Enhancing the Approach to Forecasting the Dynamics of Socio-Economic Development during the COVID-19 Pandemic

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Abstract

This study reveals the approach to scaling socio-economic indicators to ensure economic security through regional budget expenditures to the GRP ratio example. Indicator choice is conditioned by the necessity to determine the degree of the federal center's rational influence on the regional strategic goals of sustainable development. The study aims to develop and test the system for assessing the dynamics of Russian socio-economic development based on the authors' interpretation of the scaling factor values. The main research method is scaling, which provides additional perspectives reflected by preserving proportions when changing the target parameters. The new method's effectiveness is confirmed by calculating the scaling factor. Its value interpretation gives a tool for assessing the effectiveness of the strategy development system and its economic security. The study's relevance is due to adaptation to global transformations based on the management system's capability to act under various crisis scenarios and make anti-crisis decisions important for the Russian economy. The findings improve the basis for implementing a sustainable strategic planning system and strengthening national security in the COVID-19 pandemic. The findings make it possible to predict the further evolution of the relationships between indicator groups in order to increase the role of per capita budgetary expenditures in GRP.

1- Introduction

Strategic planning determines the ability of the state to respond flexibly to changing circumstances in conditions of increasing instability in all spheres of social and economic life. In this regard, a necessary condition for the development of the strategic planning system of the Russian Federation is to improve the methodological apparatus for assessing the consistency of the benchmarks for sustainable development of the Russian Federation.

The number of documents in the modern system of strategic planning of the Russian Federation is quite large and continues to increase. So, as of June 2021, more than 65 thousand active strategic planning documents, developed and approved at different levels, were included in the federal state register of strategic planning documents [1]. Such a significant number of documents has overloaded the strategic planning system as part of the public administration system, making it difficult to control the implementation of strategic plans. Therefore, the existing number of documents needs to be optimized, confirming the need to develop an integrated system of strategic planning, a single mechanism for the interconnection of various kinds of federal, regional, municipal, comprehensive, target, sectoral, etc. concepts, programs, strategic plans, and other similar documents that represent the state planning of the country. Based on the above, let us define the goal of optimization of strategic planning documents of the Russian Federation. It is to minimize and optimize the number of strategic planning documents subject to the following constraints.

The relevance of this study is due to the need to determine the degree of rational participation and influence of the federal center in achieving the strategic objectives of sustainable socio-economic development of the regions, taking into account the adjustments introduced by the COVID-19 pandemic. This study aims to develop and test a system for assessing the dynamics of socio-economic development of the Russian Federation based on the interpretation of the calculated values of the scaling factor. Based on the above, the optimization of the number of strategic planning documents should be carried out in parallel in two directions:

- "By Processes" based on the task of clear formalization of all strategic planning processes by a minimum set of documents;

- "By indicators" based on the task of full coverage of the set of indicators, ensuring effective strategic management of the country's development, by a minimum set of documents [2].

- For optimizing the number of strategic planning documents "by processes," it is initially proposed to classify the existing documents by:

- Spheres and directions of strategic planning (in the economy, social, military, scientific, regional development spheres, and others);

- Strategic planning processes (formation, approval, implementation, monitoring of plans); as a rule, most strategic planning documents contain the formalization of all these processes, and the proposed classification will make it possible to separate documents that formalize certain processes and those that formalize sets of processes;

- Strategic planning time frames; within this grouping separately note the need to analyze the documents for coordination in timing, goals, and priorities with the development of proposals for their optimization to eliminate the identified contradictions;

- Levels of strategic planning- federal, regional, municipal, and jointly administered strategic planning processes [3].

The next step is to optimize the number of strategic planning documents "by indicators", which is conducted to a certain extent in parallel with the optimization of strategic planning documents, conducted "by processes". For optimizing by indicators, it is necessary to form sets of indicators, the dynamics of which values characterize the implementation effectiveness of strategic plans in all directions and spheres.

The scientific novelty of this work lies in the fact that the authors proposed a methodological approach to the interpretation of the estimated values of the scaling factor, which can be used to predict the dynamics of socio-economic development in the COVID-19 pandemic since the pandemic realities imply restructuring and redistribution of budget allocations to reduce the socio-economic consequences of the pandemic. We should also note that the studies previously conducted by other authors in similar areas do not contain a substantiation of the need to develop new methodological approaches to the forecasting of the manifestation of negative factors and threats to economic security, which, accordingly, is a certain methodological gap filled by the authors in this article. The main difficulty in conducting this study is the irregular updating and inaccurate provision by the Russian statistical bureaus of statistical information in the regional context on the expenditure of budgetary funds by the regions.

2- Literature Review

Let us analyze the available international experience in the functioning of strategic planning systems for socio-economic development and national security of countries, the principles and approaches used, supplementing it with a general analysis of the approaches to strategic planning used in modern management.

The National Security Strategy of the United States of America is the basis for the strategic planning system of socio-economic development and national security of the United States. It outlines the main challenges to U.S. national security and ways to address them. The current version of the U.S. National Security Strategy (hereafter referred to as the Strategy) was submitted to Congress by Donald Trump on December 18, 2017. The document is designed based on four core principles: "protecting the homeland, Americans, and the American way of life," "ensuring U.S. prosperity," "strengthening the world through force," and "spreading American influence" [4]. The basis for the Strategy is a long-term strategic forecast and analysis of the situation development in the U.S. and the world as a whole. Its important part is the Global Trends report, published every four years after the U.S. presidential election [5]. Currently, the report formed in 2017 is available [6]. A new report will be published after the U.S. presidential election in 2021.

Canada's vast undeveloped territories and long distances between separate settlements have largely contributed to its strategic planning system being built on the principles of fairly broad federalism. The strategic planning process actively involves not only regional and municipal authorities but also all stakeholders directly affected by the strategic planning process and can impact the planning and implementation process. Canada uses a multi-tiered system of indicative planning, each level of which has its own programs, whose overall focus coincides with the recommended strategy of the Canadian government. Like the U.S., Canada has been active in applying compliance to strategic planning and national security, actively developing and using antitrust laws and digitizing compliance processes.

