Project-Oriented Management of Digitization of Socio-Economic Development of Territorial Communities

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Abstract

The article gives the peculiarity of the definition of "digitalization" and forms the strategies of project-oriented management of territorial communities. The problems of planning projects for the development of territorial communities are considered, in particular resource and financial support for their development with the use of IT. The share of local budgets in the revenues of the consolidated budget is highlighted and the dynamics of revenues of the general fund of local budgets compared to the previous year is depicted. A conceptual model of managing the socio-economic development of territorial communities is proposed and the management cycle of the operation of these processes is described, which includes the following main stages: identifying the problem and its analysis, use of IT technologies, finding alternative solutions, making decisions and monitoring their implementation in accordance with the selected management algorithm. The article considers a mathematical model of linear multifactorial regression, which describes the relationship between receipts to the general fund and the number and employment of the population of territorial programs.

Keywords 1

Project-oriented management, IT, territorial communities, modeling, digitalization, correlation, regression, context diagram, resources

1. Introduction

At the level of territorial communities, sustainable development is adapted to its individual synergy, there are different scales of the influence of information technologies on the functioning of communities, therefore global and local analysis will allow us to see the real picture of digitization processes in the context of socio-economic development. The development of territorial communities and pooling of resources requires scientific approaches and the usage of IT technologies to develop mathematical models of their development. The state creates all the necessary conditions for the development of territories, and individual communities themselves must choose the necessary priorities and projects for themselves. Studying the socio-economic development of territories in the conditions of a digitalized world, we understand which directions need to be improved. Digitization and the basics of project-oriented management of business processes and IT in the system of competitive development of territorial communities in modern conditions are relevant.

2. Analysis of recent research and publications

Domestic and foreign scientists M. Porter, S. Bushuyev, N. Kostileva, A. Borisov, O. Zachko, A. Tryhuba, I. Chumachenko, I. Kononenko and others in their research on project-oriented management, in particular business processes and socio-economic development of territorial communities, highlighted the versatility and complexity of research. Serhiy Bushuyev's research highlights the development of project managers' creative potential, the development of interaction

multilayer model of emotional infection with the earn value method in the project management process and complementary strategic model for managing entropy of the organization [1, 7, 19]. I. Chumachenko monitored the distribution of flows in projects taking into account the human factor and the conceptual basis of sustainable management of the project team formation process with functional redundancy [12-13]. I. Kononenko studied the process of applying the method of choosing the maturity level of project portfolio management to the organization [11]. The technical aspects of taking into account shifts and rotational inertia in the tasks of diagnosing the spectrum of critical forces of mechanical systems and diagnosing the strength and stiffness of structural elements of load-bearing systems, which can be applied in territorial communities, are described in papers [21-22]. Regarding the safety-oriented vector of research, the works of A. Tryhuba and R. Ratushny considered the process of coordinating the project configurations of the products of the development of public fire extinguishing systems with the project environment, created a model of projects for the creation of fire extinguishing systems in the territories of communities, carried out planning of the territorial placement of fire and rescue formations in the projects development of administrative territories, as well as a conceptual model of project management for the development of a technologically integrated industry is presented [3-6]. The works of O. Zachko scientific school describe the digitization of HR management processes of project-oriented organizations in the field of security, the criteria for the intelligent formation of project teams in a security-oriented system, and the content management model of infrastructure project monotemplates under the influence of project changes [10, 15-16]. However, despite the wide range of research conducted, the application of the methodology of stimulating regions to increase their competitive attractiveness through the implementation of projects, programs and portfolios of projects remains insufficiently studied. Emphasis on digitization of socio-economic development projects has not been implemented enough, therefore the relevance of the research is timely.

3. The bulk of research

The current state of socio-economic development of the country forms a mechanism of influence on the development of digitalization in society through the creation of opportunities for free access to data, the implementation of control over compliance with information legislation, use of IT technologies and this should become a tool for reducing socio-economic risks of Ukraine in risky conditions. After all, digitalization is the creation of a new innovative product with new functionality and consumer properties. Digital technologies in the field of management processes ensure the creation of new products and services. In order for the digitization process to be full-fledged, it is necessary to clearly formulate management tasks related to social and economic development for databases.

In modern conditions of socio-economic development, Ukrainian regions are involved in all three forms of competition. Therefore, given the specifics of regional development and IT usage, the main task of the authorities is to implement socio-economic policy that allows to create and develop competitive advantages that shape spatial and network competitiveness by stimulating network interaction of regions as a necessary condition for creating business regions and IT development areas. Of particular importance is the formation of financial and IT factors of competitiveness [2].

