Management of the Process of Securing Customs Interests on the Basis of Identification of Target Indicators

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Abstract. The article develops and proposes a methodical concept of algorithmization of checking the range of trends and relationships that affect the process of ensuring customs interests. Mathematical dependences within the framework of the conducted simulation modeling are formed, which give the chance to optimize the process of making managerial decisions in the plane of calculation of analytical-factual parameters of substantiation of modern and forecasted trends. It is proposed to consider customs security and customs interests from the standpoint of achieving the appropriate state of the system of economic relations between economic entities. In order to take into account different groups of factors, their chronological change, as well as the impossibility of establishing individual initial parameters, to assess the simulation data, target indicators were identified. It is proved that the selected indicators are the object of management within the framework of using the regulatory potential of the state. Within the framework of checking the quality of indicator management, the two-stage modeling approach (express, complex) was used, the regression of each of them was determined, hypothetical assumptions were formulated and economic-mathematical interdependencies were obtained.

1. Introduction.

Effective functioning of state customs institutions determined by the level of execution of the tasks and implementation of certain goals is an important component of socio-economic development of the country. One of the key roles thereupon is assigned to the management which is able both to optimize the processes of ensuring the customs interests of the country and to improve the institutional structure of customs authorities.

Analysis of the state of customs proceedings, customs tariff and non-tariff regulation, as well as other components of the regulatory potential of the country shows that further ensuring of high-quality and effective customs security and customs interests of the country is impossible without improving customs management processes.

In the appropriate format, reassessment and search for new approaches to the management of the customs system functioning from the standpoint of ensuring customs interests constitute an alternative vision of strengthening the entire organizational-structural and process-functional mechanism of the state institutional hierarchy.
2. Analysis of recent research and publications.

Problematic aspects of management of customs policy, customs activity, customs affairs, customs security in Ukraine have constituted the focus of work of a number of researchers, among them I. Berezhniuk [1], T. Kalinesku [2], S. Kivalov [3], N. Lypovska [4], V. Naumenko [5], P. Pashko [6], D. Pryimachenko [7], A. Stelmashchuk [8], V. Chentsov [9] and others.

However, despite the large number of research and educational papers, the issue of building a management system to ensure customs interests is not sufficiently clarified in the literature.

3. Presentation of the main material.

One of the aspects of the static nature of public administration in general and customs activity in particular is its inert, authoritative nature which is manifested in the exercise of regulatory powers on behalf of the state through the mechanisms of subordination of the aggregate will of the controlled entity to the management entity, mostly based on coercion rather than taking into account the interests of the other party, with a long running decision making process.

In our opinion, management should be considered through the prism of human relationships which have arisen as a need for collaborative activities and evolved under the influence of various factors in search of a balance of optimal relationship between the subject and the object of management in order to achieve the desired result. In this regard, nowadays an important part of decision making in the management of the regulatory capacity of ensuring customs interests, which would allow for better satisfaction of the parties, is simulation modeling of optimization of the choice of the best possible option to achieve the desired goals.

According to the process-oriented approach, the starting point of the relevant procedure is defining and specifying a set of factors in the plane of the mathematical method of describing changes in their states over time. The processes of ensuring customs security and protection of customs interests should be modeled, analyzed and improved using a single methodology to optimize management decisions from the standpoint of strengthening of the state regulatory capacity.

In our previous works [10, 11] we emphasized that, unlike existing approaches, customs security should be considered from the standpoint of achieving the appropriate state of the system of economic relations between economic entities (state, entities engaged in foreign economic activities, citizens, international institutions), as part of the national economy and in other life spheres, which allows to ensure full implementation and protection of customs interests from the influence of endogenous and exogenous factors in the field of elimination and overcoming of contradictions, as well as achieving their balance. In other words, it is necessary to find and build a model of activity that would satisfy all the participants without disturbing the balance of the economic system of the country.

Considering customs interests in a three-dimensional format from the standpoint of the state, the international community and the entities engaged in foreign economic activities, we made a hypothetical assumption within the normative-functional approach that ensuring customs interests of the outlined entities may be reflected by a range of indicators with GDP, position at the Doing Business ranking and the amount of customs revenues being key ones.

The rationale of this choice lies in the plane of variance of quantitative and qualitative indicators reflecting different scopes and ranges of customs interests, as well as the possibility of combining these to determine the predominant constant. To consider different groups of factors, their change with time, as well as the impossibility of establishing certain initial parameters, the above target indicators were identified to evaluate the modeling data.