In recent decades, the system of strategic planning and national security of the United Kingdom has undergone quite serious changes in favor of its decentralization. British strategic planning policy, its components, and application areas are set out in the National Planning Policy Framework, adopted in 2012, and periodically updated. At the time of writingt his report, the document's last update was on June 19, 2019 [7]. The document coordinates national and regional strategic planning, defines further directions of decentralization of strategic planning and the transition from sectoral to territorial principle of its organization. Strategic planning in Great Britain has three objectives: economic, social, and environmental. Local spatial development plans and strategies are revised to assess the need to update them at least every five years, or if necessary. Local authorities must encourage the submission of applications for participation in sustainable territorial development plans by private parties, which, in turn, encourages the interaction of public and private resources. Both at the level of the UK central government and the level of regions, the strategic planning horizon is 15-20 years, subject to the coordination of government and regional plans. In the British strategic planning system, another important document should be highlighted – the National Security Strategy of the United Kingdom. At present, there is a document in force adopted in 2015 [8] but periodically updated. The document outlines the directions of the United Kingdom's defense strategy until 2025.

The U.S. strategic planning and national security process aim to maintain U.S. global leadership, primarily as a military hegemony and as a leader in new technologies and as an economic power. The formation of strategic plans is based on the reports of analytical centers, which not only analyze the trends of technology and economy but also actively influence them [9]. It is necessary to note compliance and quality management system not only as tools to improve the efficiency of planning and implementation of public and private corporations but also as tools to ensure the United States' national security by extraterritorial application of their legal justification. Canada's strategic planning is largely federalized and involves a large number of stakeholders. Its peculiarities are the multi-level system of indicative planning and, more pronounced than in the U.S., the shift of planning to the level of executive authorities with broad powers of ministries and agencies. Only one strategic document, the economic action plan, is developed at the highest level. It is necessary to note the Canadian architecture of program coordination that makes it possible to coordinate the goals of sectoral and regional long-term programs with the strategic goals of Canada's development.

Nevertheless, all the systems considered are similar because they are based on the principles of strategic planning used in management. Plans are formed according to the following scheme: formation of plans - decomposition into programs and subprograms - formation of budget requests - financial support - plan-fact control - incentives for responsible persons. Let us group the experience of strategic planning for the national security of the countries discussed above into Table 1, determining the applicability of this experience in Russian practice. As part of this analysis, let us focus on the country characteristics that have led to one or another organization of the strategic planning system.

Table 1. Classification of the features of strategic planning within the international experience

Strategic approach	Donor of experience	Recipient of experience	Effect for the RF
Combining centralization and federalization of strategic planning.	Canada, Australia, USA, UK	The Russian Federation	It is useful for application in Russia because it is generated by the geographical conditions of these countries, which are extremely similar to those of Russia, namely – the vast territory of the country with large distances from the center to some regions, significant differences in the level of development (including economy, infrastructure, population) of different regions that make up the country.
Interaction of development strategic programs of separate regions with ones of the country as a whole, and separate branches of its economy.	"Program Alignment Architecture" in Canada, "National Federation Reform Council" in Australia.	The Russian Federation	The effect of applying this experience in Russian practice is to increase the use of municipal and regional strategic plans as enhancers of the volumes and dynamics of implementation of federal strategic plans in social, economic, and infrastructure development areas.
Decomposition of coordinated goals into programs with the further formation of budget requests for resources.	USA	The Russian Federation	The effect of applying this experience to Russian practice is to bring greater control over the resources allocated to the implementation of strategic plans at various levels.
The leading role of the "National Security Strategy" in the formation of strategic plans.	USA	The Russian Federation	The limitation of applying this experience is that an insufficiently large share of the economy of the Russian Federation in the world at present does not give an opportunity to fully use the USA experience in developing measures based on the "National Security Strategy" aimed at strengthening the country's influence in different regions of the world.
The use of compliance strategizing in ensuring the national security of the country and improving the effectiveness of strategic planning.	USA	The Russian Federation	1. Enhancing the effectiveness of the strategic planning process through the proper, regulated behavior of employees in the process of making plans. 2. Enhancing the effectiveness of implementing strategic plans through the proper behavior of the employees responsible for their implementation.
Integration of quality management system into the system of strategic planning and national security.	USA	The Russian Federation	The effect of applying this experience in Russian practice is to reduce the loss of resources and time due to improved quality of formation and implementation of strategic plans.

Development of analytical capacities for expert review of decisions made in the areas of strategic planning and national security.	UK, USA	The Russian Federation	Implementing this experience in practice will improve the validity of strategic plans and programs under development and increase their compliance with the country's current political, social, and economic situation.
Balanced development of the national economy sectors – the experience is applicable in the Russian Federation.	PRC	The Russian Federation	In general, Russian strategic planning should represent a calculated sequence of actions aimed at solving a specific problem, or achieving an implicit goal, taking into account the psychological tendencies of the object and other particularities of the situation – a stratagem in Chinese terminology.
Involvement of corporations in strategic planning processes.	France	The Russian Federation	The effect of this measure is that part of the tasks of strategic planning of socio-economic development and national security of the Russian Federation can be solved in the corporate sector, which will save a certain amount of public resources in solving these problems.
Image solutions, soft power	USA	The Russian Federation	– Increase in the number of people sympathizing with the Russian Federation around the world; – Increasing demand for Russian products, attracting foreign investors (with the appropriate development of the institutional sphere).
Study of unsuccessful foreign experience, applicable in the Russian Federation.		The Russian Federation	The expected effect is to reduce the loss of resources and time due to reducing the cases of obtaining results that do not meet the expectations in the strategic planning system.

When assessing the coherence of strategic documents, it is also advisable to consider the challenges, strategic risks, threats, and conditions for developing strategic documents. Essentially, this is an analysis of the external and internal environment parameters determining the achievement of the set strategic goals. They determine the probability with which the responsible person will be able to achieve the set strategic goal. From this point of view, the parameters hindering the achievement of strategic benchmarks can be considered threats (ways of measuring negative uncertainty) of economic security (Table 2) [10].

