# Х А Б А Р Ш Ы С Ы

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НАН РК сообщает, что научный журнал «Вестник НАН РК» был принят для индексирования в Emerging Sources CitationIndex, обновленной версии Web of Science. Содержание в этом индексировании находится в стадии рассмотрения компанией Clarivate Analytics для дальнейшего принятия журнала в the Science Citation Index Expanded, the Social Sciences Citation Index и the Arts & Humanities Citation Index. Web of Science предлагает качество и глубину контента для исследователей, авторов, издателей и учреждений. Включение Вестника НАН РК в Emerging Sources Citation Index демонстрирует нашу приверженность к наиболее актуальному и влиятельному мультидисциплинарному контенту для нашего сообщества.

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# GRAVITATION EQUALITY AS BASIS OF THE STATE'S ECONOMIC DEVELOPMENT ALGORITHM IN THE CONTEXT OF FORMING OF THE INDEPENDENT BALANCED ECONOMIC POLICY

**Abstract.** This article presents an algorithm of economic development of state, focused on finding the optimal direction of foreign economic activity in the context of ensuring economic security of region. The developed mechanism makes it possible to take into account the gravitational affiliation of states on the basis of the created integral indicator of the strength of economic gravity. Based on a theoretical assessment of the variability of the paths of economic development, a conclusion is made about the effectiveness of bilateralism in the context of global economic instability.

In the process of building macroeconomic policy, the state assesses the bilateral and multilateral aspects of economic activity. The multifactorial nature of economic activity forms the multitasking of country's economic development. Accordingly, solving economic problems requires a systematic approach. The main stages of the algorithm for choosing the path of economic development of the state:

1. Choosing a direction of economy optimization.

2. Assessment of the foreign policy position of the state, on the basis of which the choice of bilateral or international path is made.

3. Evaluation of bilateral optimization in accordance with the state of the economy.

Bilateral optimization is carried out depending on the economic gravity of states, which determines the type of interaction of elements. When assessing the current level of bilateral economic relations and the formation of prospects for cooperation, it is necessary to use the index of economic gravity of countries, which takes into account a level of trade gravity of countries, an indicator of distance dependence between countries, a measure of political calm and an indicator of monetary and financial proximity of countries.

The developed mechanism of economic actions of the state provides for the existence of an economic and political choice of the vector of economic development, taking into account the state national strategy. Reflecting systemic inversely proportional relationship between the rate of economic growth and country's economic sovereignty, the algorithm is focused on overcoming systemic interstate imbalances in the world economy.

**Keywords**: gravitational equality, algorithm of economic development, force of economic gravity.

**Analysis of publications.** Economic development is a fundamental indicator of the economic situation in the state which reflects the special features of its functioning. Investigating of the mentioned phenomenon has not lost its relevance for the whole history of the existence of economic theory. This area of knowledge is characterized by multitasking of the mentioned process which touches upon not only economic reorganizations, but also social, organizational-administrative and political transformations. In the context of the global economy particular consideration is given to the issues named above, as the globalization of the world space is a mass phenomenon of complex structure where the change of an element causes transformational processes in the range of other elements.

Various scientists have been involved in the study of national security, world order issues, management of socio-economic systems: A. Montchrestien, T. Maltus, J. Schumpeter, R. Solow, T. Swan, R. Harrod, E. Domar, A. Smith, J. Keynes, A. Muller-Armack, T. Veblen, J. Clarke and others. [1-37]

At the same time, special attention is paid to the issues of developing countries, since their resource economies predetermine their status of raw material colony, which contradicts the principle of mutually beneficial development. Consequently, economic progress of some countries causes poverty and underachievement of others.

**Economic development from a perspective of the world economy in the 21ˢᵗ century.** Despite the good perspectives of such a model, the world economy has entered the stage of recession. The crisis of the international organizations system determines the necessity for protectionist measures aimed at preserving national economies. The prevailing foundations of the international economic relations have signs of "co-operative power", which discredits international organizations and pushes countries to search new mechanisms for conducting economic activity that imply economic development regardless of the current situation. In the context of countries' striving to ensure the stability of foreign economic activity, the bilateral format acquires the features of the basis for international activity, which predetermines changes in the structure of economic development. The current system provides for the external economic development of the state as a complex element, which shows the need for the algorithm of economic actions that would take into account comprehensive optimization.

**Economic gravity and external economic choice of the state.** In the process of building macro-economic policies the state evaluates bilateral and multilateral aspects of economic activity conducting. The multifactorial nature of economic activity determines the multitasking of the country's economic development. Accordingly, solving economic problems requires a systematic approach that reflects the search for the most favourable algorithm.

At the initial stage in the process of determining the contents of basic specific indicators the objectivity and accuracy of their selection acquires fundamental importance. Performance of the task involves identifying the causes of external economic activity of the state. The activity mentioned above is focused on commercial growth which is based on economic and financial independence provided there is favourable material and technical condition [52].

