

Risks and Legal Opportunities of National Projects: Modeling Security



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Abstract: The goal is to explore the interaction between the vector of economic security development and the vector of threat to the economic security, as well as the possibility of quantifying the result for management purposes. The fundamental possibility of the business socioeconomic system at the mesolevel to counteract the factors of threat to economic security based on the model of interaction between the vectors of development and threat has been reviewed. The linear differential equations have been transformed. Analytical expressions that describe the parameters of the model of interaction between the vectors of development and threat have been obtained. Possible combinations of parameters have been studied. The main risks of the implementation of national projects include financial risks, quality of state and municipal government, external global risks, risks of trade wars, sanctions, and differentiation of regions.

The problems of public administration should include legal support, fraud, scale of corruption, speed of decision-making, terms of implementation, insufficient qualifications of civil servants, centralization of the budget process, and imperfection of control mechanisms. The problems of municipal management should include staff shortage, level of employees' qualification, outdated management system, outflow of qualified personnel/staff turnover, red tape, inconsistency of federal and regional laws, workflow, administrative barriers, and performance indicators for municipalities. Conclusion. Institutional support and measures aimed at solving problems in state and municipal administrations will allow to significantly mitigate risks in the implementation of national projects in the field of ensuring socioeconomic and national security. Risks are incomplete traceability of the movement of funds, overestimated indicators for regions that do not have the resources for this. Federal center subsidies hide the problem, but their size does not help the regions to be flexible enough, and this in turn affects efficiency.

The conclusion is drawn on the appropriateness of applying the proposed model for the interaction between the vectors of development and threat in the economy. The area of further research is determined.

Keywords: National Projects, Legal Risks, State and Municipal Government, Region, Economic Security, Vector, Threats, Development, Interaction, Model, Differential Equations.

I. INTRODUCTION

Each of the business entities, which can be a household, a business or a state, represents a socioeconomic system with an appropriate internal and external environment [1, 2]. The components of the internal and external environment are subject to cyclical changes and can bring either development factors that contribute to an increase in the level of economic security or factors of threat that reduce its level into the activities of business entities. The impact of threats depends on both the speed of their action and the speed of response of a business entity as countermeasures. Therefore, the interaction between threats and responses to them can be displayed as some economic mathematical model [3-5]. The feasibility of this approach is determined by the fact that in the context of the economy globalization and nonmarket methods of the threats competition, there are more threats and the reaction rate of business entities should be appropriate.

Problem setting. A model for predicting the economic condition of a business entity creates the prerequisites for considering the fundamental possibility of developing counteraction to factors (vectors) of threat in theory. It is required to investigate the behavior of the economic security vector in space and time when exposed to the components of the vector of security threats with different values of the characteristic coefficients. This is an important part of the implementation of national projects approved by the Decree of the President of the Russian Federation No. 204 dated 07.05.2018 "On national goals and strategic tasks of the development of the Russian Federation through to 2024" [6], along with consideration of risks and opportunities to overcome identified external and internal threats.

II. PROPOSED METHODOLOGY

A. General description

The study of methods for assessing the economic security of regions reveals that the information and analytical subsystem of the region should determine specific data on destabilizing factors to allow the organizational and management subsystem to manage threat reduction in all areas of the regional economy,

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develop and take measures to ensure economic security and real development. Destabilizing factors (criteria by sectors of the economy) have impact on the financial, manufacturing, investment, scientific, technical, power, foreign economic, social, demographic, and food sectors of the economy.

B. Algorithm

Basic concepts are introduced and differential models for the interaction of economic systems are built on the basis of the mathematical model of military operations. A linear differential model describing the process of interaction between the vectors of development and threat is represented by a system of two differential equations [7,8]:

$$\frac{dx(t)}{dt} = -(ax(t) + by(t)) + E(t). \quad (1)$$

$$\frac{dy(t)}{dt} = -(cy(t) + hx(t)) + G(t). \quad (2)$$

where: - $x(t)$ is the vector of development of the economic security (VDS);

- $y(t)$ is the vector of threat to the economic security (VTS);

- $-ax(t)$ is the speed at which the VDS component $x(t)$ suffers losses due to inappropriate control;