Table 2. Classes of external and internal environment parameters applicable for assessing the state of economic security

Risk sources	Characteristics and actions to be taken
External environment parameters	
Social, cultural, political, legal, regulatory, financial, technological, economic, and environmental factors at the international, national, regional, or local level	The main groups of factors that are the sources of the main threats that negatively affect the achievement of particular goals of strategizing
Current trends affecting the achievement of the set goals	It is necessary to consider the effect of economic hysteresis associated with dependencies of previous development trends affecting the current values. If we do not consider the possibilities of economic growth, the establishment of correct indicative values will become impossible
Relationships with external stakeholders, their perceptions, values, needs, and expectations	Analysis of the interests of stakeholders involved in the implementation of strategic documents
Contractual relationshipsand public commitments	Analysis of commitments and rights in the implementation of strategic documents
The complexity of existing relationships and dependencies on external stakeholders	Analysis of stakeholder interaction mechanisms. One of these aspects is the trend of digitalization of management modern systems, social and economic relations
Internal environment parameters	
The vision, mission, and values	Possibility to change the key benchmarks of socio-economic development
Management, organizational structure, roles and responsibilities	Strategic risks associated with errors in the processes of implementing strategic documents
Strategies, goals, and policies	List of strategizing documents, their consistency
Cultural characteristics	It is necessary to consider the socio-cultural characteristics that affect management style and implementation of management decisions
Adopted standards, guidelines, and models	Analysis of current international and national standards
Capabilities, resources, and accumulated knowledge (e.g., capital, time, people, intellectual property, processes, systems, and technologies)	Analysis of available resources, and their allocation mechanisms
Data, information systems and information flows	Analysis of the quality of data used, the degree of development of digital technologies
Relationships with internal stakeholders, considering their opinions and values	Assessing the mechanisms of interaction between individual state bodies, organizations and corporate structures
Contractual relationships and commitments	Assessment of current internal systems of allocation of public liabilities
Interdependencies and interrelationships	Consideration of the size and quality of social capital, and existing communications of information exchange

Studies analyzing the impact of various epidemics and pandemics on countries' economies remained limited until COVID-19. However, various documents can be found on the devastating impact of the coronavirus on countries and predictions of economic decline at the national level. Throughout the world, research on its magnitude and duration based on the specific conditions of each country is limited. Before presenting the results of this study, some studies that have formed the basis of this research will be mentioned.

In the context of this scientific problem posed by the authors of this study, it is difficult to speak of many research papers. As a rule, the tasks set by research teams are limited to studying certain countries' current economic realities or the analysis of the negative effects and assessment of the damage caused by the COVID pandemic. McKinsey & Company presented a report on "Rapidly forecasting demand and adapting commercial plans in a pandemic," which examines approaches to tracking changes in consumer behavior and the dynamics of procurement channels, assessing the economic burden on consumers, and also offers a six-part action plan to manage income of the population. The OECD presented the report "The impact of the COVID-19 pandemic on jobs and incomes in G20 economies," which proposed rapid response systems to the emerging threats from the pandemic through countercyclical macroeconomic policy measures.

The Department of Economic and Social Affairs Economic Analysis (UN), in its World Economic Situation and Prospects: February 2021 research, describes the long-term effects of the crisis as very serious. The rate of digitalization, automation, and robotization should accelerate, leading to a further decline in labor demand in the medium term. At the same time, sectors of the economy will see some productivity growth covering automation, but average productivity growth is likely to slow down.

In a comprehensive study, the authors assess the scope and dynamics of the COVID-19 pandemic in advanced economies, emerging economies, and developing countries and determine its impact on economic growth [11]. They note that the pandemic spread has caused countries to fall into an unprecedented recession with a slow recovery. Speaking of cross-country studies, the authors assessed the relationship of new COVID-19 cases with socioeconomic and demographic factors, health vulnerabilities, resources, and policy responses in the BRICS countries [12]. They conducted a crossover study using COVID-19 pandemic and other BRICS country data from February 26, 2020, to April 30, 2021 and analyzed the associated factors using a log-linear generalized additive model (GAM).

Another study assesses the effects of COVID-19 on gross domestic product per capita in Organization for Economic Cooperation and Development (OECD) countries. For this purpose, developments in panel data convergence theory and data from the OECD database from the last quarter of 2017 to the third quarter of 2020 were considered [13]. This study shows that the pandemic, especially in the first two quarters of 2020, eliminated the signs of convergence confirmed from the end of 2017 to the end of 2019 in OECD countries, leading to new economic challenges. By constructing an integrated economic and energy input-output model including the COVID-19 shock, the authors assess the impact of COVID-19 on the macroeconomy and energy consumption in China in the context of trade protectionism [14]. The results show that in the context of protectionism, the COVID-19 outbreak in China will lead to a 2.2-3.09% decrease in Chinese GDP and a 1.56-2.48% decrease in energy consumption, while the adverse side effects from the global spread of COVID-19 will lead to a 2.27-3.28% decrease in GDP and a 2.48-3.49% decrease in energy consumption.

Researchers from India compared the socio-economic impact of the 1918-1920 Spanish influenza pandemic with the COVID-19 pandemic in India [15]. The researchers used a systematic literature review (SLR) approach, and their results showed similarities in the socio-economic impact of the two pandemics and indicated that developing countries faced more severe consequences of such pandemics than developed countries. Russian researchers, in their article, analyze the results of a regular survey of Russian enterprises of the real sector of the economy, presenting assessments of enterprises regarding the quality of anti-crisis state policy during the pandemic [16]. The authors of another study developed a regression model explaining the spread of the COVID-19 virus in the space of Russian regions in 2020. They proposed a qualitative "networks – places – scaling" model to describe the process of spatial diffusion of the virus in Russian regions and proved the relationship of the virus spread with the economic specialization of regions, while the widely discussed factors of physical density, urbanization level, per capita income when correlated with the excess mortality rate in Russian regions showed no significant association [17].

3- Materials and Methods

Thus, based on the analysis, it is possible to identify the following sequence of determination of the target conditions for achieving strategic benchmarks:

- First, the definition of a set of key parameters of the external and internal environment, affecting the achievement of strategic benchmarks;

- Second, the definition of a set of aggregate macroeconomic indicators, most fully characterizing the assessment of the state of economic security;

- Third, the determination of its critical (so-called threshold) value for each aggregated macroeconomic indicator. In this case, the indicative value of the indicator, established by the document (documents) of strategizing, reflects the strategic benchmark for achieving the set strategic goal.