The local self-government reform project has shown itself very brightly and provides a number of opportunities, in particular with IT usage, we are already observing a difference in worldviews and approaches to their work of authorized persons who are elected to the post of heads of territorial communities.

Each territorial community should have a strategy of comprehensive financial and IT development, and its basis should be precisely the economic component. Figure 1 presents a model of the project for the formation of a strategy for project-oriented management of territorial communities.
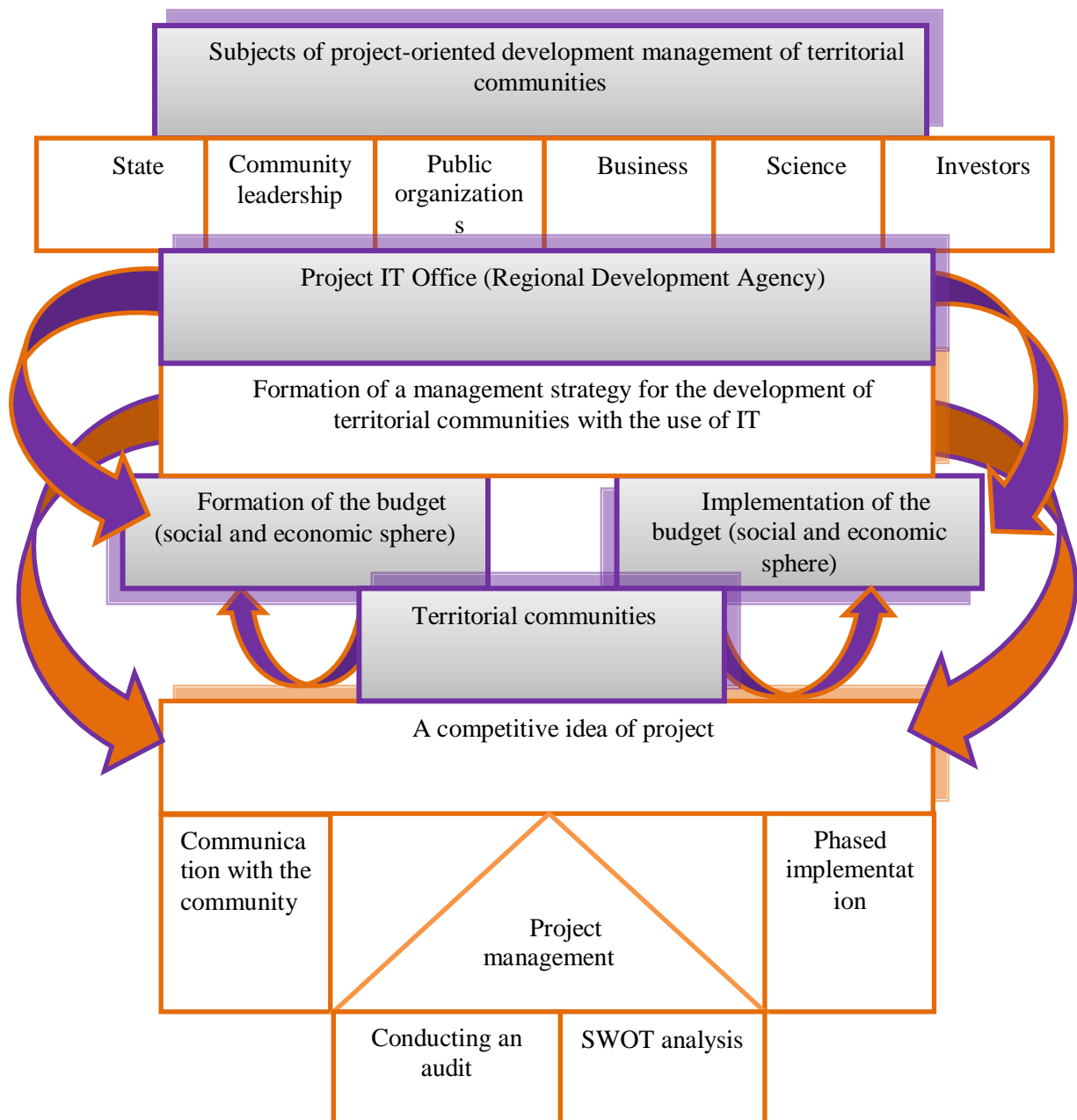
Subjects of project-oriented development management of territorial communities

| State | Community leadership | Public organization s | Business | Science | Investors |