The country’s GDP should remain a key indicator. This indicator reflects the leading concept of the country’s movement, symbolizes coherent symbiosis of indicators of major economic trends and is a summary of the final results achieved by economic entities that produce goods and services.

The international ranging of customs interests can be analyzed through the widely accepted Doing Business rating which characterizes the country by the key development indices. The country's place in the relevant rating is a clear and representative method of reflecting the level of international trade, administrative pressure from the standpoint of paying taxes and fees, the state of investment
attractiveness, etc., which largely demonstrates the effectiveness of customs policy in the field of customs security.

We will try to analyze the last selected indicator of assessment of the customs interests of economic entities in terms of the amount of the “customs revenues”. This indicator will help to determine the level of balance of the fiscal-control and regulatory-protective function of the state in carrying out the operational activities of the entities engaged in foreign economic activities. However, to ensure objectivity, clarity and representativeness of the final results, we developed a model based on a number of indicators that correlate with the selected constants and are formalized in the form of target indicators in Fig. 1.

![Diagram of Customs Interests](image)

**Figure 1.** Formalization of customs interests of the state into target indicators

Source: developed by the author
This context of the issue necessitated the development of an algorithm of activity which includes two stages of calculation. The first one is based on the use of a model that will help to check the general state of affairs in the dynamics and identify the main trends in understanding the general concept of development in the country (express model, I stage). The second stage will allow for a broader analysis of the range of trends and relationships that affect the process of ensuring customs interests (conceptual model, II stage).

It should be noted that the express model shows the trends in the development of the state requiring further interpretation and response in the form of extended mathematical modeling at the II stage. In particular, the express model is used to check the general state of ensuring the customs interests of a particular group of subjects of customs relations. In our study, during the build-up of both models, we use identical basic indicators which are the economic and fundamental basis for ensuring customs interests. These are the country’s GDP, the country’s position at the Doing Business ranking and digital indicator of the number of customs revenues to the budget.

The described approach is able to support decision making on the use of regulatory capacity in the form of reinforcement of the use of its components, as well as the development of methodological support for management decisions based on open information sources in an integrated system environment from the standpoint of customs relations.

The methodical concept of the build-up of the second level can be outlined in the form of four successive stages.

1. The first stage involves analysis and decomposition of the basic goals and factors which lie beneath the concept of modeling of the process of ensuring customs interests. This enables formalization of the key indicators of the regulatory potential of ensuring customs interests with the indication of hypothetical relationships between them.

2. At the second stage, the most important and influential factors in the context of the mathematical relationship with the established correlation values are selected to form as a representative basis reflecting the form of ensuring customs interests. This stage allows to achieve a final set of variables for the implementation of a multivariate correlation and regression model and to outline the problem of causal relationships between the selected variables.

3. The third stage involves build-up of mathematical regression with the reflection of the main relevant statistical criteria and coefficients of the obtained model, as well as obtaining information about the set of mutually exclusive states of each factor (variable value), their interpretation and association between them.

4. The fourth stage suggests interpretation and connotation of key trends with visualization and assessment of the probabilities of factors being in certain states. A conclusive description is provided for the dependence between the model variables in the process of economic-mathematical simulation with expert assessment of the dependences between different states of interdependent parameters and predictive reflection of changes of values of the observed factors in time.

The use of the two-stage modeling approach (express, complex) allowed to obtain further economic and mathematical interdependencies (Table 1).

The following conclusions were obtained during the modeling:

1. Indicators that have an inversely proportional impact on the state of receipt of customs payments to the budget have been determined; these are the time spent on customs and tax payments and the general rate of taxes and corruption perceptions index of Ukraine. This makes sense, as the outlined indicators constitute an additional administrative burden for the entities engaged in foreign economic activities. In particular, decrease in the country's corruption perceptions index and reduction of the overall tax rate and deductions by 1% allow to increase customs revenues by UAH 2.38 and 2.55 billion, respectively. Increase in these criteria will have the opposite effect on the amount of budget replenishment. Among the indicators that directly correlate with the receipt of customs payments to the treasury accounts and directly affect the growth of government revenues is the official exchange rate of the national currency to the US dollar, the number of entities engaged in foreign economic activities, and import of goods and services into the country.
Table 1. Results of modeling of target indicators to ensure customs interests