The methodology of establishing a rational scale of aggregated macroeconomic indicators and the definition of the specified ranges of their functional values (including the definition of the neighborhood of the threshold value and the dynamics of falling in this neighborhood) represents one of the most significant fundamental tasks of assessment (including practical verification) of the state of economic security, which is the most objective measure of the strategizing process. This measure is especially acute in the objectivity of the forced risk events of the choice of the moment and depth of revision of the current strategic documents. Figure 1 presents the study methodology.
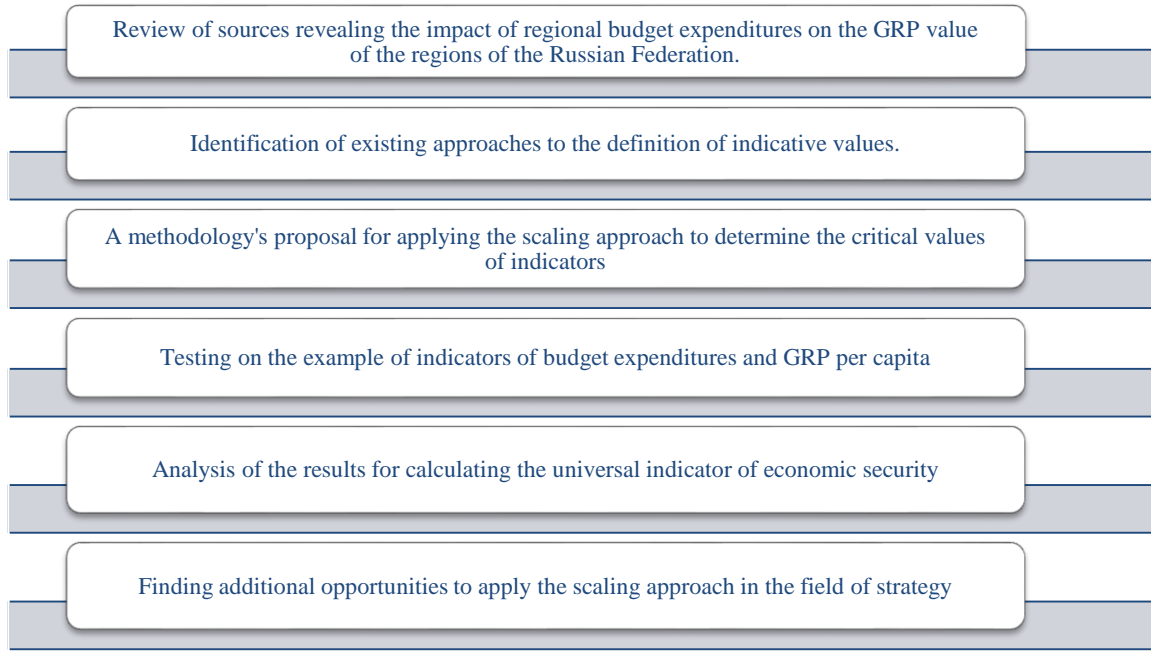
Review of sources revealing the impact of regional budget expenditures on the GRP value of the regions of the Russian Federation.

Identification of existing approaches to the definition of indicative values.

A methodology's proposal for applying the scaling approach to determine the critical values of indicators

Testing on the example of indicators of budget expenditures and GRP per capita

Analysis of the results for calculating the universal indicator of economic security

Finding additional opportunities to apply the scaling approach in the field of strategy

Figure 1. The methodologicalstudy flow diagram

The presented part of this study (as a practical example) scales an indicator that can be used to assess the impact of regional budget expenditures on the volume of GRP in Russian regions. This part of the present study reveals the approach to scaling socio-economic indicators to ensure economic security on the example of the ratio of regional budget expenditures and GRP in the regions of the Russian Federation. The choice of these indicators is conditioned by the necessity to determine the degree of rational involvement and influence of the federal center on achieving strategic goals of sustainable socio-economic development of the regions.

Scaling implies that while preserving the proportions in the size of the objects in question, the basic ratios between the indicators that allow them to be measured are preserved. In the context of strategizing, the task arises of determining the rational proportions of the national economy using a system of particular indicators. In this case, the scaling method allows us to calculate confidence intervals, falling within which will allow us to say whether the process corresponds to the goals of sustainable socio-economic development or there is a violation of the requirements of strengthening economic security. Any changes of the target object presuppose preserving ratios (certain proportions) in its development. Violation of such proportions indicates the need to search for the causes of their distortion and decide how deviations are significant. In the context of ensuring the requirements of economic security, it is necessary to predict at an early stage the probability of the moment of their violation and, therefore, to use timely measures to prevent threats to economic security and apply appropriate anti-crisis tools.

This study has chosen as an example the indicators of budget expenditures and GRP per capita, which values, according to Wagner's Law, are closely interrelated. The indicative value of the indicator of budget expenditures per capita is determined by the decisions of state administration bodies. Therefore, by managing this indicator, it is possible to achieve more positive volumes of GRP. The scaling approach for the regions in Russia will make it possible to ensure the contingency of the processes of their socio-economic development. If we consider some indicator reflecting the impact of budget expenditures on GRP as an object of analysis, both indicative and critical values can be determined for this indicator. Such an indicator assesses the ratio of the two indicators under consideration and reflects their proportions.

When establishing the critical values of economic security indicators, it is necessary to proceed from the premise that the values are based on previous trends, reflecting the situation with a lack of timely inclusion of strategizing tools. That

is why in establishing the critical value of the indicator of economic security, it is necessary to rely on methods based on considering the history of events, such as fractal analysis, ARIMA-modeling, and other approaches, including, in particular, scaling. The scaling method opens up significant additional prospects reflected by the law of conservation of proportions when changing the target parameters (for example, the increase in the territory of a particular city or its population entails a certain, i.e., scalable by a certain law, growth of its communications).

In the case of economic security ensuring, the application of the scaling method makes it possible to determine the rational effect value of the regional budget expenditures on the value of the target indicator – GRP. The budget expenditures directly impact the achievement of GRP with a certain time lag, which size may vary from a month to several years. The structure of regional budget expenditures largely determines the latter. Thus, in the first quarter of 2021, the main federal budget expenditures accounted for social policy (37.5%), health care (10.6%), education (10.4%), and the national economy (9.7%). Given the existing structure of the national economy, it can be assumed that some of these expenditures impact GRP in the current period within a year. In this case, the GRP values are determined not only by the size of government spending but also by the interaction results between regional economic entities. The essence and content of the scaling method to determine the critical values of key indicators of economic security can be reduced to the following provisions.

