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PROCESSES OF GLOBALIZATION AND TRANSNATIONALIZATION: THEORETICAL AND METHODOLOGICAL APPROACH TO COMPREHENSIVE EVALUATION

Abstract

Modern tendencies of world economy development are researched. The complex methods of working-out of description models of modern indicators, identified by authors as index of world transnationalization, index of total globalization and index of financial globalization and also an algorithm of their calculation and graphical interpretation is created. The authors' methods of determination of developed indices of world transnationalization, total globalization, and financial globalization, which is on basis on comparative principles of theoretical generalization and improvement of key definitions and on generalization of conceptual approaches to prognosis of state of complex economic phenomenon are presented. Directions of improvement of appropriate methods of supporting of national safety on the basis of usage of formed by authors' indices which provides the possibility to evaluate state of economic safety comprehensively and to

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give scientific credence the most favorable and safe script of integration process for Ukraine are proposed.

Key words:

Globalization, transnational transformations, transnationalization, total globalization, financial globalization, direct foreign investments, corporate (individual) transnationalization, world transnationalization.

JEL: O16, O52.

The dominant trend of the world economic development at the turn of the 20th–21st centuries has been the economic globalization, that as a result of a new unprecedented speeding up of the process of multidimensional structural developments has determined the objective integration character for all major players and institutions of global development, i. e. political (nations, states), economic (corporations), and supranational (international incorporations and international organizations).

In modern discussions started by the world scientists with respect to the genesis, nature and prospects for globalization, different methodic approaches are used, the most original and unique of which have been described by D. Lukyanenko [12: 3–7]. Theoretical visions of the researches have been focused in two main panels: first, it is worth mentioning the transfer of the accents from the discussions on the very fact of globalization existence to reliable evaluations and formulations respective prospects and tendencies, and second, what is meant is «probabilities for comprehensive and clearly determined research of globalization with its challenges, problems, contradictions, perspectives, and negative effects and consequences» [12: 67].

Nevertheless, proceeding from merely theoretical principles, it is impossible to clearly determine the different-vector parameters of future global organization of vital activity of people and nations. Therefore, the need is actualizing of further improvement of methods and techniques for quantitative evaluation of disposition of all global economic players that will enable to deepen its qualitative analysis.

Though the research interest to globalization problems has grown for the latest decades, the practical and methodological issues are still disputable concerning category- and- conceptual identification, possibility of economic evaluation of not only globalization significance, but also the peculiar to the latter transnational transformations with respect to regional groupings, individual countries with different levels of economic development, and the world economy, as a whole.

The aim of this research is to specify the basic notions and peculiarities of the globalization processes of world economy, its financial area and transnational transformations on the basis of conceptual theoretical principles study, development and empiric approbation of comprehensive analysis methods, creation of key indicators for the evaluation of the dynamics of the researched processes.

To meet the set objective we offered the multidimensional method for the model development of quantified assessment of global processes on the basis of seven-stage algorithm of key indicators formation (table 1) and its empiric approbation. Keeping to the determined by the algorithm sequence, we will formulate the indicators for the dimension of the researched processes, and will make the respective empiric computations.

Table 1.

Logic for key indicators creation to evaluate the dynamics of researched processes

Stage	Stage subject matter	Expected result
I	Specification of conceptual and categorical instrument on the basis of comparison of essential significance of key definitions and revealing their substance completion.	Author's definition
II	Study of theoretical basis for prognostication of the state of economic phenomena and the processes through: • Fundamental analysis (F. Block, B. Graham, D. Dodd, I. Zakarian, H. Kim, S. Cottle, B. Likhovidov, R. Murray, S. Turner, M. Thomsett, M . Haertfelder); • Quantitative analysis (Bachelier, Graham); • Technical analysis (H. Dow, E. Nayman, B. Twardovskii, J. Schwager, Elliot, De Mark, Fibonacci); • Economic and mathematic modeling (R.Frisch)	Selection of method approach
III	Choice of mathematic model for constructing the graph interpretation of the process, and on its basis evaluation of indicators prognostication (Box-Jenkins methods Durbin-Wotson and W. Sealy (Student) statistics, Akaike and Bayes-Shvarts criteria, Fischer F-statistics, trends, autoregression model, one-step prognostication, logarithmation).	Relevant model
IV	Creation of indicator system to ensure the quantified evaluation of the investigated process	System of indicators
V	Empiric computations on the basis of the developed indicator system.	Analytical tables
VI	Graphing the behavior of main indicators for visual interpretation and extra argumentation of the revealed trends and regularities.	Graphs
VII	Analytical evaluation of the process, creation of prognosticated information, and design of relevant action plans on the level of national or international structures	Analysis, forecast and measures

1. Key Indicators Creation to Evaluate the Essence and Behavior of the Researched Processes

The creation of key indicators for evaluation of the essence and behavior of the researched processes is based on the authors' developed algorithm and it provides for the actions carried out according to the objectives of the prior four stages.

Stage 1. Specification of conceptual and categorical instrument

Globalization, being the phenomenon of the 20th and 21st centuries, in the wide sense could be interpreted as a process encouraging the civilization to proceed to the higher level of development with the system internationalization of the conditions and areas of human vital activity [12: 66], that implies political, economic, social, ecological, scientific and technical, and other components, thus being of comprehensive overall-embracing character.

