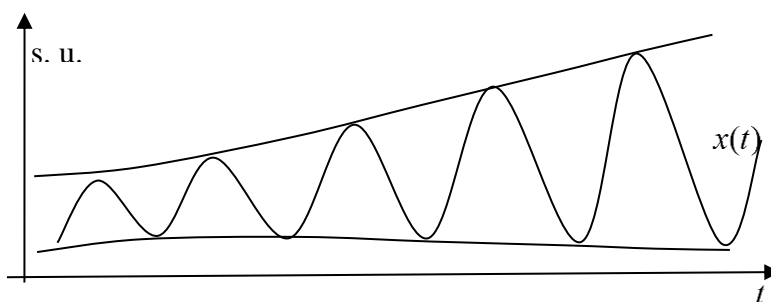

Fig. 3. Dynamics of production volumes in the conditions of market competition

Evaluation and engaging external resources leads to increasing productivity, increasing production and buildup of potential of subjects, revealing new possibilities for gaining competitive advantage in the future.

National agricultural sector shows a tendency to activise the role of infrastructures of the agricultural market and the impact of their activities on economic entities. The latter especially evident at the regional level. Meanwhile, national producers are at a stage of formation and acquirement of new qualities and properties, but not enough coordinated, which often does not allow use of their

potential for system development. Initial prerequisites of explanations of innovational investment decisions are: type and basic parameters of innovational investment strategies; the total amount of capital, aiming at the formation of the enterprise portfolio; the volume of investment market proposals, investment tools, which are fully correspond to the most important parameters of the chosen type of portfolio (formed as a result of their value list); the values of the indicators of the level of profitability, level of risk and the coefficient of correlation, which are included in a list of certain types of instruments for investing.

The formation of the food safety – aim of the economic policy of any country, so the development of national agriculture sector is permanent interest to the government and parliament. The lack of a systematic approach in the formation of the national agricultural policy and insufficient level of internal industrial intersectoral exchanges are the cause of insufficient supply of raw material of processing companies and the low efficiency of management of agricultural units (table 1) – (Osaulenko, 2010; Zinchuk, 2008). The need of formation of investment policy based on the strategic goals, which agrees with the current activity, accompanied by changing external factors, determines the direction of development of the agricultural sector.

Table 1. Efficiency of production activity of Ukraine agricultural enterprises of, 2010–2012

Products	2010	2011	2012
Cost of gross product per:			
100 ha of agricultural land, thous. UAH	468.7	562.3	536.8
one average worker, thous. UAH	327.6	416.6	440.0
100 UAH of fixed assets, UAH	296.7	336.0	256.8
100 UAH of circulation means, UAH	235.2	232.6	159.4
Net profit per:			
100 ha of agricultural land, thous. UAH	41.6	61.1	65.0
one average worker, thous. UAH	29.0	45.2	53.3
100 UAH of fixed assets, UAH	26.3	36.5	31.1
100 UAH of circulation means, UAH	20.9	25.3	19.3
Capacity of the assets, UAH	0.34	0.30	0.39
Capacity of the means, thous. UAH / person	110.4	124.0	171.4
Funding security, UAH / ha	1579.8	1673.7	2090.5
Roi, %	23.2	23.6	21.4

Investment attractiveness of agrarian sector depends on strategy and level of management of separate subjects of market relations, willingness of the owners, the financial condition and economic results (table 2) – (Osaulenko, 2010; Plotnikova, 2013). In the structure of the gross product of the industry can be seeing negative dynamics of reduce of a level of profitability, reducing the volume of agricultural production and a part of households. At the same time relatively the same conditions of functioning of agrarian sector of the economy from the standpoint of the adoption and implementation of management decisions are set as secondary internal factors

shaping the investment attractiveness of participants of market processes, and in the first place were external. The main factors that affect the choice of the investor identifies the location of the investment object, the level of regulation of relations within national and international law, the presence of competitors (between investors and the alternative of investment objects), as well as the overall assessment of the economic situation in the country. Economic model of the innovation process is a simplified representation of the relationships that are taken into consideration during the understanding of economic phenomena.