The theoretical part of the method is the selection of self-similar objects for which the evaluation is carried out. Self-similarity means the same distinctive characteristics that coincide regardless of the object's scale [18]. Such objects can be the country and its national economy, region, economic areas, and others from the economic security position. Further, two key indicators of economic security are established for calculating scaling factors. One of the indicators should probably act as a basic characteristic, reflecting the state of economic security, and the second indicator should be a controlled indicator for the assessment. Two indicators are taken to simplify the calculation process. In the case of further development of the presented methodology, it is advisable to include more indicators to derive a universal indicator of economic security. Between the selected indicators, there should be clearly defined causal relationships, disclosed the impact mechanism of the controlled indicator on the target indicator, reflecting the state of economic security. An important aspect is that the applied indicators should be relative. A relative indicator contains information on at least two absolute indicators, so it is the more informative indicator. In addition, the use of a relative indicator makes it possible to more accurately comply with the requirement for dimensionality in applying the scaling mechanism.For scaling and compliance with the dimensionality of indicators, it is also possible to use the logarithms of absolute indicators. The use of logarithms will make it possible to assess the ratio between the percentage increase of the two indicators in question.

Then the main dependencies between the selected indicators are established. For this purpose, it is assumed that there is some basic indicator C_i, reflecting the possible values that the target indicator, which characterizes the state of economic security in the period t (where t is all available time values, which are available in the monitoring of statistical data), can take. For scaling, it is probably necessary to consider t as annual values to exclude possible errors due to the high variability of the indicator. The target indicator C_i is determined using the following dependence:

$$C_i = C(\text{M}; a_1 \dots a_k; \ e_1 \dots e_k) \tag{1}$$

where M is an independent parameter reflecting the value of the scaling factor (takes into account the proportions between a_k and e_k); a_k is the controlled indicator, whose change affects the value of the target indicator C_i; $e_k$is the indicator of the state of the external environment, which represents all the influence that cannot be taken into account in the analysis of the relationship between the target indicator and the controlled indicator; k is the number of regions under study, in this case, the Russian Federation. The parameter C affects the value of the targetindicatorC_i indirectly. This fact determines the possibility of the scaling function (Z(M)) existence, determining the relationship between a_k and C_i. Thus, it is possible to determine the target indicator by the following dependence:

$$C_i = C(Z(\text{M}); a_1 \dots a_k; \ e_1 \dots e_k) \tag{2}$$

The scaling factor M is described as a function Z(M) whose values we observe at each time t. As a result, if to consider the entire range of C_i values at each time t, we obtain the following dependence:

$$C_{it} = C(z_1 \dots z_t; a_{1t} \dots a_{kt}; \ e_{1t} \dots e_{kt}) \tag{3}$$

The values of the target indicator C_i and the controlled indicator a_k are known and can be derived from available Rosstat data [19]. The dependence of C_i and a_k is likely to be determined by simple dependences because several studies have demonstrated the absence of the need for approximation of socio-economic indicators using complex functions [20]. The latter means that it is sufficient to use linear, exponential, and other dependencies. The choice of the function

can be made by assessing the maximum value of the determination coefficient. A concept adopted in statistics is used here; the coefficient of determination is the proportion of variation of the dependent variable that is predictable from the independent variable (or their aggregate population). As a result, the dependencies between the selected indicators of economic security for all available periods t are determined. Further analysis is conducted to assess all possible values of the scaling function set at a certain time interval and to determine the range of values of the indicators of the external environment state. For this purpose, the dependences C_{it} on a_{kt} are constructed for each time interval t for the subjects of the Russian Federation. The obtained dependence actually reflects the value of the scaling factor at each time moment t. Dependencies are constructed for all time segments t. As a result of the dependencies construction, we obtain the whole range of scaling function values, including the range of scaling function values $z_1 \dots z_t$, and the range of environmental state indicator values $e_{1t} \dots e_{kt}$.

Further, based on the obtained values and information about the level of socio-economic development of the selected subject, it is possible to determine the threshold values of the key indicators of economic security, in particular, using the graphical method by plotting the obtained dependencies on one coordinate system with the simultaneous identification of "crisis periods." The constructed scaling function makes it possible to determine the current dependencies between the two indicators under consideration. In order to assess the practical applicability of the scaling method, we selected two indicators of socio-economic development that are important for ensuring economic security: budget expenditures and GRP per capita (Table 3). The GRP per capita indicator was taken as an independent indicator from 2000 to 2018 and calculated according to the Rosstat methodology. The indicator "Budget expenditures per capita" is defined as controlled (within the state socio-economic policy) (in this case, only the labor force of the country is taken into account, which allows for more accurately determining the average budget expenditures on the economically active population).The data were used for each country region for the whole period under consideration and chosen based on annual data to avoid the influence of seasonal factors. As a result, to solve the problem using the scaling method, 19 ratios will be obtained from 2000 to 2018. For scaling and compliance with dimensionality, the logarithms of the values of the used ratios were taken. This approach makes it possible to assess the ratio by the percentage growth of the two indicators in question (by how many percent the independent indicator will increase when the controlled indicator grows by 1 %).

Table 3. Characteristics of indicators used to apply the scaling methodology

Item	Description	Source
GRP per capita	Gross regional product per capita, rubles. (the logarithm of the value of the indicator is taken)	Rosstat [19]
Budget expenditures per capita	Expenditures of the consolidated budgets of the Russian Federation/labor force (million rubles / thousand people; the logarithm of the value of the indicator is taken)	Rosstat [19]

From the results of the empirical assessment of the scaling method's applicability for verification of the critical values of economic security indicators, it is possible to formulate several assumptions. First of all, the country's regions are chosen as self-similar objects because such a sample is more consistent with the property of self-similarity. The regions operate in a common system of strategizing since they are subject to the same regulations, have a similar organization of socio-economic processes, and others. Thus, the application of the scaling method, in this case, is conditioned by the use of regional indicators of socio-economic development, ensuring the fulfillment of the "self-similarity of the subjects" condition.

4- Results and Discussion

As a result of the assessment, the range of values of the corresponding scaling factor was obtained. Their interpretation makes it possible to forecast the country's socio-economic development dynamics (provided that the current structural conditions are maintained). It is suggested that the search for a rational scale of aggregated macroeconomic indicators of economic security will help to create a universal (comprehensive) indicator of economic security, applicable to regular monitoring of the strategizing results.