Project IT Office (Regional Development Agency)

Formation of a management strategy for the development of territorial communities with the use of IT

| Formation of the budget (social and economic sphere) | | Implementation of the budget (social and economic sphere) |

Territorial communities

A competitive idea of project

Communica tion with the community		Phased implementat ion
Project management		
Conducting an audit	SWOT analysis	

Figure 1: Model of the project of forming a strategy of project-oriented management of territorial communities

For the implementation of socio-economic projects and organizational - technical support of territorial communities, it is important to create project IT offices at regional development agencies for the purpose of using project management methods and IT technologies.

Taking into account the requirements of investors regarding the type of project documentation using project management and researching the strategic development of territorial communities and increasing their financial capacity, it is necessary to implement IT projects that will fill the revenue part of budgets.

The IT project office also documents, advises and promotes the best practices of project management in the organization. The idea of introducing a project office to coordinate some process is not far-fetched. Thus, in the created National Council of Reforms [14], the project office is a coordination, analytical and communication support for those responsible for the development and implementation of reforms. The project office of the National Council of Reforms delegates project managers to the Reform Task Teams. A closer relationship between the stages of the life cycle of the

project and its product, for the long-term development of territories, is the use of project management methods and IT technologies, which will allow you to count on the funds of investors to finance socio-economic and IT projects.

When developing methical approaches for optimal assessment of the socio-economic status of a separate territory, it is necessary to follow the sequence of stages of project assessment, which is shown in Figure 2 and 3. The conceptual model of managing the socio-economic development of TC in the IDEF0 notation is presented. In fig. 2 is a simulated diagram of the project of management of socio-economic development of territorial communities with the use of IT, in fig. 3 – a diagram of the decomposition of the context diagram of the project of managing the socio-economic development of territorial communities that takes into account the influence of IT technologies.

Figure 2 presents the process of modeling the current state of managing the socio-economic development of territorial communities, which makes it possible to build a mathematical model and develop a procedure for making a management decision.
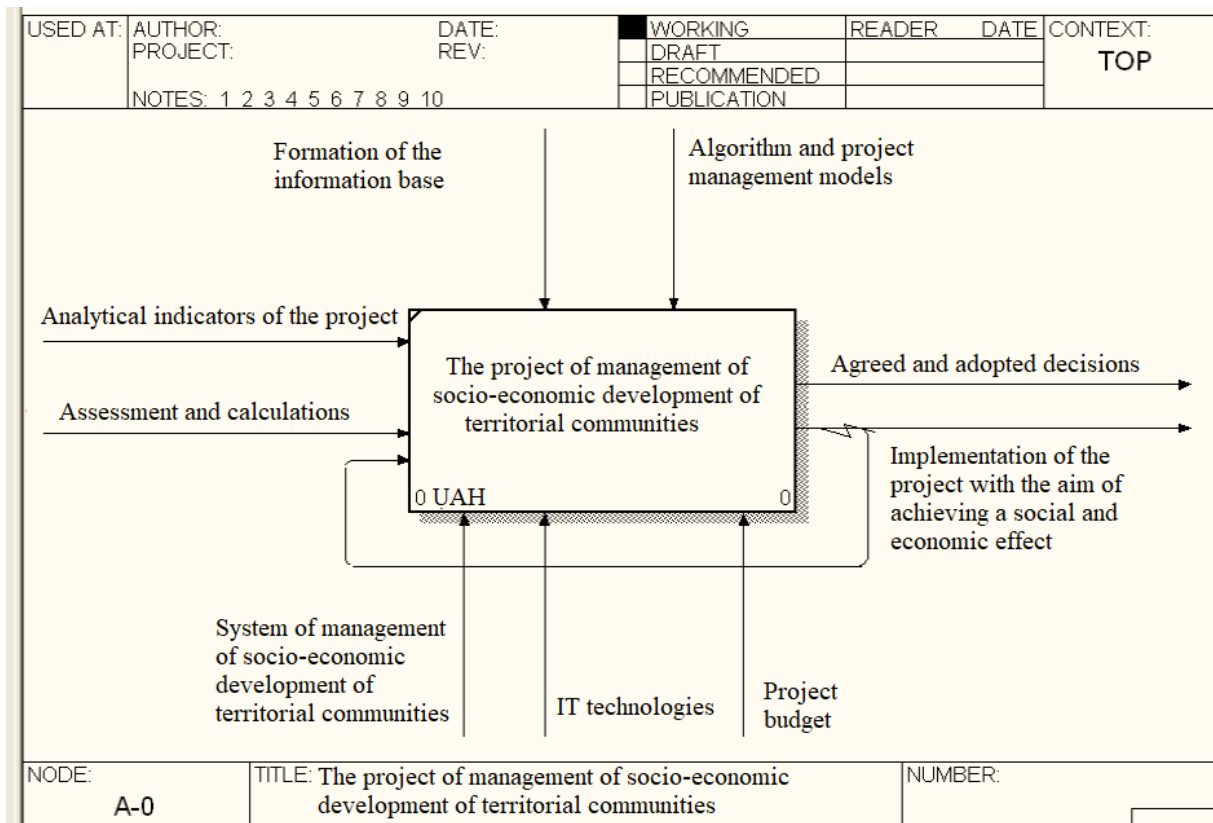