O. Bilorus [1,2,3] has fundamentally described globalization as the global mega-system originated through intensive processes of global transformations, globalization of the development and new stage of world integration within the frames of global capitalism and traditional imperialism as its modern specific form and new super-high stage. Determination of other similar notions, like globality, globalism, global studies, and so, is rather ambiguous, though their notional-logic subordination is obvious. Thus, the analysis of literature sources made by D. Lukianenko showed that Russian scientists Yu. Osypov, S. Baburin, V. Belolipetskii, Ye. Zotova interpret globality as a community, while globalization – as the process for reaching globality, and globalism – like conscious implementation of globalization. O. Bilorus considers globalization to be an objective regularity of post industrial civilizational evolution, while globalism – to be a paradox consequence of forced globalization [12: 66].

In addition to evident phenomenal manifestations, the globalization demonstrates asymmetry, asynchronism and disparity of the development. *On the one hand,* it is just the globalization that has to define the way of noosphere-wise development, where radical transformation of social production will occur in the direction of its intellectualization, humanization, sociologization, and that has to produce an unprecedented effect of economic multiplication and an explosive economic development. Modern researches [12: 81–84] refer the development prospects to the model of knowledge-based economy, managed by the intelligent capital, implying human capital as an aggregate of knowledge, skills and creative abilities of a person plus structural capital as technical, information and organization facilitation for its implementation. Today in the countries of the Organization of Economic Cooperation and Development over half of GDP volume has been created in the area of knowledge-based production. *On the other hand,* more and more researchers, political and state figures come to the con-

clusion that this new system of world order will inevitably bring about global apocalypse [2, 6, 8, 12] implying inevitability and absolute character of global challenges and threats.

Since the objective matter of the globalization consists of the processes which are different in their origin, manifestation areas mechanisms and outcomes, the globalization provides a sophisticated contradictory phenomenon filled with different, sometimes polar processes of economic and social human life, as well as with new challenges for national economies, and that causes the emerging of different theoretical concepts and scientific discussions.

In this context, D. Lukianenko considers indicative from theoretical view, to realize the concept of «new economy» as truly global both, according to the vital activity areas encountered, and according to the technologies of running business [12: 81]. The phenomenon is meant of «high-tech companies», who use Internet as a major economic resource; global cluster of economy, which produces the software, either provides technologies for other areas of application; patterns of electronic practices instrumentally based on Internet and directed at building new economic models; 'information paradigm of socio-economic development based on the fact, that the condition, basis and objective for human society development is accumulation of useful information and improvement of techniques for its processing and use; global informatization as the manifestation of the essence of post-industrial development and key technological challenge of a universal character in the 21st century, therefore, all the countries should search the solutions in all areas of vital activity to meet those challenges.

Some authors consider relative independence on national borders to be one of the main descriptions of «new economy». In D. Lukianenko's opinion, this feature could be considered as a basic one, since «ex-territoriality» and «ex-statehoodness» comprise both global advantages of «new economy», and its probable global disadvantages. He considerers that trans-nationalization acquires new impulses and new more contradictory quality through creation of global corporate structures mostly because of merges and absorptions, likewise regional economic integration does entering continental and intercontinental level [12: 86].

One more point of view is worth mentioning, referring harmonization of global process. Here, on the one hand, new functional forms and mechanisms are required for harmonization of national economic interests, policies and actions, and on the other hand, global thinking should be formed, when business motivation is based on innovation and secure of the development. It is enabled specifically under condition of humanization of the world economic development based on its intellectualization, socialization and ecologylization, and that corroborates our hypotheses.

In future it will imply maximal use of integrated information and world intellectual potential, creation of qualitatively new [in modern sense, global noo-

sphere-space) economy of the third millennium. The true global economy will be dominated by global mind against global interest [12: 86–87].

Hence, globalization quantitatively encounters the whole world through, while qualitatively it embraces all areas of human vital activity. Therefore, we can speak about political, economic and socio-cultural globalization tentatively, within the frames of abstract method.

According to O. Bilorus' [1, 2, 3] estimations modern researches [7, 8, 11, 19, 20] most frequently define the following essential peculiarities:

- Taking the economic interests of national economic agents out of national – governmental frames;
- Access of national corporations to global market, that is being created;
- Transformation of national corporations into TNCs with successive transformation into global corporations;
- Expansion of the activity area of transnational economic and financial structures up to that of global markets;
- Impossibility for most economic and social problems to be solved on limited national level;
- Intensification of economic situation dependence in most countries upon that in the leading countries of globalization;
- Dolarization expansion of national economies;
- Intensification of volunteer-forced coordination of national economic and financial strategies and policies on global level [specifically, in the area of trade, finance, ecology, employment, and migration).

In this context, D. Lukianenko considers economic globalization to be a higher level of economic life internationalization with unprecedented scopes and qualitatively new dynamics of international production and exchange. In his opinion, while being in close interrelation with other components of general globalization process [i. e. political, scientific and technical, information, ecologic, and socio-cultural], in its turn, it is under the influence of domestic structuring [12: 73–74], that is, it could be differentiated into production, trade, financial-investment, infrastructure, etc. ones.

The quantitative parameters of economic globalization usually comprise enormous scopes of direct international production, exchange and consuming on account of outstripping GDP growth, dynamics of international trade in goods and services, direct and portfolio foreign investments, and exchange currency transactions.