| EXPRESS MODELING | COMPLEX MODELING |
|------------------|------------------|
| **Function**     | **Mathematical description of the regression function** | **Mathematical description of multifactor modeling** |
| **GDP at actual prices** | | |
| Exponential      | $y = 9E-106e0.1238x$ | $Y=4188.4+17.8{x_1}–66.9{x_2}–4.2{x_3}+3.5{x_4}–92.3{x_5}–223.9{x_6}–0.24{x_7}$, Where $Y =$ GDP at actual prices (bln UAH), $x_1 =$ receipt of customs payments (bln UAH); $x_2 =$ number of entities involved in foreign economic activities (thous.); $x_3 =$ the state budget of Ukraine (bln UAH); $x_4 =$ capital investment (bln UAH); $x_5 =$ the share of enterprises implementing innovations (%); $x_6 =$ the share of sold innovative products in the volume of industrial products (%); $x_7 =$ state debt of Ukraine (bln UAH) |
| Linear           | $y = 204.36x + 501.45$ | $Y=-12.44+0.22{x_1}–0.05{x_2}–0.43{x_3}$, Where $Y =$ the country’s position at Doing Business ranking; $x_1 =$ the country’s “Registration of enterprises” index; $x_2 =$ the country’s “International trade” index; $x_3 =$ the country’s “Taxes payment” index. |
| Logarithmic      | $y = 411200\ln(x) - 3E+06$ | $Y=31.44+0.22{x_1}–0.05{x_2}–0.43{x_3}$, Where $Y =$ the country’s position at Doing Business ranking; $x_1 =$ the country’s “Registration of enterprises” index; $x_2 =$ the country’s “International trade” index; $x_3 =$ the country’s “Taxes payment” index. |
| Polynomial       | $y=23.992x^2–96362x+1E+08$ | $Y=31.44+0.22{x_1}–0.05{x_2}–0.43{x_3}$, Where $Y =$ the country’s position at Doing Business ranking; $x_1 =$ the country’s “Registration of enterprises” index; $x_2 =$ the country’s “International trade” index; $x_3 =$ the country’s “Taxes payment” index. |
| Power            | $y = 10x^{24.914}$ | $Y=31.44+0.22{x_1}–0.05{x_2}–0.43{x_3}$, Where $Y =$ the country’s position at Doing Business ranking; $x_1 =$ the country’s “Registration of enterprises” index; $x_2 =$ the country’s “International trade” index; $x_3 =$ the country’s “Taxes payment” index. |
| **Where** $y =$ GDP at actual prices (bln UAH), $x =$ number of periods |
| **The country’s position at Doing Business ranking** | | |
| Exponential      | $y = 177.25e^{-0.071x}$ | $Y=31.44+0.22{x_1}–0.05{x_2}–0.43{x_3}$, Where $Y =$ the country’s position at Doing Business ranking; $x_1 =$ the country’s “Registration of enterprises” index; $x_2 =$ the country’s “International trade” index; $x_3 =$ the country’s “Taxes payment” index. |
| Linear           | $y = -7.9333x + 166.73$ | $Y=31.44+0.22{x_1}–0.05{x_2}–0.43{x_3}$, Where $Y =$ the country’s position at Doing Business ranking; $x_1 =$ the country’s “Registration of enterprises” index; $x_2 =$ the country’s “International trade” index; $x_3 =$ the country’s “Taxes payment” index. |
| Logarithmic      | $y = -26.38\ln(x) + 162.95$ | $Y=31.44+0.22{x_1}–0.05{x_2}–0.43{x_3}$, Where $Y =$ the country’s position at Doing Business ranking; $x_1 =$ the country’s “Registration of enterprises” index; $x_2 =$ the country’s “International trade” index; $x_3 =$ the country’s “Taxes payment” index. |
| Polynomial       | $y = -1.4962x^2+8.525x+133.82$ | $Y=31.44+0.22{x_1}–0.05{x_2}–0.43{x_3}$, Where $Y =$ the country’s position at Doing Business ranking; $x_1 =$ the country’s “Registration of enterprises” index; $x_2 =$ the country’s “International trade” index; $x_3 =$ the country’s “Taxes payment” index. |
| Power            | $y = 171.27x^{0.236}$ | $Y=31.44+0.22{x_1}–0.05{x_2}–0.43{x_3}$, Where $Y =$ the country’s position at Doing Business ranking; $x_1 =$ the country’s “Registration of enterprises” index; $x_2 =$ the country’s “International trade” index; $x_3 =$ the country’s “Taxes payment” index. |
| **Where** $y =$ the country’s position at Doing Business ranking, $x =$ number of periods |
| **Receipt of customs payments to the budget** | | |