Figure 2: Context diagram of the project of management of socio-economic development of territorial communities

In Figure 3, the control object is modeled using typical algorithms and procedures by means of modeling using information data and IT.

Compliance with the sequence of these stages in the project is a prerequisite for the effective distribution and redistribution of financial resources for the correct management decision regarding the projects of individual territorial communities in order to ensure social and economic and IT development as a whole.

In the modern scientific literature, the development of local budgets is insufficiently studied, taking into account financial decentralization and changes in the role of local governments in ensuring the socio-economic development of the community.
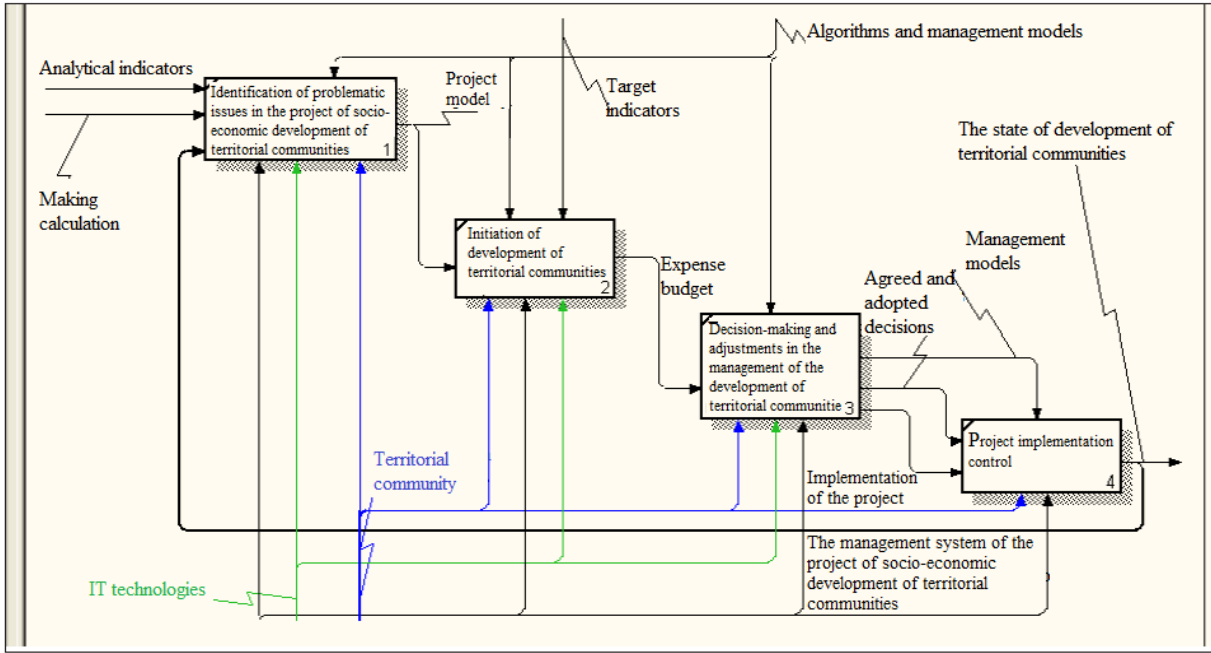
Figure 3: Diagram of the decomposition of the context diagram of the project of management of socio-economic development of territorial communities