It is worth noting, that in modern paradigm-wise determinations of globalization the thought is prevailing to view the economic globalization as the initial

one, the basis of which makes financial and investment interaction, though global unbalances are of objective system-based character. That is the reason why financial globalism is becoming a more attractive area of researches.

Indeed, if functional-branch-wise specification of economic globalization unbalance is studied, the outrun activity of international flows of capital is observed against the activity of commodities or financial services. In his publications [12: 100] D. Lukianenko notes, that having originated on commodity markets as a result of sales, and then manufacturing TNCs activity, recently globalization has been developing mostly on financial and investment basis. That was induced by many factors, specifically by free movement of capital in global information and communication net under significant restrictions on the markets of commodities, commercial services, and labor force. Actually, at the moment the volumes of transactions on international credit, investment, and particularly, currency markets by several orders exceed the volumes of commodity sales activity, and each dollar of a real sector of world economy accounts for one hundred dollars in financial area.

Different velocity of production factors movement with the outrun dynamics of international capital exchange distorts the global reproducing processes, at that discrediting traditional theoretical views respective macroeconomic proportions, stability, effectiveness, and competition. Primarily, it refers to operations on the globalized securities market, which at the moment are not only a key segment of financial market, but due to its integrated nature, provide a comparatively independent element of modern market infrastructure [12: 100]. On the one hand, the movement of securities in their constant changeable variety dynamicizes, at that ensuring self-regulation of national and international economic systems under conditions of regulation of the securities market through instruments coincident with its scope and structure. On the other side, regulative problems are more complicated and urgent in the conditions of apparent interrelation between the investment instruments and interpenetration not only of financial market segments, but also their integration into the markets of resources, commodities and services [14, 15, 16].

The flows of resources on financial markets are rather changeable in functional and institutional aspects, and the investment market is described by continuous differentiation, diversification of certain segments, and mostly by global character of functioning.

In the globalization epoch financial area demonstrates ever-increasing self-sufficiency and independence from regulatory mechanisms of macroeconomic policies effects of the world countries. While determining by its own the parameters of global financial aggregates, it is able to ensure gaining of surplus profits and it induces the increase of financial imbalances in world economy.

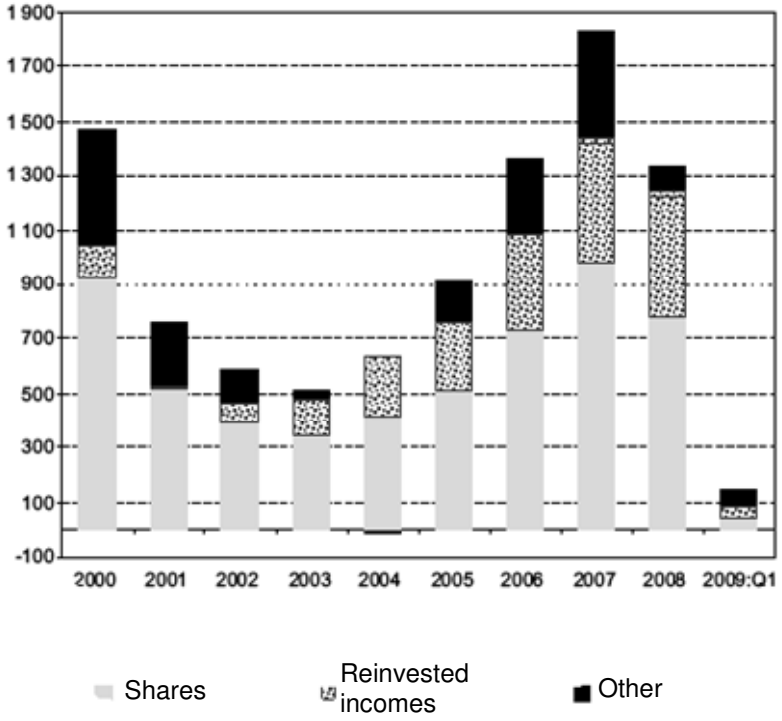
The notion of financial globalization as one of the components of economic globalization is connected with sharp increase of international monetary and financial relations for the latest decades, which primarily was enabled by expansion of investment and credit activity of transnational corporations and

banks, liberalization of currency exchange, investment, and credit markets, wider access of different countries to global financial resources, and diversification of concentration for mechanisms of investment resources [14, 15]. The corroboration of that is, in particular, large-scale values of world trans-border financial flows, including foreign direct investments, injections into securities and debt securities, as well as trans-border loans and deposits [fig. 1], which from 2003 increased more than three times, though somewhat decreased since the beginning of global financial crisis.

That phenomenon is often considered as a significant factor of economic development, on the one hand, and on the other – as exacerbation in the world scope the problems of financial, and specifically, exchange currency crises.

Figure 1.

Structure of Global FDI Flows [33]



In addition to the fact, that financial globalization makes the world economy an integral structure and internal unity, it causes deepening of asymmetry of regional and structural – functional distribution of global capital [table 2], thus stimulating its excess concentration in a small group of post-industrial countries, and creating a kind of financial captivity for backward countries, who because of mechanisms of external financing and liberalization of domestic financial markets find themselves before menace to loose economic and political sovereignty.

Table 2.