| Exponential      | $y = 63.253e^{0.365x}$ | $Y=85.4–0.93x_1+1.52x_2–0.04x_3–2.55x_4+7.08x_5–2.38x_6+4.07x_7$, Where $Y =$ Receipt of customs payments to the budget (bln UAH); $x_1 =$ export of goods and services (bln USD); $x_2 =$ import of goods and services (bln USD); $x_3 =$ time spent on tax payment (hours per year); $x_4 =$ general rate of taxes and deductions (%); $x_5 =$ official exchange rate of the national currency to the US dollar, UAH; $x_6 =$ corruption perceptions index of Ukraine; $x_7 =$ Number of entities engaged in foreign economic activities (thous.) |
| Linear           | $y = 21.748x + 28.093$ | $Y=85.4–0.93x_1+1.52x_2–0.04x_3–2.55x_4+7.08x_5–2.38x_6+4.07x_7$, Where $Y =$ Receipt of customs payments to the budget (bln UAH); $x_1 =$ export of goods and services (bln USD); $x_2 =$ import of goods and services (bln USD); $x_3 =$ time spent on tax payment (hours per year); $x_4 =$ general rate of taxes and deductions (%); $x_5 =$ official exchange rate of the national currency to the US dollar, UAH; $x_6 =$ corruption perceptions index of Ukraine; $x_7 =$ Number of entities engaged in foreign economic activities (thous.) |
| Logarithmic      | $y = 73.761\ln(x) + 36.298$ | $Y=85.4–0.93x_1+1.52x_2–0.04x_3–2.55x_4+7.08x_5–2.38x_6+4.07x_7$, Where $Y =$ Receipt of customs payments to the budget (bln UAH); $x_1 =$ export of goods and services (bln USD); $x_2 =$ import of goods and services (bln USD); $x_3 =$ time spent on tax payment (hours per year); $x_4 =$ general rate of taxes and deductions (%); $x_5 =$ official exchange rate of the national currency to the US dollar, UAH; $x_6 =$ corruption perceptions index of Ukraine; $x_7 =$ Number of entities engaged in foreign economic activities (thous.) |
| Polynomial       | $y = 4.2114x^2–24.577x+120.74$ | $Y=85.4–0.93x_1+1.52x_2–0.04x_3–2.55x_4+7.08x_5–2.38x_6+4.07x_7$, Where $Y =$ Receipt of customs payments to the budget (bln UAH); $x_1 =$ export of goods and services (bln USD); $x_2 =$ import of goods and services (bln USD); $x_3 =$ time spent on tax payment (hours per year); $x_4 =$ general rate of taxes and deductions (%); $x_5 =$ official exchange rate of the national currency to the US dollar, UAH; $x_6 =$ corruption perceptions index of Ukraine; $x_7 =$ Number of entities engaged in foreign economic activities (thous.) |
| Power            | $y = 65.209x^{0.4769}$ | $Y=85.4–0.93x_1+1.52x_2–0.04x_3–2.55x_4+7.08x_5–2.38x_6+4.07x_7$, Where $Y =$ Receipt of customs payments to the budget (bln UAH); $x_1 =$ export of goods and services (bln USD); $x_2 =$ import of goods and services (bln USD); $x_3 =$ time spent on tax payment (hours per year); $x_4 =$ general rate of taxes and deductions (%); $x_5 =$ official exchange rate of the national currency to the US dollar, UAH; $x_6 =$ corruption perceptions index of Ukraine; $x_7 =$ Number of entities engaged in foreign economic activities (thous.) |
| **Where** $y =$ Receipt of customs payments to the budget (bln UAH), $x =$ number of periods |
| $a$ The time lag is 1 year; 2008-2018 period. |
| $b$ The probability of approximation. |
| Source: developed by the author |
2. Increase in the number of entities engaged in foreign economic activities, change of the official exchange rate of hryvnia to the US dollar, positive growth of import of goods, reduction of bureaucratic procedures in the form of lowering the overall tax rate and combating corruption lead to increased customs revenues, which makes sense as the outlined indicators provide growth of volumes and acceleration of the rates of the aggregate income increase, and also distort the bureaucratic system through the reduction of the level of control and administrative influence. At the same time, the time spent by economic entities on customs and tax payment is inversely proportional to the initial indicator, its increase leads to a decrease in state budget revenues in terms of customs revenues, demonstrating the dependence of business climate on customs control, customs formalities etc.