- $-by(t)$ is the speed at which the VDS component $x(t)$ suffers losses from exposure to $y(t)$ VTS;

- $E(t)$ is the speed at which losses are compensated by the VDS system;

- $-cy(t)$ is the speed at which the component $y(t)$ suffers losses due to inappropriate control

- $-hx(t)$ is the speed at which the VTS component $y(t)$ suffers losses from counteraction to the VDS component $x(t)$;

- $G(t)$ is the speed at which losses are compensated by the VTS system; and

- coefficients a, b, c, h describe the degree of losses of the VTS and VDS components and should be determined by statistical data, where the increase of a and b weakens the VDS, while the decrease of c and h strengthens the VTS.

The following conditions are introduced for the analytical presentation of model parameters:

- the rate of change of the VDS component and the VTS component cannot exceed the modules of these values;

- the values of coefficients a, b, c, h cannot be more than one;

- $E(t)$ and $G(t)$ are absent in the system of equations, i.e. are equal to zero; and

- the change in the VTS component in time occurs according to the linear law within the zone of economic security, in a certain area of the region's economy

$$y(t) = mt + n, \quad (3)$$

where m can be positive, negative or equal to zero, while n cannot be negative, because otherwise the factor of threats to the economic security turns into a factor of development of the system.

Under the assumptions made, differential equation (1) and condition (3) are sufficient to study the behavior of VDS under the impact of VTS. Substituting condition (3) in equation (1), taking into account $E(t) = 0$, the following is obtained:

$$\frac{dx(t)}{dt} = -ax(t) - bmt - bn \quad (4)$$

A differential equation (4) is transformed into an equation with separable variables. Separating the variables and integrating, and then returning to the previous variable, the following is obtained:

$$x(t) = -\frac{C_2}{a^2} e^{-at} + D - \frac{bmt}{a}, \quad (5)$$

where $C_2 = -a^2(x_0 - D)$, $D = \frac{bm}{a^2} - \frac{bn}{a}$, a, b, m, n

Solution (5) is studied for various constants with due consideration of the normalization condition according to the following algorithm:

1. At the maximum normalized values of parameters $a = 1$ and $b = 1$, which corresponds to the maximum impact of VTS on VDS and the maximum speed at which VDS suffers losses due to inappropriate control of the system development and other unfavorable factors that arise within the system.

2. At the maximum normalized value of parameter $a = 1$ and a small normalized value of $b = 0.1$;

3. At the small normalized value of parameter $a = 0.1$ and a maximum normalized value of $b = 1$;

4. At the small normalized values of parameters $a = 0.1$ and $b = 0.1$, which corresponds to small destructive impact of the VTS component on the VDS component and the low speed at which VDS suffers losses due to inappropriate control of the system development and other unfavorable factors that arise within the system.

For each condition 1 – 4, studies are carried out at different values of the coefficients: $a = 0.1(0.5, 1.0)$, $b = 0(0.1, 1.0)$, $m > 0$, $m = 0$, $m < 0$, $n = 0$ and $n > 0$ (Table 1).

The VTS parameters do not take negative values, since the threat vector turns into a development vector in this case.

For example:

- if the VDS component is a food safety of the system, and the VTS component is drought, then after the intersecting axis of the VTS decreasing function with the abscissa, its economic meaning becomes opposite (rains), which contributes to the VDS growth;
- if VTS is an inflation rate, then its decrease contributes to the VDS growth; and
- if VTS is a high level of public debt, then its reduction has a positive economic effect and contributes to the VDS growth.

Therefore, when analyzing the interaction between the

VDS and VTS components, their charts are considered only until the intersection of one component with the abscissa axis. A graphical interpretation of the interaction between VDS and VTS is provided in Figures 1 – 14. Each of the considered cases (1.1 – 5.2 of Table 1) of the interaction between VDS and VTS is explained as follows:

1.1. With a double increase in the dynamics of the VTS component growth, under the given initial conditions, the slope of the curve $x(t)$ increases, and the lifetime of the VDS component decreases from 1.27 to 1 conventional time units.