Table 2. Production of agricultural products in Ukraine, 2010–2012

Products	2010	2011	2012
Production of Agriculture of Ukraine in permanent prices 2010, billion UAH	194.9	233.7	223.1
including plant production	124.6	162.4	149.1
incl.: cereals	41.6	60.5	60.3
industrial crops	33.0	41.5	41.5
potatoes, vegetables, water-melon	38.0	46.9	46.9
fruit, berry and grapes	6.9	7.8	7.9
cattle breeding production	70.3	71.3	74.0
incl.: cattle and poultry	31.2	31.6	33.1
Milk	28.5	28.2	29.0
Eggs	7.9	8.7	8.9
The share of households population in production agriculture, %	51.7	48.2	47.2
including plant production	46.4	43.3	43.1
incl.: cereals	24.2	22.1	25.0
industrial crops	12.7	12.2	11.2
potatoes, vegetables, water-melon	97.4	96.9	96.9
fruit, berry and grapes	88.1	84.3	84.0
cattle breeding production	61.2	59.4	57.4
incl.: cattle and poultry	44.9	43.3	42.0
Milk	80.3	79.7	78.4
Eggs	39.9	37.2	38.5

The research proved that the production process in agriculture of Ukraine can be presented in the form of the production function of Cobb-Douglas:

$$x = a_0 \cdot L^{\alpha_L} \cdot A^{\alpha_A} \cdot K^{\alpha_K} \cdot V^{\alpha_V}, \qquad (5)$$

where x – the total volume of production; L – labour costs; A – agricultural lands; K – capital costs; V – total variable costs; α_L, α_A, α_K, α_V – paramets, that define the changing of factors in the calculation of per unit of time.

Provided a high level of competition and the behaviour of producers, aimed at maximising profits, elasticity of production for certain groups of factors will be determined as follows:

$$p \cdot \frac{\partial x}{\partial z_i} = w_i \quad a \bar{o} o \quad \frac{\partial x}{\partial z_i} = \frac{w_i}{p} , \qquad (6)$$

where p – market price of product; wi – market price of factor.

In the case of the assumption of the effect of scale of production, the part of the cost of production factors in volume production reaches 1 (Plotnikova, 2013). On the analysis of the functioning of the national agriculture, we made the conclusion about the influence of the innovation process for its development (table 3).

Table 3. Determination of norms of influence of the innovation process on the development of agrarian sector of Ukraine, in average, 2006–2012

Desig-netion	Products	Relative change over the year, %	Elasticity of the production	Impact on production, %
x	Total volume of production	5.4400	1.0000	5.4400
L	Labour costs	– 0.9683	0.7081	– 0.6857
A	Agricultural lands	– 0.0568	0.0789	– 0.0045
K	Capital costs	1.2600	0.0957	0.1206
V	Total variable costs	30.9507	0.1172	3.6287
δ	NORM of innovational process			2.3810

Thus, were found the presence of the innovation component of the development of the agricultural sector, which contributes to the reduction of production losses, reducing redundant costs and prevent technical failure. However, in contrast to the industry, the growth of production in agriculture shows lower rates. Complications of socio-economic relations is accompanied by a disparitet of prices for agricultural and industrial products, which determines the need for finding an alternative concepts of sectoral exchange.

4. Conclusion

1. Thus, the research proved the necessity of use of innovational investment approach for the aim of rural development by the means of modern system management.

2. Innovational investment management in agricultural sector is caused by factors. Priority directions of the evaluation are systematization, classification and grouping of existing factors of innovational investment activity. In the management of economic processes very important is the modeling of investment activity, in particular, the relationship between the investor and the object of investment.

3. The development of the national agricultural sector showes the presence of innovative component in social production, but its lower rates as compared with other sectors of the economy, including industry, determines the need for further research in the direction of intersector balance.

4. Thus, the research of the theoretical and methodological approaches in

innovational investment management within rural territories was done, namely the theoretical base and methodology of modern system management proposed.

5. Proposals and Recommendations

The prospects for further research relates to development of the advanced mechanism of interaction of the investor and the object of investment activity on the level of territorial formations.

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INOVACINIŲ INVESTCIJŲ VYSTYMOSI KRPTYS KAIMO VIETOVĖSE

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Santrauka

Straipsnyje nagrinėjamos problemos, susijusios su atitinkamų gyvenimo standartų Ukrainos gyventojams užtikrinimu ir jų gyvenimo kokybės pagerinimu. Remiantis empirinių tyrimų rezultatais, nustatyti svarbiausi socialinės-ekonominės agrarinės politikos ypatumai. Straipsnyje taip pat apibūdinti gyvenimo standartai, įvertinta socialinių standartų įtaka gyvenimo standartams, pateikti siūlymai Ukrainos visuomenės gyvenimo kokybės ir standartų gerinimui ateityje, paremtoje inovacijomis ir ekologinės gamybos technologijomis.

Reikšminiai žodžiai: investicijos, inovacijos, kaimo vietovių vystymasis, valdymo sistema.
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