3. The amount of customs duties and the level of capital investment directly affect GDP. Thus, 1 billion UAH of customs payments increases the total GDP by 17.2 billion UAH, and 1 billion UAH of capital investment increases it by 3.5 billion UAH. At the same time, the level of the state debt has an inversely proportional effect on the level of gross domestic product, in particular 1 billion of borrowed funds reduces the country’s GDP by 0.24 billion, which requires balanced approaches to the implementation of debt as well as customs and tax policy in the framework of management decisions on borrowing financial resources by the state and support for domestic producers.

4. Considering customs interests from the international standpoint, the hypothesis that the country’s position in the international rating significantly depends on the quality and level of customs and foreign economic policy of the state was confirmed. Reducing bureaucratic procedures at the border and forming a balanced fiscal policy through customs and non-tariff regulation measures remain important elements in promoting the country's positive dynamics in the international arena.

The interrelations between the models created within the framework of the formed hypotheses correspond to the defined goals, as well as to the proposed concept of reviewing the situation with the possibility of decision making and forecast calculation of the trend development. At the same time, we draw attention to the fact that the assessment of the effectiveness of current activities on ensuring customs interests of the state depends on reliability and completeness of monitoring results, a set of criteria (characteristics) by which the analysis is conducted. The list of characteristics we use depends on a number of factors that are quite dependent and volatile in the context of the political, economic, social situation of the state, and the influence of world trends which must be taken into account.

4. Conclusions.
Summarizing the above and paying attention to the economic development of Ukraine in terms of ensuring customs interests within the studied period, we can see the growth and decline of the economy under the influence of many factors that set the main trends in the economic environment. At the same time, the correlation-regression modeling allows to increase the controllability and orderliness of the process of ensuring customs security and protection of customs interests, given the reflection of coherent relationships.

The built-up mathematical dependences allow for their use during the decision making process in the calculation of analytics-factual parameters of substantiation of modern and projected trends, as well as increase the efficiency of levers and mechanisms of regulatory potential of the state in terms of timely reformatting and coordination of efforts to achieve the set goals.

References
[1] Berezhnyuk I (2009) Customs regulation of Ukraine: national and international aspects (Dnipropetrovsk: Academy of Customs Service of Ukraine) p. 543
[2] Kalinescu T V and Ponomareva I V (2011) Application of balanced scores for assessing customs activities (Economic space. Vol 47) pp 50-57
[3] Kivalov S and Kormich B 2001Customs policy of Ukraine. Odessa. 256 p.
[4] Lipovska N A (2007) The management of institutionalevolutionof the State Customs Service of
Ukraine. (Dnipropetrovsk: National Academy of public service under the patron of the President of Ukraine) 38 p.

[5] Naumenko V P, Pashko P V, Russkov V A (2006) Customs regulation of foreign economic activity in Ukraine (Kiev – Knowledge) 394 p.

[6] Pashko P and Shevchuk S (2019) Essence and peculiarities of state regulation of mechanisms of providing customs interests of Ukraine (Economy and state. vol 4). pp. 4–10.

[7] Pryimachenko D V (2006) Customs policy of the state and its implementation by customs authorities. (Dnipropetrovsk: Academy of Customs Service of Ukraine) 332 p.

[8] Stelmashchuk A (2011) Increasing the role of customs policy in the system of protection of the domestic market. (Innovative economy. Vol 1) pp. 279–286.

[9] Chentsov V V (2013) Attributive parameters of the customs system. (Bulletin of the Academy of Customs Service of Ukraine Vol 1(8)). pp. 63–68.

[10] Shevchuk S V (2019) Customs interests of the state: identification, regulation and provision. (Kyiv: Agrar Media Group) 522 p.

[11] Shevchuk S and Myskin Y (2018) Management as an important component of the regulatory potential of the state to ensure customs interests. (Collection of scientific works of the University of the State Fiscal Service of Ukraine Vol 2). pp 428–437