Table 1. Interaction between VDS and VTS with variable parameter values

	Description of VDS and VTS	Parameter values				Fig.
		a	b	m	n	
1.1	VTS grows, VDS declines	1	1	0.5 1.0	0	1
1.2	VTS declines	1	1	-0.5 -1.0	1	2
1.3	VTS is constant	1	1	0	0.1 1.0	3
2.1	VTS is minimal	1	0.1	0.5 1.0	0	4
2.2	VTS is minimal	1	0.1	+0.5 -1.0	1	5
2.3	VTS is minimal	1	0.1	0	0.1 1.0	6
3.1	VTS is maximal	0.1	1	0.5 1.0	0	7
3.2	VDS: intrasystem disorganization is negligible	0.1	1	-0.5 -1.0	1	8
3.3	VDS vanishes	0.1	1	0	0.1 1.0	9
4.1	VDS: intrasystem disorganization is negligible; VTS is minimal	0.1	0.1	0.5 1.0	0	10
4.2	VTS reduces the impact	0.1	0.1	-0.5 -1.0	1	11
4.3	VTS grows, VDS vanishes	0.1	0.1	0	0.1 1.0	12
5.1	VTS is absent	0.5 1.0	0	-	-	13
5.2	VDS: disorganization is maximal; VTS is maximal	0.01	1	1.0 -1.0	0	14

1.2. With a VTS growth from $m = -1$ to $m = -0.5$, the VDS lifetime decreases. At $m = -1$, VDS does not reach the abscissa axis and begins to increase once VTS vanishes.

1.3. An increase in the VTS absolute value from $n = 0.1$ to $n = 1$ leads to the VDS decrease. The conditional VDS lifetime is reduced from 2.4 to 0.7.