Ultimately, one of the key goals of the existence of any state is economic development, which can differ by format and in its most complete form should look like:

$$ED_i = QualG_i^n + QuanG_i^m + ES_i^l, \tag{1}$$

where $ED_i$ is the economic development of the country i, $QualG_i^n$ − n is the number of indicators reflecting the qualitative growth of the economy, $QuanG_i^m$ − m is the number of indicators characterizing the quantitative growth of the economy, $ES_i^l$ − l is the number of determinants of economic security.

In current conditions, this process involves an increase in the well-being of the population, favourable investment climate and continuous scientific and technological progress [35].

Particular importance in these processes must be given to ensuring the economic security of the state. The policy should be aimed at providing economic sovereignty and common economic area (CEA), and the condition of the economic system and government institutions should reflect the country's socially oriented development (SEP) regardless of external (EET) and internal threats (IET) of an economic nature [36,37].

Consequently:

$$ES_i = CEA_i + SEP_i \tag{2}$$

In this way:

$$ES_i^t \neq f(IET, EET) \tag{3}$$

where t is period the of research.

Let us change the initial equation:

$$ED_i = QualG_i^n + QuanG_i^m + CEA_i^t + SEP_i^t \tag{4}$$

The economic development policy of the state should be focused on the four conditions represented in the equation. Its main indicators are the following:

$$EDP_i^t = EDD^t + SR^t = ED_i^t \tag{5},$$

where $EDD$ is the efficient development direction, $SR$ is the source of the economic reformation.

The equation of the maximum resource support of the state is as follows:

$$SR_i^{PCA} = FC_{IO} + \sum FB_i^{t_{IO}} \tag{7},$$

where $t_{IO}$ is the time of receiving the loan from the international organizations.

However, international loans ($FC_{IO}$) are of the primary importance due to the bigger volume of the financing:

$$FC_{IO}^{t_{IO}} > \sum FB_i^{t_{IO}} \tag{8}$$

Let us transform the equation taking into account presented conclusions for the international direction of ensuring the economic development of the state:

$$QualG_i^n + Quan_i^m = [(T + Inv + Mon + Tech + Inst) + BSS] + FC_{IO} + \sum FB_i^{t_{IO}} \tag{9}$$

Taking into account the multiplicity of factors of economic impact on gravitation processes, the gravitation equation is an incomplete tool with respect to the formation of the initial (modern) point of bilateral interaction. Correspondingly, in assessing the current level of bilateral economic relations and the formation of prospects for cooperation, it is necessary to use the index of economic gravity of countries which has the following formula:

$$IndGrav = \frac{Tgrav + Dgrav + Pol + Fin}{4} \tag{10},$$

where $Tgrav$ is the level of the trade gravity of countries, $Dgrav$ is the indicator of the remote dependence of countries, $Pol$ is the degree of political serenity, $Fin$ is the index of financial and monetary proximity of countries.

The economic gravity index reflects the basic postulates of the gravitation equation (the dependence of total trade on the distance between countries) which together with political, monetary and financial indicators allow a qualitative assessment of the degree and the nature of economic relations between countries.

Let us define the mechanism for calculating the mentioned above indicators:

1. Trade is characterized by the share of the state in relation to the most preferable trading partner and is found by the formula:

$$Tgrav_{ij} = \frac{T_{ij}}{T_{imax}} \tag{11},$$

where $T_{ij}$ is the share of the countries' commodity turnover i and j in the general structure of trade i, $T_{imax}$ is the share of the state taking the first position in the trade structure of i. In other terms, $Tgrav=1$ for the most attractive partner for a country's relationship, and, respectively, $Tgrav = 0$ if the trade relationship between countries does not exist.

2. The distance between the countries is calculated according to the formula:

$$Dgrav_{ij} = 1 - \frac{D_{ij} - D_{imin}}{D_{imax}} \tag{12},$$

where $D_{ij}$ is the distance between the capitals of the countries i and j, $D_{imax}$ is the maximum distance of the country i from all its partners, $D_{imin}$ is the minimum distance of the country i from all its partners.

In such a way, $Dgrav$ tends to 1 if the distance between the countries is the shortest in relation to the other states and tends to 0 respectively if the distance is the longest.

3. Political tranquility is determined by the principle of dummy variables taking into account the existence of geopolitical conflicts between countries:

$$Pol = \begin{cases} 0, if\ conflict\ exist \\ 1, if\ it\ is\ not \end{cases}$$

4. Financial gravity of countries is determined by the same principle (1 in the presence of a single monetary and financial system, 0 in its absence).

$$Fin = \begin{cases} 1, with\ unified\ monetary - financial\ system \\ 0, if\ the\ opposite\ is\ true \end{cases}$$

It should be noted that the degree of gravity of bilateral economic relations is determined by the ratio of the Indices of the two countries. If their values are in the 1% range from each other, we can talk about the lack of economic dominance and the triggering effect of economic repulsion on an equal basis with attraction. In the opposite case, we can talk about the belonging of one state to the gravitational field of another.