World FDI Flows in Regions [32]

№	Region	FDI Inflow (US mln.dol.)			FDI Outflow (US mln.dol.)		
		2006	2007	2008	2006	2007	2008
1	Whole world	1 461 074	1 978 838	1 697 353	1 396 916	2 146 522	1 857 734
2	Developed countries	972 762	1 358 628	962 259	1 157 910	1 809 531	1 506 528
3	Developing countries	433 764	529 344	620 733	215 282	285 486	292 710
4	Asian region	283 402	332 682	388 709	144 492	223 130	220 194
5	South-Eastern Europe and CSE countries	54 548	90 866	114 361	23 724	51 505	58 496

In inter-state plan the financial and investment projects have been implemented. Their participants mainly are all major players, including physical persons, corporations, governments, and international organizations. Consequently, not only investment practice is significantly corrected, but also the activity of traditional regulative institutions is somewhat discredited [12: 100–102]. Thus, hypothetically we can speak about certain interrelation and interdependence of such phenomena as investment corporate activity and state regulatory and supra-state activity, which is corroborated by our empiric researches [fig. 2].

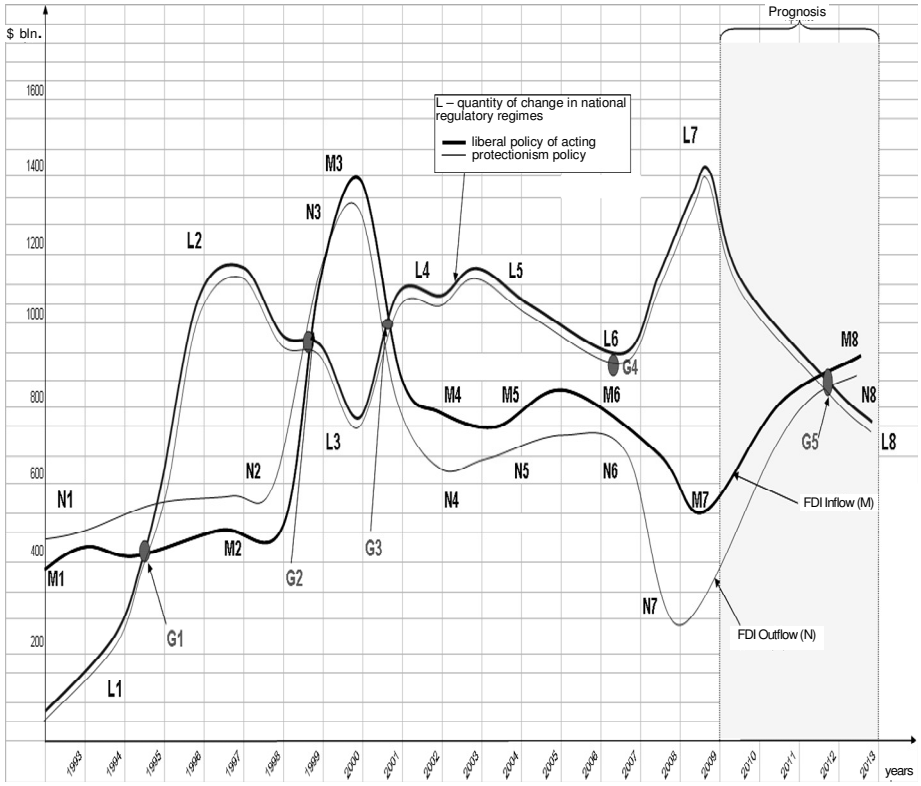
In general, we can not help agreeing with O. Bilorus' point of view that globalism manifests itself as a system of utter economic and political power of new global monopolistic corporations, which got out of control of the countries of their origin and basing. They maneuver financial capital making it circulate on the world market with «the light velocity», and through masterly avoided taxation**,** strengthen exploitation in many countries, including that in their own ones. O. Bilorus views global corporations' civilization as increase of menace to humanity, and the latter should make its choice [1, 2, 3, 5]. U. Back accentuates that in the process of globalization national states and their sovereignties inter-

vene into the net of transnational subjects and comply with their authority opportunities, their orientations and their identities [22, 23]. Th. Levitt [29] like many other researches [13, 17, 18, 19, 20, 21, 24, 25, 26, 28, 30, 31] refers the notion of globalization to the market integration of certain products produced by TNCs.

It is worth accentuating the fact, that the globalization process acquires a new quality under the influence of modern system-based transformations. It implies that from the tendency to globalization there comes the speeded up development and switch to all-around process of complicated motivation, positive and negative effects of system nature. Transnationalization comprising creation of global corporate structures mainly through merging and absorptions, likewise regional economic integration entering continental and intercontinental levels acquire new impetus and new, a more contradictory quality.

Figure 2.

Comparative Behavior of Investment Corporate Activity and Regulatory Activity of the Governments of National Economies
(developed by the authors)



O. Bilorus considers one of the distinctive features of global transformation of modern world economy to be speeding up of structural changes, that, on the one hand, breaks new grounds for the countries to increase the production of material values, improvement of people's life quality, and on the other hand, it shows new requirements the world countries will face within transnationalization process [1, 2, 3].