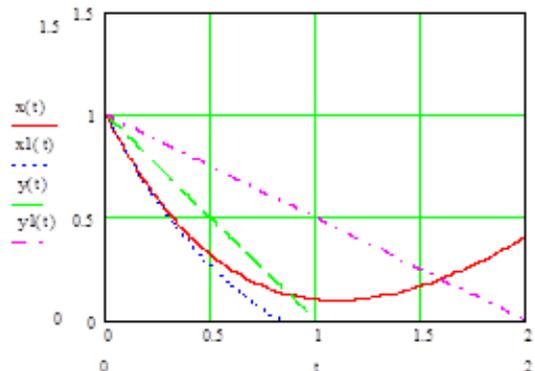


Fig. 1: $a = 1, b = 1, m = -0.5$ and $n = -1$

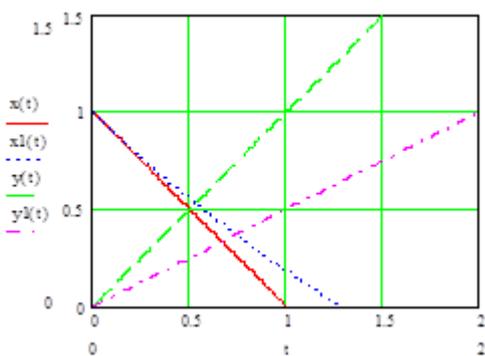


Fig. 2: = 1, = 1, = 0.5 and = 1

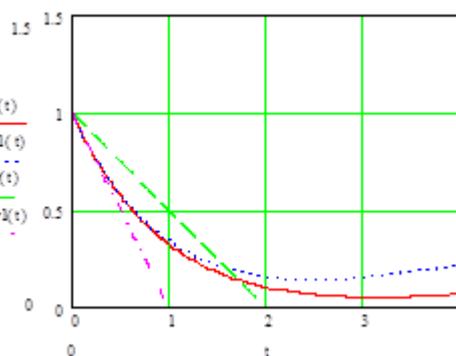


Fig. 5: = 1, = 0.1, = -0.5, = -1, = 1

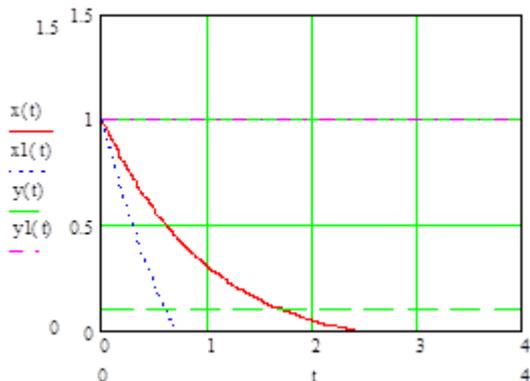


Fig. 3: = 1, = 1, = 0, = 0.1, = 1

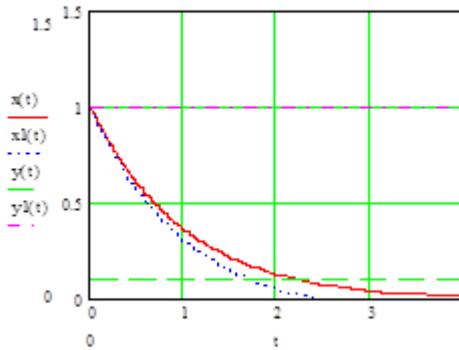


Fig. 6: = 1, = 0.1, = 0, = 0.1, = 1

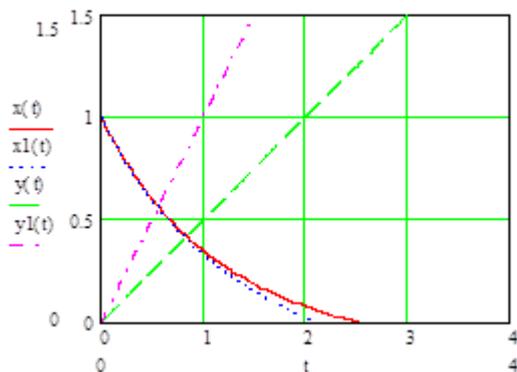


Fig. 4: = 1, = 0.1, = 0.5, = 1, = 0.

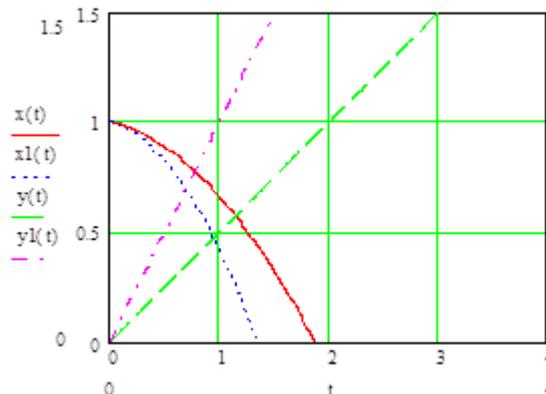


Fig. 7: = 0.1, = 1, = 0.5, = 1, = 0

2.1. With a low efficiency of the VTS impact on VDS, a double VTS growth intensity leads to a decrease in the VDS lifetime from 2.5 to 2.1, i.e. only by 20%.

2.2. With a low efficiency of the VTS impact on VDS, a double VTS decline intensity (from $m = -0.5$ to $m = -1$), the VTS component cannot completely destroy VDS.

2.3. With a low efficiency of the VTS impact on VDS, a ten-fold increase in the VDS value (from $n = 0.1$ to $n = 1$) leads to a decrease in the VDS lifetime from 4 to 2.5, i.e. VTS manages to completely destroy VDS, but in a relatively long time, which allows for the VDS system management to take extra time to optimize their decisions.

3.1. With a high efficiency of the VTS impact on VDS, an increase in the VDS value (from $n = 0.1$ to $n = 1$) leads to a decrease in the VDS lifetime from 1.9 to 1.4 conventional units, and the sign of the second derivative $x(t)$ in time changes from positive to negative, increasing the steepness and speed of the VDS decrease rate.

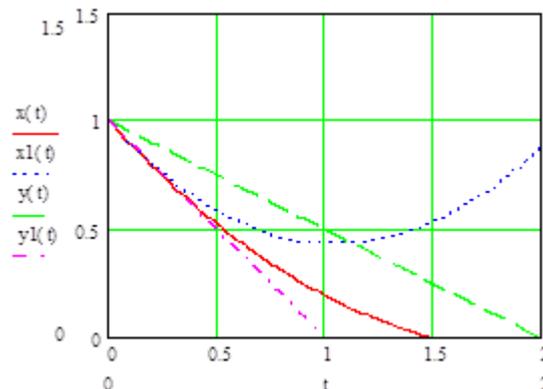


Fig. 8: = 0.1, = 1, = -0.5, = -1, = 1

3.2. A double VTS decrease (from $m = -0.5$ to $m = -1$) leads to the fact that VDS does not disappear completely by the time VTS completely disappears, but it reaches its minimum of 0.45, and if it exceeds the critical level at which the system (VDS) is not able to restore its functions, then it can be restored effectively.