For convenience, we transform this action into a single integral indicator of gravity which has the form:

$$Sgrav_{(A \to B)} = \frac{(IndGrav_B - IndGrav_A)}{(IndGrav_A + IndGrav_B)/2} * 100 \ (13)$$

Index analysis: if $Sgrav \in [-1; 1]$, it means that there is gravitational equality between the countries; if $Sgrav > 1$, it means that the country A dominates the state B; if $Sgrav < -1$, it means that the country A is in the relationship of gravitational dependence on the state B. It should be noted that $Sgrav_{(A \to B)} = -Sgrav_{(B \to A)}$, i. e. gravitational dominating and dependence always complete each other.

As a result, countries rely on gravitation equality or dependence as optimization directions (10). Gravitation dependence (11) provides for the political independence of the state from the dominant country, which creates a system of "co-operative power" and leads to a partial loss of economic freedoms. However, the achievement of systemic economic development is possible, but only in the conditions of a favorable economic situation of the hegemon (12).

$$QualG_i^n + QuanG_i^m = [(T + Inv + Mon + Tech + Inst) + BSS] + FB_{ij}^{DEP} \quad (14),$$

where j is the economic hegemon.

The most balanced tool providing for mutually beneficial cooperation and strategic partnership is gravitation equality (13) in which the system of economic development will have the following form:

$$QualG_i^n + QuanG_i^m + (CEA_i + SEP_i)^t = [(T + Inv + Mon + Tech + Inst) + BSS] + \sum FB_i^{EQU} \ (15)$$

Optimization of these relationships leads to the differentiation of external economic activity. The key disadvantage of this concept is the limited amount of resources that can be obtained within one bilateral chain. Thus, the achievement of economic development is possible only if the complex of bilateral relations of gravitation equality is optimized.

$$FB_{ij}^{DEP} \approx \sum FB_i^{EQU} \quad (16)$$

Gravitation dependence and dominance should be noted as conditions for the creation of regional integration associations, which can be interpreted as an alternative international level.

The developed mechanism of the state economic actions provides for the existence of the political-economic choice of economic development vector taking into account the state national strategy. Reflecting the systemic inversely proportional relationship between the rate of economic growth and the country's economic sovereignty, the algorithm is focused on overcoming interstate imbalances in the global economy.

**Conclusions.** At the present time in the world there is an objective need for reforming the global system of international relations, which includes is the process of optimizing the economic development of the country and macroregions as an integral element. A key component of the new economic order is the search for a balance between the active external economic activity and the economic security of the state. This approach is focused on the variability of areas of economic development, which suggests the possibility of economic prosperity regardless of the scale and nature of the country's economy. This is particularly relevant for developing countries.

The developed algorithm allows revealing two-sided dominance, dependence or equality accurately. It complements the gravitational theory of economic relations and is located at the junction of the classical approach, Keynesianism and institutionalism, providing a qualitative assessment of the gravitational force of bilateralism.

This algorithm is characterized by several features. The system works in the absence of external economic shocks which cause is not related to the external economic policy of the state (world crises, pandemics, etc.). In addition, there is no unified system of indicators with the highest quality that would reflect the economic progress of the state as well as the correctness and indifference to politics when deciding on the economic direction of development. Thus, a need to develop universal integrated indicators has emerged. In the basis of the indicators mentioned above it is necessary to take into account groups of specific indicators characterizing the most important sides of the object in the research aspect.

Such a study involves an increase in the number of objects, which leads to an increase in the number of connections between them increasing proportionally to the square of the number of objects. Storing in the memory and analyzing a larger set of relationships between objects is limited by the psychological capabilities of a person. Thus, on the stage of the final ranking of a larger number of objects, there is an objective need to minimize the possibility of construction errors.

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## ГРАВИТАЦИЯЛЫҚ ТЕҢДІК ТӘУЕЛСІЗ ТЕҢДЕСТІРІЛГЕН ЭКОНОМИКАЛЫҚ САЯСАТТЫ ҚҰРУ ЖАҒДАЙЫНДА МЕМЛЕКЕТТІҢ ЭКОНОМИКАЛЫҚ ДАМУ АЛГОРИТМІНІҢ БАЗИСІ РЕТІНДЕ

**Аннотация.** Мақалада өңірдің экономикалық қауіпсіздігін қамтамасыз ету жағдайында сыртқы экономикалық қызметтің оңтайлы бағытын іздеуге бағытталған мемлекеттің экономикалық даму алгоритмі ұсынылған. Әзірленген механизм құрылған экономикалық гравитация күшінің интегралды индикаторы негізінде мемлекеттердің гравитациялық қатыстылығын ескеруге мүмкіндік береді. Экономикалық даму жолдарының вариативтілігін теориялық бағалау негізінде жаһандық экономикалық тұрақсыздық жағдайында билате-рализм тиімділігі негізінде қорытынды жасалды.