Thus, the comparative assessment of conceptual globalization principles covered in the papers by O. Bilorus, D. Brock, I. Wallerstein, O. Havryliuk, M. Deliahin, S. Dolhov, V. Inozemtsev, M. Castells, M. Kim, V. Kuznetsov, D. Lukianenko, J. Nesbitt, A. Obukhov, V. Ovchynnikov, Yu. Pakhomov, A. Poruchnyk, V. Sidenko, V. Sokolov, J. Stiglitz, A. Stryzhenko, A. Filipenko, M. Khokhlov, O. Cherkovets, T. Tsyhankova, V. Chuzhykova; the processes making the basis of financial globalization researched in the papers by P.-R. Agenor, C. Wei, H. Edison, M. Kos, V. Korneyev, S. Kotyolkin, A. Kredisov, R. Levin, F. Lein, Z. Lutsyshyn, G.-M.Milesi-Ferretti, S. Moiseyev, M. Obstfeld, E. Prasad, O. Plotnikov, L. Richie, O. Rohach, K. Rogoff, T. Slock, N. Stukalo, A. Taylor, T. Sheremet, and others, as well as the transnationalization processes that for a long time have been studied by V. Heyets, B. Hubskii, Yu. Makohon, V. Novytskii, Ye. Panchenko, V. Rokochi, Ye. Savelyev, I. Shkola and others, contributed much to better understanding of modern problems of the development of global economy and particularities of national economies functioning there, also understanding of interrelations among those economies. Moreover, the researches of the named authors enabled to make the following *theoretical generalizations and conclusions*:

- One of the leading trends in the development of modern world economic system is globalization, that is a qualitatively new stage of internationalization and that provides for setting a direct connection between national economies and world economy. Globalization encounters the whole world quantitatively, while qualitatively it covers all areas of human vital activity. Therefore, specifically political, economic, and socio-cultural globalization could be implied tentatively within the abstract method.
- Financial-investment interrelation makes the basis of economic globalism, since lately globalization has been developing mainly on the financial and investment basis. That was induced by many factors, in particular, by free movement of trans-national capital and speeding up of the process of structural changes within trans-nationalization process.
- Trans-nationalization has got new impulses and new, more contradictory quality, and, in its turn, it puts forward new demands for the world countries.
- Activity of trans-national capital on global financial markets becomes a catalyst of global transformations. Therefore, the subject of research

should become the processes of *trans-nationalization*, *overall globalization and financial globalization.*

Thus, grounding on the authors' researches of theoretical models and concepts that explain essence, and reasons for arising and evolution of the researched processes we suggest that **trans-nationalization** should be identified as the most mature and completed stage in the process of internationalization of business activity of the subjects of any property form, that is described by high level of geographical diversification of resource provision system (i. e. inventory resource, intellectual and personnel resource, financial, and information resource); specified by flexible organizational architecture with obligatory segmentation of one (or several) leading ideological strategic nucleus producing a unique business ideology with the synthesis of the philosophy of voluntarism, pragmatism and liberalism; priority utilization of foreign direct investment as an instrument of foreign economic expansion; aspiration of corporate top management towards global domination on the basis of purposeful use of financial power, information and political influence, coalition might of connections with governments, and instruments for power game and hidden pressure.

Being a worldwide phenomenon the transnationalization provides an objective process of the world integration intensification resulted by expansive intensification of TNCs international operations.

Proceeding from the above mentioned, we consider it necessary for differentiation of the studied notions and phenomena to introduce the *identification index accents,* enabling to concretize the scope of transnationalization process, specifically, **world trans-nationalization and corporate trans-nationalization**.

We identify the ***total globalization*** as objectively regular, quantitatively all-embracing and all-involving process of a new era evolution creation for fusion of available social environment, nations, political, socio-cultural, and economic systems at the background of fundamental qualitative transformations in all areas of social life, that is of complicated motivation nature, and produces positive and negative effects, and has system-wise consequences.

Within the system-based research the essence of financial globalization is revealed as extreme multi-valued process enabling not only to eliminate regional imbalance of financial assets accrue, but also allows the countries – world financial centers to become «financial managers» of global world. Therefore, we can argue, that **financial globalization** is one of the lines of universal globalization, which at the background of large-scope liberalization of currency regimes and development of information technologies enables rapid increase of world financial flows and operations on world financial markets; peak of financial engineering, that promotes extension of fictitious capital and provokes emerging of «financial bubbles»; consolidating of integration ties among national financial markets, and their rapid transformation into a single world financial area with the respective modified configuration of world financial architecture.

Thus, the mentioned approaches to the identification of the notions of trans-nationalization, universal globalization and financial globalization create the preconditions for updating the indexes of their dimension, and revealing of the tendency towards development and mutual conditioning.

Stage 2. Study of Theoretical Basis of the Analysis and Prognostication of Trans-nationalization and Globalization Processes Position

The science-based evaluation of such sophisticated phenomena as trans-nationalization and globalization do not seem to be possible without empiric researches of the state, development, and forecasting of their probable behavior scenarios. As far as modern world economic development is described by deep complexity of its processes, the standard methods for modeling numeric rows for the analysis and prognostication in those conditions are not always succeeding. Therefore, we have chosen the methods based on comparative principles of theoretical generalization and improvement of key definitions, and generalization of conceptual approaches to retrospective analysis and prognostication, in particular, the fundamental one (F. Block, B. Graham, D. Dodd, I. Zakatian, H. Kim**,** S. Cottle, V. Likhovidov, R. Murrey, S. Turner, M. Thomsett< M. Haertfelder), technical (Ch. Dow, E. Nayman), V. Tvardovskii, J. Schwager), quantitative (Bachelieu**,** Graham) and economic and mathematical modeling (R. Frisch) [7, 9, 10, 11, 24, 25, 26, 29, 31].