Measuring the state of economic security by common for both spheres indicators of socio-economic development of the country predetermines the possibility of revealing the probability of manifestation of crisis phenomena in the national economy. One possible approach to determine the critical values of the country's socio-economic development indicators, characterizing a critical (or close to it) state of economic security, is the scaling method. In general terms, the essence of the scaling method for solving the problem of verification of such critical values is based on the establishment of patterns of change in the statistical values of indicators characterizing the processes of socio-economic development of the country (Figures 2 and 3).
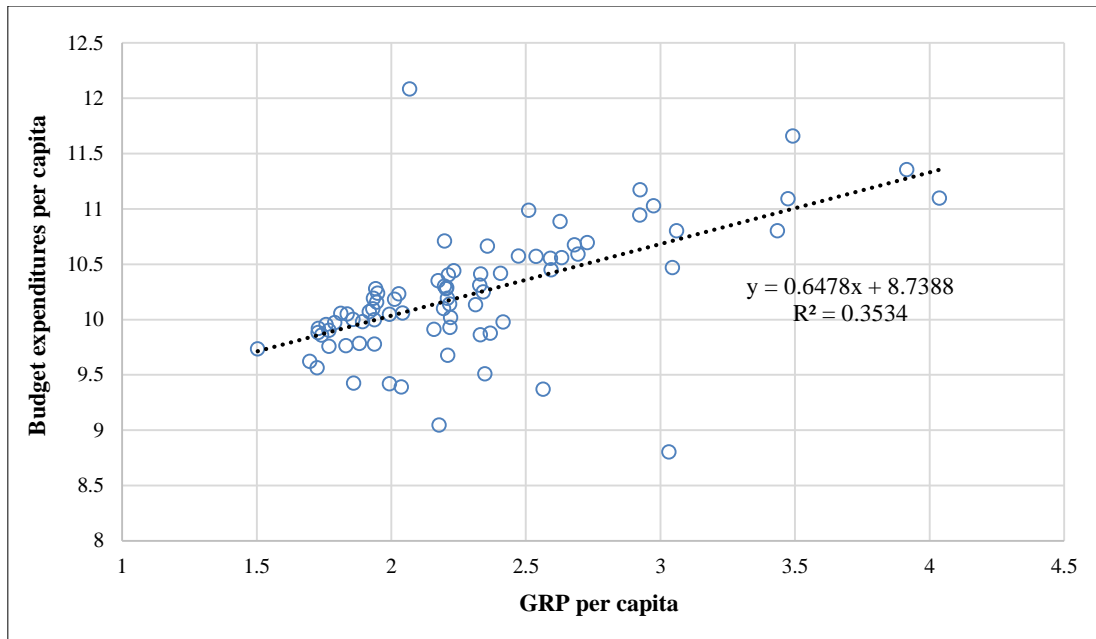
Figure 2. Ratio of the logarithm of the GRP per capita value and the logarithm of the budget expenditures per capita value in 2000
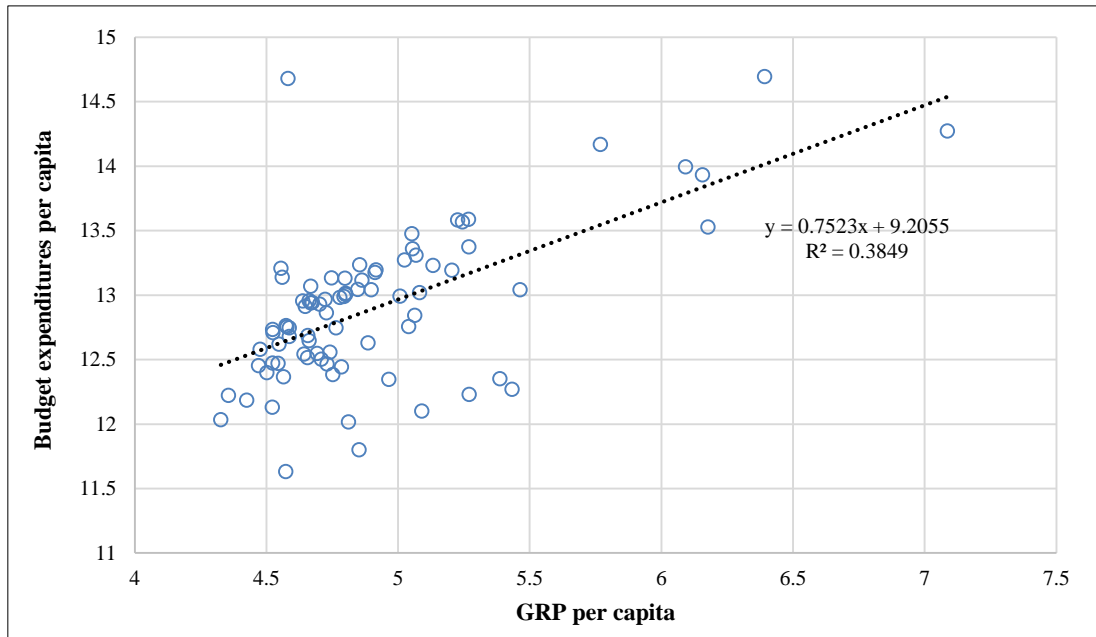

Figure 3. Ratio of the logarithm of the GRP per capita value and the logarithm of the budget expenditures per capita value in 2018

As follows from Figures 2 and 3, the scaling factor for 2000 is 0.6478, while for 2018, it is 0.7523. An increase in the values of the determination coefficient for 2018 compared to the year 2000 is also evident. From the standpoint of econometric analysis, such values of determination coefficients are relatively small. However, from the standpoint of the proposed approach, the increased impact of external conditions on the group of indicators under consideration draws attention. The increase in the values of determination coefficients can be achieved through lag variables. However, in the framework of this analysis, only the ratio of budget expenditures to GRP in the current period is assessed.

The existence of logical and mathematical dependence between the two indicators under consideration is sufficient for applying the scaling method, which determines the possibility of calculating the scaling factors over the entire range of available variables. In order to determine the dependencies between the selected indicators, it is advisable to build dependencies over the entire available range of values from 2000 to 2018 (Table 4) under the approach outlined earlier. The latter allows us to determine the values of the scaling factor, the range of balances, and the value of the determination coefficient. As a result of the calculations, 19 reference values of the ratio of the logarithms of the indicator "GRP per capita" and indicator "Budget expenditures per capita" were obtained. Certain fluctuations for the periods under consideration are observed, but they were not chaotic. In particular, the average value of the scaling factor for the period under consideration was 0.71072, and the standard deviation of the scaling factor was 0.08053 (Figure 4).