3.3. VDS disappears in both cases under the VTS impact. The only difference is that in the first case, the VDS lifetime is seven arbitrary units, which gives enough time for the management to make a decision on withdrawing the system from a critical state, while in the second case it is only one unit, in fact.

4.1. A double VTS growth (from $m = 0.5$ to $m = 1$) leads to a reduction in the VDS lifetime from 5.1 to 4, while the second VDS derivative becomes negative, exacerbating the situation.

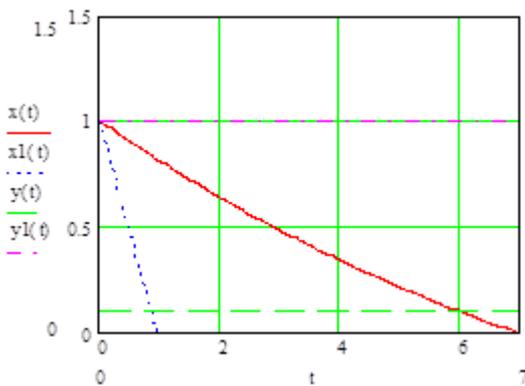


Fig. 9: $\alpha = 0.1, \beta = 1, \gamma = 0, \delta = 0.1, \epsilon = 1$

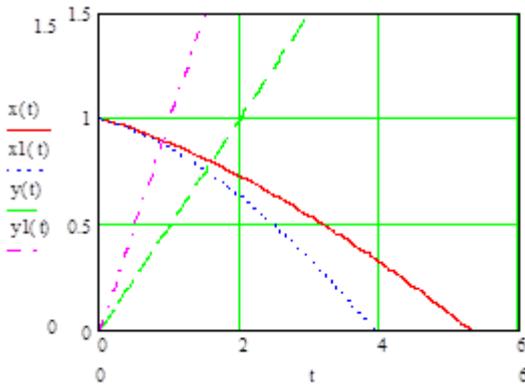


Fig. 10: $\alpha = 0.1, \beta = 0.1, \gamma = 0.5, \delta = 1, \epsilon = 0$

4.2. VDS does not disappear completely by the time VTS completely disappears, but it reaches its minimum of 0.8 from the initial normalized value $x_0 = 1$ and then can be effectively restored.

4.3. A ten-fold increase in the VTS impact (from 0.1 to 1) leads to the complete disappearance of the VDS component. However, this occurs in time equal to 23 conventional units with a weak VTS impact and to seven conventional units in case of strong impact. This means that a nonlinear dependence is observed – a ten-fold increase in the VTS intensity reduces the VDS lifetime by a little more than three times.

Consideration of four practically feasible cases of interaction between VDS and VTS with variations of all

economically important parameters allows to proceed to the study of the VDS and VTS behavior in the absence of some of the factors on the right part of equation (1).