Stage 3. Choice of Mathematical Model for Construction of Researched Processes Graph Interpretation

Selective approach to choice of mathematical model and construction of graph interpretation of the process is based on determination of positive trend through visual analysis, since it is impossible to determine independent variables (regressors) because that trend's peculiarity was the long-term development towards increase of indexes with significant fluctuations at the end of the period. It conditions necessity to select a relevant model from among the developed autoregressive models-candidates modified after Box-Jenkins method [4]. The latter ensures the model of high adequacy rate under condition of using the information statistical indexes and keeping to the requirements of the parameters assessment method.

To assess the model quality (adequacy) we used Durbin-Watson (DW) statistics with the checking of significance of the model parameters assessment through Student t-statistics, Akaike and Bayes-Shvarts information criteria, Fischer F-Statistics [24, 25] with computation of average absolute value of error (AAVE), mean square of error (MSE), sum of squares of errors (SSE), and average absolute error in per cent (AAEP). For construction of autoregressive model of the process the values of autocorrelation and partially autocorrelation functions were computed, also the least-squared methods, trends, one-step forecasting and logarithmic calculations were applied. The assessment results of analyzed models and forecasts are demonstrated in table 3.

Table 3.

Results of Modeling and One-step Forecasting of Researched Process

Type of model	Description of model			Descriptions of one-step forecasting			
	R^2	$\sum e^2(k)$	*DW*	*СеКП*	*САП*	*САПП*	Weibull tail-coefficient
AP(1)+trend	0,874	669587	1,22	173,95	92,91	30,93	0,1761
AP(1,4)+trend	0,890	545316	1,52	187,15	106,71	39,68	0,1779
AP(1,13)+trend	0,865	513607	1,95	259,21	163,66	31,12	0,2079
Models for logarithmic data							
AP(1)+trend	0,979	1,432	1,136	0,263	0,213	4,29	0,0256
AP(1,13)+trend	0,956	1,029	1,366	0,280	0,226	3,985	0,0103

The results of modeling show that one of the constructed models enables to estimate short-term and long-term forecasts with average absolute error of about 3.985 %. It is an acceptable result if to take into account that financial and economic forecasts are considered to be adequate under the errors of 30 %.

Application of economic and mathematical methods for determination of quantitative criteria allows creating a renewed system of required indexes.

Stage 4. Creation of Indication System for Quantified Estimation of the Researched Process

4.1. Indexes for Trans-nationalization Process Estimation

A. Index of Corporate (Individual) Trans-nationalization. Known in economic literature trans-nationalization index respective every individual TNC (I_{TH}) after UNCTAD technique is determined as an arithmetical average of three following values*: i_A – share of foreign assets in total volume of assets, $i_П$ – share of foreign sales in total volume of sales, $i_{чП}$ – ratio of foreign employees in total number of all employees* (Table 4).

Nevertheless, taking into account comprehensive nature and multi-aspect description of trans-nationalization process, and proceeding from the necessity to involve as many criteria as possible, we have offered the improved technique for calculation of trans-nationalization index $(I_{TH(У)})$ due to introduction into it two other indexes, i. e. :

- *Commodity (branch-wise) diversification* $(i_{ТД})$ – ratio of a number of branches involved in TNC activity to total number of activities according to statistics (for example, following the UNCTAD recommendations, thirty three economic sectors are taken into account [32]:

Table 4.

Ten Major Non-Funded World Corporations as for 2009 in Volumes of Foreign Assets (USA mln. dollars) and Trans-nationalization Index (after UNCTAD method)

№	THC	Home country	Industry	Assets		Sales		TNI (%)
				Foreign	Total	Foreign	Total	
1	General Electric	USA	El.-Techn.	420 300	795 337	86 519	172 738	51,4
2	Vodafone Group Plc	United Kingdom	Tele-communications	230 600	254 948	60 317	71 070	87,0
3	Royal Dutch/ Shell Group	Nether-lands Un. Kingdom	Oil	196 828	269 470	207 317	355 782	71,3
4	British Petroleum Company Plc	United Kingdom	Oil	185 323	236 076	223 216	284 365	79,9
5	Exxon Mobil	USA	Oil	174 726	242 082	269 184	390 328	68,0
6	Toyota Motor Corpo-ration	Japan	Automo-bile	153 406	284 722	145 815	230 607	51,9
7	Total	France	Oil	143 814	167 144	177 835	233 699	74,5
8	Electricité De France	France	Electricity Produc-tion	128 971	274 031	40 343	87 792	34,7
9	Ford Mo-tor Com-pany	USA	Automo-bile	127 854	276 459	91 581	172 455	51,3
10	E.ON AG	Німеч-чина	Electricity Produc-tion	123 443	202 111	41 391	101 179	53,6

$$i_{ТД} = \frac{ТД_Г}{\sum ТД_{ГЗ}},$$

where $ТД_Г$ – number of branches involved in TNC activities;

$\sum ТД_{ГЗ}$ – total number of branch-wise activities (in our further calculations equals 33.