Effective socio-economic development of regions is objectively limited by the level of its provision with financial resources, which are based on local budget revenues. The current challenges of decentralization and the transformation of the financial system at all levels necessitate the role of local budgets in pursuing the strategic goals of reform, in particular IT sphere. Financial decentralization is an important lever in establishing them as financially independent entities of the state economy [18].
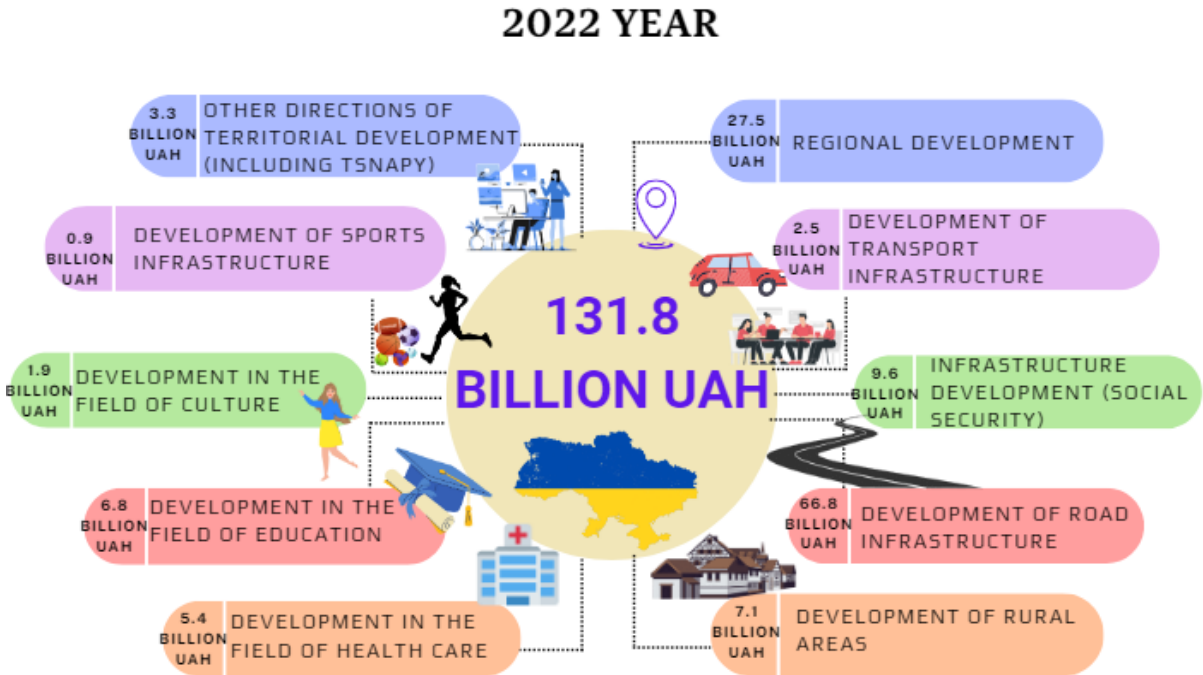

Figure 4. State financial support for community development projects.

The most difficult financial challenges of 2022 in the conditions of martial law, the local self-government faced with dignity, in addition, demonstrated proper support not only to the forces of the Armed Forces, but also to internally displaced persons who needed immediate shelter. Figure 4 shows state financial support for community development projects.

According to the figure, we trace the largest state support for regional development projects (27.5 billion UAH) and for road infrastructure development projects (66.8 billion UAH). Most of the communities have demonstrated their ability to effectively manage and increase the received financial resources with the use of IT, to adequately respond to unforeseen challenges and to ensure a high level of service provision in any conditions, as well as to quickly adapt to new conditions. Of course, there are communities that need an immediate response.