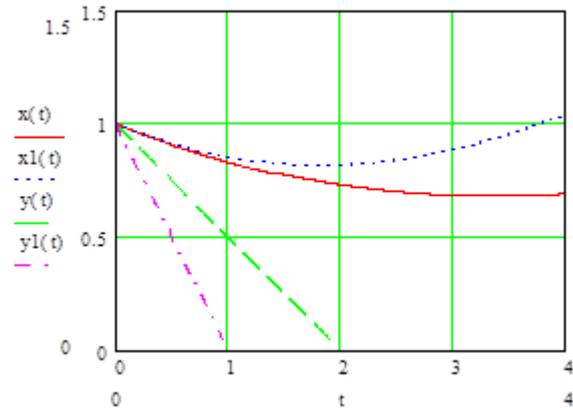


Fig. 11: $\alpha = 0.1, \beta = 0.1, \gamma = -0.5, \delta = -1, \epsilon = 1$

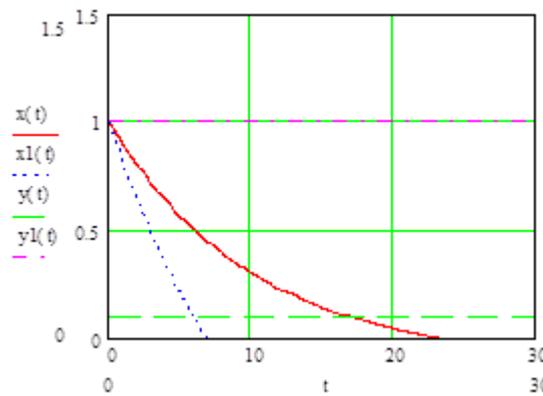


Fig. 12: $\alpha = 0.1, \beta = 0.1, \gamma = 0, \delta = 0.1, \epsilon = 1$

5.1. There are no losses from the VTS impact, but there are $x(t)$ (VDS) losses due to inappropriate control of the VDS system development and other unfavorable factors within the system that are not related to VTS. The larger is the α coefficient, the steeper the $x(t)$ (VDS) curve falls to the abscissa axis and the shorter is its lifetime, and hence the time for making decisions. For $\alpha = 0.5$, the VDS lifetime is eight conventional units, while for $\alpha = 1$ it is only four.

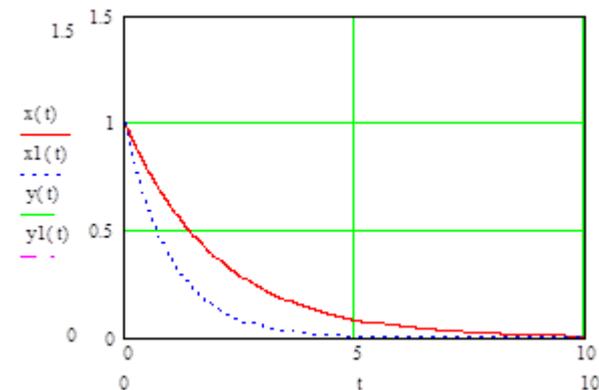


Fig. 13: $\alpha = 0.5, \beta = 1, \gamma = 0$

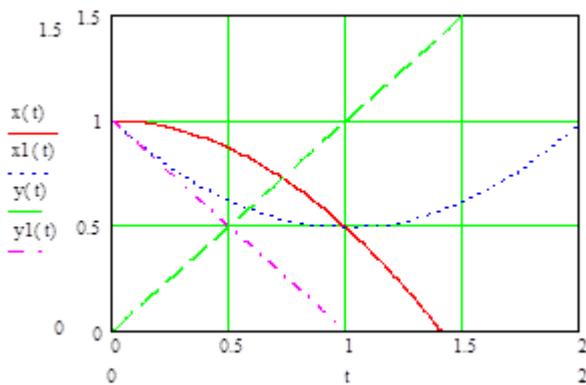


Fig. 14: = 0.01, = 1, = 1 and - 1, = 0 and 1

5.2. The model assumes the mandatory existence of minimal disorganization in the VDS system due to reasons associated with inappropriate management and other unfavorable factors not related to VTS that arise within the system. With a VTS increase, VDS decreases rapidly in a way that its second derivative is negative, and the lifetime is limited to 1.4 conventional units. As VTS decreases, VDS decreases less intensively, in a way that its second derivative is positive and the VDS lifetime is unlimited.

III. RESULTS ANALYSIS

Program solutions in the management of the regional economy.

The economic security of the socioeconomic system is a condition for the sustainable development of a business entity and depends on multiple factors defined by the state of the internal and external environment of the system. Since the permissible limits for factors deviation can be determined, an approach was proposed to build a mathematical model that allowed to evaluate the value of the integrating vector of economic security in a multidimensional space of vectors of development and threat [9]. Based on the proposed approach, a model of forecasting the economy state was developed that took the impact of external and internal forces into account and allowed to correctly set the acceptable intervals for changing the values of variable factors [10].

Since minimal disorganization always exists in the VDS system, the regional governance should pay attention to the fact that the presence of the second derivative in the model indicates the magnitude of the acceleration at which VTS changes, due to which the speed of adoption of managerial decisions, not to mention their quality, becomes a major factor. This provision emphasizes the importance of proactive decisions based on the forecast of threats.