- *geographic diversification* ($i_{ГД}$) – ratio of a number of countries of corporation (presence) geographic diversification to total number of countries on geopolitical map of the world (193 countries according to UNO indexes as for 2009) [32].

$$i_{ГД} = \frac{ГД_К}{\sum ГД_{КЗ}},$$

where $ГД_К$ – number of countries of geographic diversification corporations,

$\sum ГД_{КЗ}$ – total number of world countries (*in our further calculations equaling 193).*

In appliance with the authors' method and made amendments the improved TNC trans-nationalization index is like the following:

$$I_{ТН} = \frac{(i_А + i_П + i_{ЧП} + i_{ТД} + i_{ГД})}{5}.$$

To refer the given index to a certain TNC, we think it feasible to identify it as an *individual trans-nationalization index.*

In our research the empiric computations of the given index are made on the bases of two following dynamic series:

- TNC one hundred – element series (corporation selection is based on TNC grading in 2008 published in WIR UNCTAD 2009 report [32, 33] after rating tables of «25 top major TNCs of the developed countries», «25 top major TNCs of the developing countries», «25 top major TNCs of CEU countries, «25 top major financial TNCs»);
- One-hundred element time series (from 1920 to 2020 (table 5).

Selective comparison of the improved index ($I_{ТН(У)}$), and the traditional one enabled to corroborate our approach to be more efficient and analytical (table 6). The sampling was made in the leading corporations after 2008 rating, and in periods indicating the beginning of each world economic crisis. To make the table construction more convenient in reference, the following indications were used: A – for $I_{ТН}$ value after UNCTAD method, B – for $I_{ТН}$ value after the authors' method.

Table 5.

Computation of individual trans-nationalization index*

№	TNC	Years													
		1920	1930	1940	1950	1960	1970	1980	1990	2000	2005	2009	Forecast		
													2010	2015	2020
Group 1: Top 25 TNCs of developed countries															
1	General Electric	10,14	12,59	19,42	20,71	43,48	55,50	71,07	77,00	50,38	82,64	58,93	66,40	91,78	94,53
2	Voda-fone Group Plc	14,00	12,03	18,99	22,81	47,59	57,62	70,85	79,20	47,60	82,03	50,23	65,81	87,69	94,99
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
24	Eads	6,48	8,54	18,81	22,18	45,45	56,33	71,36	79,50	44,61	80,61	57,25	65,49	86,97	94,09
25	Nestlé SA	7,07	9,92	16,33	24,19	44,83	57,37	71,78	93,67	93,42	97,29	90,51	94,70	94,65	94,07
Group 2: Top 25 TNCs of the developing countries															
26	Hutchison Whampoa Limited	*	*	11,38	13,89	24,31	36,51	52,70	60,56	57,43	83,74	67,66	73,64	88,54	90,90
27	Cemex S.A.	*	*	10,02	11,16	22,56	38,94	51,35	62,67	54,69	82,66	65,10	70,18	91,56	91,93
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
49	Flextro-nics In-ternation al Ltd.	*	*	13,25	14,28	20,76	35,33	54,40	60,04	54,49	78,50	65,77	73,66	92,34	93,28
50	New World Develop ment Co.	*	*	12,86	13,74	24,49	38,01	53,06	60,49	58,05	83,29	64,84	72,27	88,80	94,80
Group 3: Top 25 TNCs of the CEE countries															
51	Gazprom	*	*	*	*	*	*	*	38,07	54,06	74,79	54,18	74,68	78,90	79,29
52	Lukoil	*	*	*	*	*	*	*	37,56	56,22	72,96	49,63	74,63	72,24	80,08
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
74	Severstal	*	*	*	*	*	*	*	43,99	47,77	71,82	53,61	70,60	77,20	76,05
75	Mechel	*	*	*	*	*	*	*	47,10	45,13	72,36	51,01	70,66	75,84	82,72
Group 4:Top 25 world financial TNCs															
76	GE Capital Services	*	*	*	*	*	40,07	62,37	60,06	23,89	77,49	42,85	58,85	78,12	86,57
77	Citigroup	*	*	*	*	*	43,28	60,29	61,36	19,00	79,03	41,67	54,77	76,80	86,50
…	…	…	…	…	…	…	…	…	…	…	…	…	…	…	…
99	Royal Bank of Canada	*	*	*	*	*	42,67	61,32	63,31	17,32	75,31	44,86	59,37	77,82	89,95
100	Banca Intesa	*	*	*	*	*	43,97	62,64	61,34	18,20	79,83	44,65	55,38	83,90	80,66

*To simplify visual study of the table contents we present specifically samples of the received results.

Table 6

Comparative analysis of the results for trans-nationalization index computation after UNCTAD method and the authors' method (%)

TNC	1929		1970		1998		2004		2007	
	A	B	A	B	A	B	A	B	A	B
General Electric	7,39	5,40	55,50	19,30	52,56	30,80	84,42	53,90	51,81	45,60
Hutchison Whampoa Limited	*	*	36,51	4,50	58,88	52,70	80,42	70,50	69,66	82,70
Gazprom	*	*	*	*	47,82	17,65	69,58	29,50	56,90	57,50
GE Capital Services	*	*	40,07	*	20,76	21,70	79,12	26,50	47,28	39,40

Basing on the results of comparative analysis of trans-nationalization index computation after both methods we can argue that the index value calculated after the authors' method more precisely characterizes the development of the company as a trans-national one, and proves that quantitative criteria of commodity and geographic diversifications are critical indicators of the firm's rate as an international one. Moreover, the behavior of index value corroborates the fact that at the beginning of internationalization period companies were minor diversified and only from 20 % to 25 % of their activity entered the foreign market through establishing small but powerful branches.