Figure 5 shows the share of local budgets in the revenues of the consolidated budget (without transfers).
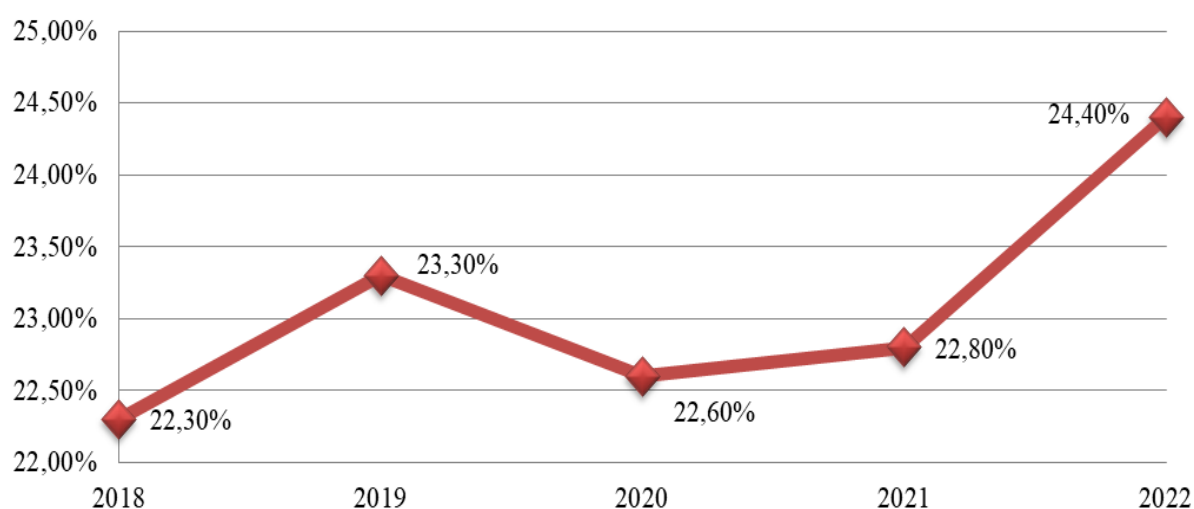

Figure 5. Share of local budgets in consolidated budget revenues (without transfers) (2018-2022)

The largest potential losses of the general fund were experienced by local budgets in April (-2.4 billion UAH (-8.5%), compared to April 2021). But already in May there was a positive increase in the amount of UAH 3.5 billion (or +11.9%) compared to the corresponding period last year. In July, the increase in revenues of the general fund of local budgets amounted to 4.9 billion hryvnias (+17.1%). In August, the increase amounted to UAH 2.6 billion (+7.7%). In September +7.2 billion UAH (+28.1%). In November + UAH 3.8 billion (+10.7%). In December, +8.7 billion was the largest absolute monthly increase (or +24.9%).

In the cross-section of the regions, the peculiarities of individual areas and the change in business activity in the regions are immediately visible. There is a noticeable decrease in income in the regions where hostilities are (were) taking place. On the other hand, in the regions where a large number of internally displaced persons are located and business activities have been resumed, a significant increase has been observed, compared to the corresponding period of the previous year.

Effectively implemented decentralization reform made it possible to provide support to relocated businesses and the opportunity for local self-government bodies to obtain adequate financial resources for development and operation with the use and implementation of IT. Local self-governments made projects from their own funds and formed various programs to support business entities. Communities have shown that local self-government budgets form the basis of the sustainability of local financial resources. Figure 6 shows the schedule of monthly revenues to local budgets.

Analyzing the monthly dynamics of the execution of local budgets for 12 months of 2022, a slight decline in growth rates can be observed in August and a significant increase in September (+28,1%). In general, overall growth during the year remained consistently high.

In August, the rate of growth slowed somewhat to 7,7% due to a relative decrease in the rate of receipts of local taxes and fees. September saw a nearly 30% increase, which is the largest monthly increase since the beginning of the year for the general fund. In December, the increase was 24,9%. The monthly dynamics shows a negative value (-8,50%) in April, however, we can observe an increase in the revenues of the general fund of local budgets already in May.
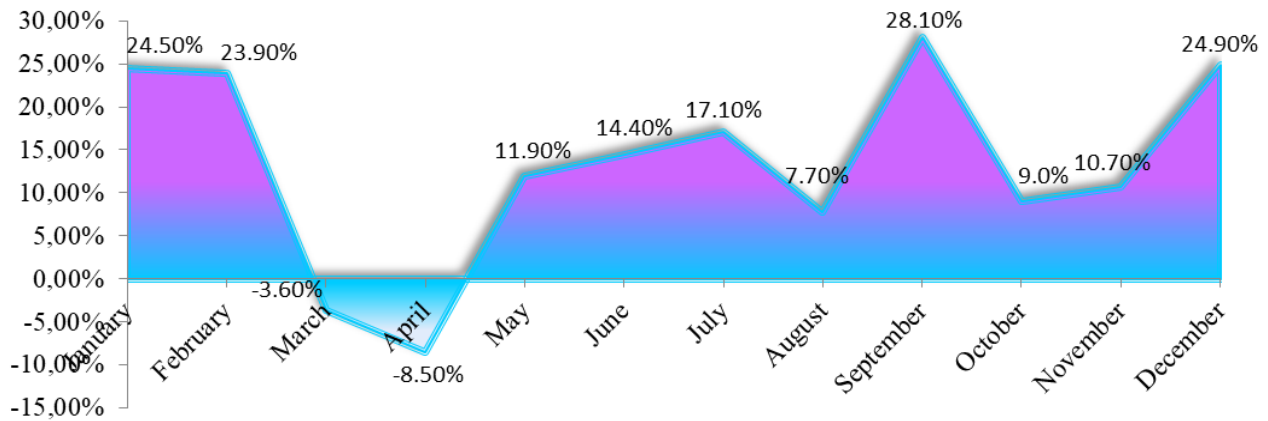