Table 4. Scaling factor ranges for logarithms of GRP per capita and budget expenditures per capita

Year	Scaling factor	R^2	C(balances)
2000	0.6478	0.3534	8.7388
2001	0.6428	0.3359	8.7696
2002	0.5688	0.2383	8.9999
2003	0.577	0.2522	9.0826
2004	0.5583	0.2478	9.2856
2005	0.7139	0.3675	8.8335
2006	0.7482	0.3414	8.7681
2007	0.7198	0.3179	8.9108
2008	0.8215	0.4067	8.5106
2009	0.7943	0.3626	8.5705
2010	0.7893	0.3426	8.6784
2011	0.8152	0.3684	8.6539
2012	0.7907	0.3844	8.8038
2013	0.6917	0.3531	9.2807
2014	0.7336	0.3898	9.1507
2015	0.7181	0.3649	9.2878
2016	0.7093	0.3729	9.3593
2017	0.7111	0.368	9.3707
2018	0.7523	0.3849	9.2055

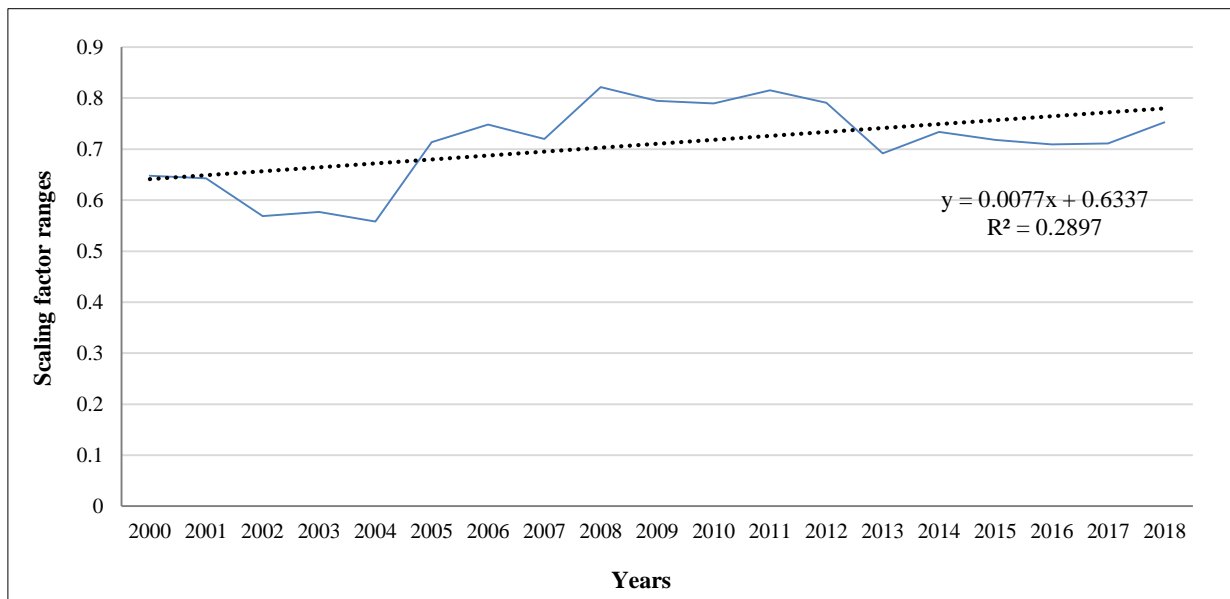$$y = 0.0077x + 0.6337$$
$$R^2 = 0.2897$$

Figure 4. Scaling factor ranges for logarithms of GRP per capita and budget expenditures per capita

The analysis shows that during all the periods t, there is a positive growth of the scaling factor of the considered indicators of economic security. Given that the calculation uses the logarithms of the target indicators (the GRP per capita and budget expenditures per capita), the growth of the scaling factor reflects the existence of a positive growing contribution of budget expenditures per capita into the GRP per capita. Specifically, a 1% increase in budget expenditures per capita in 2018 gave a 0.75% increase in GRP per capita. At the same time, a similar contribution of budget expenditures per capita in 2000 to the growth of GRP was 0.65%. The established trends make it possible to forecast the further dynamics of developing the relations between the groups of the considered indicators to increase the role of budget expenditures per capita into GRP. The latter demonstrates the trend towards an increase in the contribution of budget expenditures to the sustainable socio-economic development of regions.

With such an interpretation of the scaling factor, it is possible to determine the critical values for the controlled (dependent) indicator of economic security. At present, there is an increase in the scaling factor values, which reflects the trend towards an increasing contribution of budget expenditures to GRP. Accordingly, from the position of achieving the strategizing goals, the contribution of budget expenditures should increase. In turn, the decline in the contribution of

budget expenditures to GRP will act as one of the indicators of a violation of the economic security requirements. The value of the trend line coefficient is 0.0077. Accordingly, it is possible to identify three main zones into which the calculated scaling factor may fall:

- The trend line coefficient value is less than 0.0077, which demonstrates the deterioration of the dynamics in terms of scaling of budget expenditures and GRP. This situation indicates a possible deterioration of the socio-economic situation in the country and requires the implementation of measures aimed at strengthening economic security. In particular, it necessitates the elaboration of new approaches to improve the efficiency of budget expenditures in the regions;

- The trend line coefficient value is 0.0077, which reflects the insufficient level of effectiveness in implementing the strategizing system mechanisms. The implementable tools can not lead to significant positive changes within the adopted economic paradigm and the overall scaling values of the two target indicators;

- The trend line coefficient value will be greater than 0.0077 with the addition of the next periods (2019, 2020, and others). This fact will reflect the improvement of the dynamics of the country's socio-economic development, which is an indicator of the effective work of the strategizing system; in particular, an increase in the efficiency of budget expenditures at the regional level can be observed.

Thus, the calculation of the scaling factor and the subsequent analysis and interpretation of its possible values makes it possible to obtain a tool for assessing the efficiency of the strategizing system. Moreover, there is a real possibility to determine the critical (or close to it) state of economic security. Here it should be noted that the results obtained also have significant additional opportunities in analyzing the structure of the national and regional economy.

The target value of the indicator (in conjunction with other indicators from the adopted scale) characterizes the strategic goal to be achieved in the implementation of strategizing tools. The target value can be established by applying, in particular, the methods of econometric analysis. In turn, the critical value of the same indicator reflects the state, in which the trends of violations of the requirements of economic security emerged. When establishing the critical values of indicators of economic security, it is necessary to proceed from the premise that the values are based on previous trends, reflecting the situation of a lack of timely inclusion of strategizing tools. That is why, when establishing the critical value of the economic security indicator, it is necessary to rely on methods based on considering the prehistory of events, such as fractal analysis, ARIMA-modeling, and other approaches, which include, in particular, scaling. The scaling method, in this regard, opens up significant additional prospects, reflected by preserving proportions when changing the target parameters (for example, the increase in the territory of a particular city or its population entails a certain, i.e., scalable by a certain law, growth of its communications).