The greatest increment of index growth for the period from 1970 to the end of the millennium shows significant activation of TNC investment activity, mainly directed at the creation of new structures in as many countries as possible. Decrease of index growth rate occurred from the beginning of the third millennium manifests changes in TNC investment behavior biased to merges and fusions of other mighty companies. The index growth is tending to characterize the aggressive companies, or such firm strategists as Vodafone, ExxonMobil, and Samsung Electronics at the background of obvious index fall of those who are loosing international positions, like their shares of assets (GM, AIG).

The improved method received at the previous stage of modeling for diagnostics of trans-nationalization rate of a certain TNC improves the quality of the gained results, but it does not enable to assess (evaluate) trans-nationalization within the scope of the whole world. Therefore, we have developed and offered a new indicator of **global trans-nationalization** level. Due to overall covering of the most powerful TNCs united into groups on the basis of generally known classifications and ratings of world financial organizations that indicator enables to extrapolate the received results to the whole world area.

In addition, we suggest that generalized evaluation of trans-nationalization level should be made after main industries; individually for American TNCs; specifically for BRIC countries (Brazil, Russia, India, China), that will allow from the view of strategic horizons observe favorable or threatening trends for social development.

B. Index of global trans-nationalization. The initial stage for the development of statistical average index of global trans-nationalization can be a base matrix where the horizontal dynamic series *(j)* consists of *m* – element time series (years from 1 to *m);* vertical dynamic series *(i)* cascaded after ordinal numbers of TNC grouped in 25»Top» under four groups, and it acquires values in the interval from 1 to *n* (table 7). Proceeding from the above mentioned, annual statistical average index of global trans-nationalization is calculated by the below formula:

$$I_{TH_{ij}} = \left(\frac{\sum_{i=1}^{n} I_{\overline{TH}_{ij}}}{n} \right) = \left(\frac{I_{\overline{TH}_{1j}} + I_{\overline{TH}_{2j}} + ... + I_{\overline{TH}_{(n-1;j)}} + I_{\overline{TH}_{nj}}}{n} \right),$$

where $i = [1; n]$,

$j = [1; m]$,

$I_{TH_{ij}}$ – individual index of a certain TNC trans-nationalization for a certain year.

Table7.

Base matrix for computation of global trans-nationalization statistical average index[1]

№ *i*=[1;*n*]	TNC	Home country	Priority industry	Indication and computation index	Years: *j*=[1;*m*]			
					ITH i1	...	*ITH i*(*m*-1)	*ITH im*
Group 1: Top 25 TNC s of developed countries								
1				*ITH 1j*				
…				…				
25				*ITH 25j*				
Total in group № 1 $\left(\sum_{i=1}^{25} I_{TH1j} + ... + I_{TH25j} \right) / 25$								
Group 2: Top 25 TNCs of developing countries								
Total in group № 2 $\left(\sum_{i=26}^{50} I_{TH26j} + ... + I_{TH50j} \right) / 25$								

[1] Sample data.

№ i=[1;n]	TNC	Home country	Priority industry	Indication and computation index	Years: j=[1;m]			
					ITH i1	...	*ITH i*(m-1)	*ITH im*
Group 3: Top 25 TNCs of CEE countries								
Total in group № 3 $\left(\sum_{i=51}^{75} I_{TH51\,j}+...+I_{TH75\,j}\right)/25$								
Group 4: Top 25 financial world TNCs								
100				*ITH 100j*				
Total in group № 4 $\left(\sum_{i=76}^{100} I_{TH76\,j}+...+I_{TH100\,j}\right)/25$								
Index of global trans- nationalization $I_{\overline{TH}_{ij}} = \left(\frac{\sum_{i=1}^{n} I_{TH_{ij}}}{n}\right) = \left(\frac{I_{TH_{1j}} + I_{TH_{2j}} + ... + I_{TH_{(n-1;j)}} + I_{TH_{nj}}}{n}\right)$								

4.2 Evaluation Indexes of Comprehensive Globalization Process

Known from economic sources [32, 33] globalization index since 2001 has been computed according to the method of authoritative *Foreign Policy* journal, and is based on statistical data characterizing the most important areas of social and economic development of over sixty world countries. In *FP* analysts' opinion, that method ensures maximal information and sufficiency of the given dynamic series for revealing general regularities of analyzed process due to analysis of over 90 % of world economy and survey of over 85 % of world population.

The computation comprises four following main groups of factors:

Group 1-a: Economic integration (volume of international trade, volume of foreign direct investments, volume of portfolio investment, volume of investment earnings.

Group 2-a**:** Technological capacity to interact (a number of Internet users, a number of web sites, a number of security servers for performing enciphered transactions);

Group 3-a: Personal international contacts (international trips and tourism, international telephone traffic, international cash remittance and individual transfers, including non-resident wages, employees' compensations, and other private transfers of money);

Group 4-a: Involvement into global political processes (membership in international organizations, financial and humanitarian participation in the missions of UNO Security Council, a number of UNO international agreements, volume of governmental international financial flows).

(Continuation – in the next issue)

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