Figure 6. Dynamics of revenues of the general fund of local budgets (January 2022/January 2021.....
December 2022/December 2021)

Achieving these goals will create appropriate conditions for socio-economic development of the community as a whole as well as all of its components, while using the diversification mechanisms to address potential risks in rural areas [23].

If the territorial community is competitive, then an additional inflow of development resources (financial, labor, IT resources, etc.) is ensured and their efficiency increases. Therefore, the competitive advantages of territorial communities make it possible to attract more resources for development. The development of the innovative and IT sphere is also a competitive advantage, as it contributes to the growth of labor productivity and the achievement of social results, that is, competitive advantages are a general condition for the development of the region.

Favorable conditions for the development of territories should have a favorable macroeconomic environment, IT technologies, job creation, social stability, a tax and legal system that encourages business development and job creation. On the basis of economic and mathematical modeling, we will find out the dependence of revenues to the general fund on the number of the population and the number of employed people aged 15-70. The sampling was carried out in the regions of Ukraine as of January 1, 2022.

The construction of an economic-mathematical model necessarily takes into account the following key elements: the characteristics of changing external conditions, a certain set of internal parameters that are taken into account and which can, in accordance with the purpose of modeling, characterize one or another economic process, as well as parameters or characteristics of the process, which must be obtained. Calculations of correlation-regression analysis and modeling were carried out on the basis of initial data for calculations, the data are shown in Table 1. The information base of the current analysis was statistical data published on the web resources of the State Statistics Service of Ukraine.

Table 1
Indicators for correlation and regression analysis by regions of Ukraine, as of January 1, 2022

Region/Oblast	Total receipts to the general fund, (billion hryvnias) (Y)	Population (million people) (X1)	Employed population aged 15-70, thousand persons (X2)
AR Crimea	No data	No data	No data
Vinnytsia	9,8	1,5	634,9
Volyn	5,4	1,0	364,1

Dnipropetrovsk	29,1	3,2	1367,8
Donetsk	12,4	2,3	713,7
Zhytomyr	7,5	1,2	489,3
Zakarpattia	5,4	1,2	492,7
Zaporizhzhia	12,8	1,7	707,3
Ivano-Frankivsk	6,6	1,4	548,8
Kyiv	17,4	1,8	755,7
Kirovohrad	6,2	0,9	362
Luhansk	3,7	0,9	287,1
Lviv	17,6	2,5	1038,9
Mykolayiv	7,4	1,1	479,7
Odesa	18,2	2,4	991,2
Poltava	12,0	1,4	566,2
Rivne	6,0	1,1	465,8
Sumy	6,9	1,1	459,9
Ternopil	5,1	1,0	398,4
Kharkiv	21,9	2,8	1208,5
Kherson	5,6	1,0	434,5
Khmelnytsk	7,6	1,3	505
Cherkasy	7,9	1,2	504,5
Chernivtsi	3,7	0,9	376,5
Chernihiv	6,7	0,9	411,3

Calculations will be made using MS Excel software (table 2, table 3).

Table 2
Data analysis "Regression"

Regression statistics						
Multiple R				0,9711		
R-squared				0,9430		
Normalized R-squared				0,9376		
Standard error				1,606		
Observation				24		
Analysis of variance						
	df	SS	MS	F	Significance F	
Regression	2	897,52	448,76	173,97	8,51	
Remainder	21	54,16	2,57			
Together	23	951,69				
	Coefficients	Standard error	t-statistic	P-Value	Lower 95%	Upper 95%
Y-intersection	-3,44	0,84	-4,09	0,001	-5,19	-1,69
X_1	0,64	2,45	0,26	0,79	-4,45	5,75
X_2	0,02	0,01	3,61	0,001	0,009	0,03

The multiple coefficient of determination is greater than the coefficient of determination $R^2{}_{yx1x2} > R^2$ (0,971 > 0,943), and the adjusted coefficient of multiple determination (0,938) determines the closeness of the relationship, and therefore the expediency of including factors X1, X2 in the model is justified.