In the case of economic security, the application of the scaling method makes it possible to determine the rational value of the degree of influence of regional budget expenditures on the value of the target indicator – GRP. The budget expenditures directly impact the achievement of GRP with a certain time lag, whose size may vary from a month to several years. The latter is largely determined by the structure of regional budget expenditures. Thus, in the first quarter of 2021, the main federal budget expenditures accounted for social policy (37.5%), health care (10.6%), education (10.4%), and the national economy (9.7%). Given the existing structure of the national economy, it can be assumed that some of these expenditures impact GRP in the current period within a year. At the same time, GRP values are determined not only by the size of public expenditures but also depend on the results of interaction between regional economic entities.

The state during the crisis acts as a stabilizing institution, ensuring the continuity of the economy. On the contrary, during economic growth, the impact strength of regional budget expenditures in GRP will decrease due to the increasing role of other significant factors. The latter is because the GRP indicator depends on various parameters, such as consumption, savings, investment, and others. The contribution of these indicators to GRP decreases during the crisis, which determines the increasing role of regional budget expenditures in the GRP of a particular region. Since the scaling in the simple case is focused on the forecast of the ratios of the values of the two indicators, it is obvious that there are additional factors that determine the value of the target indicator. In the econometric analysis, such factors are the residuals reflecting the unaccounted parameters influencing the value of the referable variable.

The indicator of the ratio of GRP to regional budget expenditures will depend on the institutional development of the region, largely measured from the position of the established technological level. In crisis periods, the impact strength of other factors will be lower relative to the impact strength of the regional budget expenditures and vice versa. It means that in order to achieve the strategic objectives of sustainable socio-economic development during the crisis, it is necessary to focus more on the regional budget expenditures rather than on other factors determining the GRP values. During the rising phase of the economic cycle, it is necessary to use the positive impact of other factors as much as possible. In order to assess the proportions between GRP indicators and budget expenditures, it is advisable to use the scaling approach, which allows for establishing stable relationships of the socio-economic phenomena in question over time.

The implementation of measures to prevent the strategic risks of sustainable development of the national economy in the context of the manifestation of negative factors of the COVID-19 pandemic at the regional, sub-regional and global levels has demonstrated that the state acts as a guarantor of national security and stability of key economic processes [21]. In this regard, assessments of the rational ratio of regional budget expenditures and GRP in the regions of the Russian Federation should be considered as key indicators of sustainable socio-economic development of the country as a whole [22].

In turn, ensuring the processes of sustainable socio-economic development and national security is achieved by establishing strategic planning goals [23], and monitoring the degree of their achievement. Thus, under the requirements of the Federal Law of 2014 No. 172-FZ [1] "On strategic planning in the Russian Federation", issues of socio-economic development should be considered in the context of achieving the goals of national security. In other words, the strategic objectives of strengthening economic security and ensuring sustainable socio-economic development are connected with ensuring the continuity of strategizing functions of the economic complex of the country.

Given the undoubtedly high interdependence of these processes, the indicators used to monitor economic security and indicators of sustainable socio-economic development should be authentic. At the same time, the goals of sustainable socio-economic development are calculated by indicative values of the adopted scale of national development indicators, and the assessment of the state of economic security is measured through their critical values [24]. Failure to achieve the stated indicative values determines the need to develop new methodological approaches to predicting the manifestation of negative factors and threats to economic security [25].

The novel results obtained have a fundamental character since they are aimed at improving the general theoretical, scientific-methodological, and scientific-practical basis for the implementation of state policy in the formation and sustainable functioning of an integral system of strategizing in the Russian Federation at the federal, sectoral and regional levels of cyclical nature of the crisis manifestations in the world economy. The scope of the results is focused on the implementation of the state policy framework of the Russian Federation in the sphere of strategizing sustainable socio-economic development of the Russian Federation and strengthening national security in the face of challenges and threats to the global economy.

5- Conclusions

Preserving development sustainability in conditions of increasing global risks should be accompanied by the development and implementation of methods and technologies to identify, analyze, and monitor situations and events in which risks or their combinations can transform into crisis phenomena, leading to both local and systemic economic crises. At the same time, recently, in conditions of globalization of the world economic space, increasing world competition, and increasing intensity of external challenges and threats, negative processes and risks have become more acute, whose realization can not only lead to a functioning stability violation of the country's economic complex or its most important sectors but also create obstacles for progressive economic development. At the same time, the rise in international conflict makes it impossible to see any positive changes in the near future. The task of structural and institutional adaptation to global transformations is based on forming a management system capable of acting under various scenarios of pro-crisis development and making anti-crisis decisions. This task was and remains relevant for the Russian economy.

The main purpose is to investigate, identify, and justify the logic, architecture, and order of formation of the system for assessing changes in the statistical values of indicators that characterize the country's socio-economic development processes within the methodology of strategizing. This study uses the term "strategizing," combining the concepts of strategic planning, strategic management, and strategic forecasting. The main study objective is to develop and test the system for assessing the dynamics of socio-economic development in the Russian Federation, based on the interpretation of the calculated values of the scaling factor developed by the authors.

Summarizing, it mentioned that within this study, it has become possible to achieve the set goals and obtain the following practical results:

- In this study, the international experience of a country's strategic planning was looked at, and the main differences in approaches were looked at and analyzed. The study also looked at whether the experience could be used in other countries.

- The methodological approach to the interpretation of the calculated values of the scaling factor developed by the authors makes it possible to forecast the dynamics of the socio-economic development of the Russian Federation.

- The necessity of developing new methodological approaches to forecasting the manifestation of negative factors and threats to economic security has been substantiated.

6- Declarations

6-1- Author Contributions

Conceptualization, V.V.E.; methodology, V.V.E. and T.S.G.; software, V.V.E.; validation, T.S.G.; formal analysis, T.S.G.; investigation, V.V.E.; resources, V.V.E.; data curation, S.A.P.; writing—original draft preparation, S.A.P.; writing—review and editing, V.V.E.; visualization, E.V.Z.; supervision, V.V.E.; project administration, V.V.E. All authors have read and agreed to the published version of the manuscript.

6-2- Data Availability Statement

The data presented in this study are available in the article.

6-3- Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

6-4- Ethical Approval

Not applicable.

6-5- Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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