As such, the mathematical analysis of the system of linear differential equations obtained when considering the interaction between VDS and VTS vectors for various values of their components indicates that the nature and dynamics of changes in VDS under the impact of VTS correspond to the trends observed in real economic systems and, therefore, may find application in managing the regional economy with appropriate program solutions.

Institutional support in the implementation of national projects in the field of ensuring socioeconomic and national security.

At the same time, the institutional support of the economic

security system in the regions comes to the fore when implementing national projects in the field of ensuring socioeconomic and national security.

The modern approaches to regional management in solving the problems of the budget revenues of the municipality by the example of the Republic of Crimea include the creation of socioeconomic conditions and the solution of the following relevant issues for the socioeconomic growth of the municipality:

- Legalization of wages;
- Amendments to laws and regulations (at the regional and federal levels) to grant the right to hold government authorities accountable;
- Lack of an unoccupied land registry, namely the absence of the clause "On the timing of the provision of land plots for the preferential category of citizens" in the Law of the Republic of Crimea No. 66-ZRK/2015 dated 15.01.2015 "On the provision of land plots owned by the state or municipality, and some issues of land relations" (adopted by the State Council of the Republic of Crimea on 24.12.2014) [11];
- Principle of the budget system according to FZ-44 [12], when "low cost" brings "big result";
- Inconsistency of 1 sq.m., established by the Order of the Ministry of Construction of Russia [13], with the market value of 1 sq.m. – once they are levelled, problems within the federal target program development will be eliminated [14];
- According to the Law of the Republic of Crimea "On administrative offenses in the Republic of Crimea" No. 217-ZRK/2016 dated 18.02.2016 [15] regarding trade, fines are not charged in the place of the responsible commission operation;
- Lack of parking spaces at the attractions;
- Updating the socioeconomic development strategy of the region;
- Risks of digitalization in view of the problems of the old-age generation;
- Legalization of accommodation facilities;
- Land inventory. Purchase of software products;
- Re-registration of real estate;
- Receiving income from objects that are not re-registered in the cadastral register;
- Lack of a self-taxation system for citizens. The State Program Fund "One ruble of the Republic of Crimea will bring five rubles" should be adopted. Respectively, Investment projects of the region – Strategy for the socioeconomic development of the region – Master plan of the region should also be developed;
- Revision of the percentage of taxes under the simplified system to local budgets from the Republic of Crimea;
- Problem of accelerating rental contracts on property of individuals;
- Introduction of agricultural land into circulation;
- Lack of regional conditions for special investment contracts;
- Mandatory registration of lease for use contracts; and
- Management quality.

At the same time, the personnel component is the main key in the project implementation. There is a lack of approaches to projects with due consideration for volume of funds and the scale of development.

By the example of the Republic of Crimea, at most stages of strategic planning, not all aspects were found in activities and tasks in the approved strategies for the socioeconomic development of municipalities of the Republic of Crimea. A master plan was adopted without the initial approval of a strategy for the socioeconomic development of this territory in some municipalities. There is lack of professional competencies: the ability to analyze, find gaps, possibilities of adjustment in the preparation of municipal/regional programs to address the goals of socioeconomic development of the municipality/region within the allocated funds, existing restrictions, and the specifics of the Republic of Crimea.

The following problems of public administration can be noted in the Republic of Crimea: regulatory support, in particular FZ-44 [12], fraud, scale of corruption, speed of decision-making, timeliness for implementation, insufficient qualifications of civil servants, centralization of the budget process, and imperfect control mechanisms.

The problems of municipal governance include: staff shortage, level of staff qualification, outdated management system, outflow of qualified personnel/staff turnover, bureaucracy, inconsistency of federal and regional laws, workflow, administrative barriers, and performance indicators for municipalities.

External, global risks that are not sufficiently taken into account in the implementation of the national project are also worth considering: protracted recessions after the crisis; social risks, where the stratification of society is one of the big risks; risks of trade wars, sanctions; differentiation of regions, which is already taken into account in national projects – namely, life expectancy, living standards, healthcare, and readiness of regions. The GDP per capita differs 93 times between the richest and poorest regions of the Russian Federation. The level of investment differs 203 times. The volume of production of goods differs 75 times. There are different needs of the regions. It is nonlinear due to different financial opportunities of the regions [16].