Observations cover 24 oblasts of Ukraine (data on the Autonomous Republic of Crimea are temporarily unavailable) taking into account revenues to the general fund and employment of the population and its size.

Let's build a correlation matrix and determine the degree of influence of factors on the resulting factor. For this, we will use the correlation matrix R_y (1).

$$R_y = \begin{pmatrix} 1 & r_{12} & \cdots & r_{1n} \\ r_{21} & 1 & \cdots & r_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ r_{n1} & r_{n2} & \cdots & 1 \end{pmatrix},$$

(1)

Let's use the "correlation" data analysis tool and get the following results (table 4).

Table 3
Correlation matrix R_y

	Population (million people) (X_1)	Employed population aged 15-70, thousand persons (X_2)	Total revenues to the general fund, (billion UAH) (Y)
Population (million people) (X1)	1		
Employed population aged 15-70, thousands of people (X2)	0,98	1	
Total receipts to the general fund, (billion UAH) (Y)	0,95	0,97	1

A visual presentation of the results showed the closest connection between the employed population aged 15-70 years (0,98) and the population size, and (0,97) total revenues to the general fund. If the value of the coefficient is not specified, it means that the relationship between this factor and the resulting variable is either very weak or absent at all, so the factor can be removed from the model. So we see that there is a very strong relationship between the resulting factor and because $|r| > 0,9$.

Mathematical model using regression coefficients:
$$Y = -3,44 + 0,64x_1 + 8,30x_2 \qquad (2)$$
From this model, we can make an economic conclusion that there is a directly proportional relationship between factors $X1$ and $X2$. Therefore, an increase in the indicator $X1$ (population) by one unit leads to an increase in Y by an average of 0,64; an increase in the indicator $X2$ (Employed population aged 15-70) by one unit affects an increase in Y by an average of 8,30.

To evaluate the adequacy of the model, we will use the Fisher criterion:

$$Fp = \frac{R^2}{1-R^2} * \frac{n-m-1}{m}$$

(3)

where m is the number of factors on which y depends; n is the number of observations.

$$Fp = \frac{0.943}{1-0.943} * \frac{24-2-1}{2} = 173.9$$

(4)

Calculation of the value of Fp:

Let's find the table value of F, having previously calculated the number of degrees of freedom, which are $k1 = m = 2$ i $k2 = n–m–1 = 24–2–1 = 21$. Then $Fkp = 8,51$. Since $Fp > Fkp$, it can be stated that the coefficient of determination is statistically significant and the regression equation is reliable.

Thus, the perspective in the development of territorial communities should be their economic growth, development of IT which ensures expanded reproduction of the territory. The economic effect of decentralization arises due to the formation of a positive investment climate of territorial communities, because each investment project fills local budgets.

Improving the management of innovation and rural development projects involves changes in planning, employment, product promotion, IT usage, communication between government and business, government and the public, and knowledge management. In this context, focus on working with active people to find common ideas for solving complex socio-economic problems, forming new perspectives, new paradigms and new ways of solving problems, ways to remove obstacles to creative thinking, finding examples. The analogy can help identify potential opportunities for rural development. [17].

4. Conclusions

Having conducted this research, we will assert that the process and success of digitalization of project-oriented management of territorial communities will depend on:

1) acquiring skills in working with digital technologies and modern software;

2) creation of an initiative group of experts in digital technologies and conducting trainings to improve the acquired experience in working with projects.

3) building a digitalization strategy based on the community's own resources.

A high-quality portfolio of IT projects ensures effectiveness and innovation in the development of territorial communities. The most relevant areas of local self-government development projects are: the process of implementing digitalization with the aim of improving the quality of administrative services and creating modern systems of community management.

The created economic-mathematical model confirms that effective management of socio-economic development enables territorial communities to work and develop effectively in modern conditions. Correlation-regression analysis made it possible to reveal the dependence and direct influence of the factors that determine the current opportunities for the development of territories, namely: income to the general fund depends on the size and employment of the population.

The prospects for the development of territorial communities in the process of project-oriented management consists in improving the socio-economic conditions of the territories based on the development of new projects in particular IT and attracting additional financial resources from all possible sources, accelerating the transfer and application of experience and technologies in the process of digitalization, strengthening local potential.

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