Макроэкономикалық саясатты құру процесінде мемлекет экономикалық қызметті жүргізудің екіжақты және көпжақты аспектілерін бағалайды. Экономикалық қызметтің көпфакторлылығы елдің экономикалық дамуының көпфункциялылығын қалыптастырады. Тиісінше, экономикалық мәселелерді шешу жүйелі тәсілді қолдануды талап етеді. Мемлекеттің экономикалық даму жолын таңдау алгоритмінің негізгі кезеңдері:

1. Экономиканы оңтайландыру бағытын таңдау.

2. Мемлекеттің сыртқы саяси жағдайын бағалау, соның негізінде билатералдық немесе халықаралық жолды таңдау жүргізіледі.

3. Экономика жағдайына сәйкес билатералды оңтайландыруды бағалау.

Билатералды оңтайландыру элементтерінің өзара әрекет түрін анықтайтын мемлекеттердің экономикалық гравитациясына байланысты жүзеге асырылады. Екіжақты экономикалық қатынастардың ағымдағы деңгейін бағалау және ынтымақтастық перспективаларын қалыптастыруда елдердің сауда гравитация деңгейін, елдер арасындағы қашықтық тәуелділік индикаторын, саяси тыныштық шарасын және елдердің валюталық-қаржылық жақындығының көрсеткішін ескеретін елдердің экономикалық гравитация индексін пайдалану қажет.

Мемлекеттің экономикалық қарым-қатынасының әзірленген тетігі мемлекеттік ұлттық стратегияны ескере отырып, экономикалық даму векторын экономикалық-саяси таңдаудың болғанын көздейді. Экономикалық өсу қарқыны мен елдің экономикалық егемендігі арасындағы жүйелі кері пропорционалды өзара байланысты көрсету арқылы алгоритм әлемдік экономикадағы жүйелі мемлекетаралық теңсіздікті еңсеруге бағытталған.

**Түйін сөздер**: гравитациялық теңдік, экономикалық даму алгоритмі, экономикалық ауырлық күші.

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# ГРАВИТАЦИОННОЕ РАВЕНСТВО КАК БАЗИС АЛГОРИТМА ЭКОНОМИЧЕСКОГО РАЗВИТИЯ ГОСУДАРСТВА В УСЛОВИЯХ ПОСТРОЕНИЯ НЕЗАВИСИМОЙ СБАЛАНСИРОВАННОЙ ЭКОНОМИЧЕСКОЙ ПОЛИТИКИ

**Аннотация.** В данной статье представлен алгоритм экономического развития государства, ориентированный на поиск оптимального направления внешнеэкономической деятельности в контексте обеспечения экономической безопасности региона. Разработанный механизм позволяет учитывать гравитационную принадлежность государств на основе созданного интегрального показателя силы экономической гравитации. На основе теоретической оценки изменчивости траекторий экономического развития делается вывод об эффективности двусторонности в условиях глобальной экономической нестабильности.

В процессе построения макроэкономической политики государство оценивает двусторонние и многосторонние аспекты экономической деятельности. Многофакторность экономической деятельности формирует многозадачность экономического развития страны. Соответственно, решение экономических проблем требует системного подхода. Основные этапы алгоритма выбора пути экономического развития государства:

1. Выбор направления оптимизации экономики.

2. Оценка внешнеполитической позиции государства, на основе которой осуществляется выбор двустороннего или международного пути.

3. Оценка двусторонней оптимизации в соответствии с состоянием экономики.

Билатеральная оптимизация осуществляется в зависимости от экономической тяжести государств, что определяет тип взаимодействия элементов. При оценке текущего уровня двусторонних экономических отношений и формировании перспектив сотрудничества необходимо использовать индекс экономической гравитации стран, который учитывает уровень торговой гравитации стран, показатель дистанционной зависимости между странами, меру политического спокойствия и показатель валютно-финансовой близости стран.

Разработанный механизм экономических действий государства предусматривает наличие экономического и политического выбора вектора экономического развития с учетом государственной национальной стратегии. Отражая системную обратно пропорциональную зависимость между темпами экономического роста и экономическим суверенитетом страны, алгоритм ориентирован на преодоление системных межгосударственных дисбалансов в мировой экономике.

**Ключевые слова:** гравитационное равенство, алгоритм экономического развития, сила экономической гравитации.

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