At the same time, the authors consider financial risk as one of the greatest.

The system of financial security indicators should reflect the critical points of the financial system and financial relations of the Russian Federation and should consist of security indicators of the fiscal, credit, banking, and monetary systems [17,18,19,20].

The following threats are typical of the fiscal system: a large amount of external public debt, an excess of domestic public debt over tax revenues of more than 1.5 times, and an insufficient share of investments in the GDP structure.

The security of the credit and banking system suffers from a reduction in the amount of profit received by banks, which is a threat to financial security in such circumstances.

The lack of monetization caused by a shortage of money supply is the most significant threat for the monetary system. This problem was artificially created by the Central Bank of the Russian Federation as a result of an inappropriate policy aimed at combating inflation.

According to the majority of experts in the field of finance of regional budgets, the primary problem is a poor budget planning. The key recommendations are following: combating red tape; finding skilled workforce; participation

in federal and regional programs; stimulation of expansion of tax bases; government reform; and actual implementation of result-oriented budgeting in the regions. It is also required to introduce uniform living standards and encourage a phased implementation of a policy of aligning standards with consideration of the geographical location. Most of the money should be left in the region. Preventive measures of raider seizures should be taken by entrepreneurs. The tax base is growing very slowly if there is a big debt. This necessitates a set of measures that would encourage economic activity for the tax base (increase investment activity, create more businesses and industrial enterprises). The way to increase the tax burden will be a dead end in this case [16,17].

The high-quality implementation of national projects is hindered by a complex hierarchy of management levels. It is an obsolete shell and is not always effective, namely [21]:

- incomplete traceability of the movement of funds, overestimated indicators for regions that do not have the resources for this.
- subsidies from the federal center hide the problem, but their size does not help the regions to be flexible enough, and this affects efficiency.
- at each management level, targets are defined, while national projects go through federal projects.

IV. CONCLUSION

1. The proposed mathematical model, represented by the differential equation of the VDS state (1) and the condition of the VTS impact (3), allows to obtain a qualitative and quantitative assessment of the results of interaction between the VDB and VTS components and to predict the nature of changes in both components over time, which contributes to the adoption of optimal decisions in modeling various situations in the tasks of ensuring economic security at the mesolevel.

2. The proposed model has wide capabilities and can be modified for the case when $E(t)$ (the compensation rate for losses of the VDS system) is represented as a linear function, and compensation can be provided both from the external environment of the system and from the system itself by activating the internal reserves of the region and optimizing the decisions made. A fairly correct analytical solution can be obtained for this case.

3. The following changes in the budget policy of the Russian Federation have occurred in 2019: transfers were reduced in case of the region's violation previously, and now the sanctions were canceled, and the heads of the regions were personally responsible. The following main problems remained: distrust in local authorities, lack of main professional competencies for the implementation of national projects (ability to analyze, find gaps, be able to adjust the municipal/regional programs to address the goals of the socioeconomic development of the municipality/region within the allocated funds and available restrictions), and the specifics of the Republic of Crimea in the implementation of national projects.

This problem can be solved by creating the Competence Center on the basis of the leader among higher educational institutions of the republic – the Crimean Federal University named after V.I. Vernadsky.

4. The use of the revolving financing method and consolidating its legal possibilities for use, when all tax increments due to the federal tax budget from the implementation of the Federal target programs (FTPs) became the contribution of the Russian Federation to the implementation of subsequent FTP projects, according to experts, and now within the implementation of national projects.

The *scientific novelty* of the work lies in the study of interaction between the vectors of development (VDS) and threat (VTS) to the economic security and the conclusion about the possibility of a quantitative assessment of the result for managerial purposes.

The *practical utility* of the study is to consider the interaction between the vectors of development and threat to the economic security and to identify the possibility of predicting the nature of changes in both the VDS and VTS components.

It is advisable to direct further studies to the development of methods and analytical relationships for calculating the current values of the characteristic parameters of the model of interaction between VDS and VTS in order to implement the simulation results in the management system to ensure economic security at the mesolevel.

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