

ANALYZING THE INTERNATIONAL SYSTEM USING GENERAL SYSTEM ONTOLOGY CONSIDERING THE GLOBAL DEMOGRAPHIC TRANSITION AND THE LAST DECADES OF GLOBALIZATION

АНАЛІЗ МІЖНАРОДНОЇ СИСТЕМИ ЗА ДОПОМОГОЮ ОНТОЛОГІЇ ЗАГАЛЬНОЇ ТЕОРІЇ СИСТЕМ У КОНТЕКСТІ ГЛОБАЛЬНОГО ДЕМОГРАФІЧНОГО ПЕРЕХОДУ Й ОСТАННІХ ДЕСЯТИЛІТЬ ГЛОБАЛІЗАЦІЇ

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Abstract. *The article aims to update the use of the ontology of general systems theory in the analysis of the evolution of the modern system of international relations. The article analyzes the main schools of modern international relations theory, which in one form or another turn to the ontology of general systems theory together with criticism, inherent limitations in the use of the main categories and patterns of general systems theory. The author focused his analysis on the features of the structure of the international system, especially in the aspect of the element-structure dialectic at the macro level of system organization in order to analyze how global trends in the development of international relations are capable of introducing fundamental changes into the global architecture of international politics in the next decades of the 21st century. At the same time, the author proceeded from the presumption that in the second half of the 21st century social crises associated with the uneven distribution of wealth; economic capabilities, caused by the inefficiency of the economic system in the context of the global trend of population decline in the most industrialized countries; as well as the consequences of the environmental crisis associated with the extreme exploitation level of natural resources, foremost in the countries of the so-called global South, maintaining that aforementioned developments had precipitated the landslide transformations of the post bipolar international system.*

Key words: *international system, general system theory, globalization, population growth, post bipolar international system.*

Анотація. *Стаття має на меті актуалізувати використання онтології загальної теорії систем в аналізі еволюції сучасної системи міжнародних відносин. У статті аналізуються основні школи сучасної теорії міжнародних відносин, які у тому чи іншому вигляді звертаються до онтології загальної теорії систем разом із критикою, властивими їм обмеженнями у використанні основних категорій та закономірностей загальної теорії систем. Автор сфокусував свій аналіз на особливостях структури міжнародної системи, особливо в аспекті діалектики елемент-структура на макрорівні системної організації, щоб проаналізувати, яким чином глобальні тренди у розвитку міжнародних відносин здатні внести кардинальні зміни до глобальної архітектури міжнародної політики у наступні десятиліття 21 століття. При цьому автор виходив із презумпції, що у другій половині 21 століття соціальні кризи, пов'язані з нерівномірним розподілом багатств; економічні,*

викликані неефективністю економічної системи за умов глобальної тенденції зменшення чисельності населення найбільш індустріально розвинених держав; а також наслідки екологічної кризи, пов'язаної з екстремальним рівнем експлуатації природних ресурсів, особливо у країнах так званого глобального Півдня, наблизили момент широкомасштабної трансформації всієї пост-біполярної системи міжнародних відносин.

Ключові слова: міжнародна система, загальна теорія систем, глобалізація, зростання населення, пост-біполярна міжнародна система.

The current problem. The system analysis of international relations using the ontology of the General Systems Theory was mostly in demand and popular in the 50s and 60s of the 20th century. Modern attempts of the systemic analysis of international relations in the prevailing number of cases are extremely superficial at using the conceptual apparatus of the General Systems Theory in their research into the regularities of international politics in the first half of the 21st century. Therefore, the research task of this paper is an attempt by its author to actualize the use of the ontological premises of the General Systems Theory in the study of modern international relations and international politics.

The aim of the article is to revive the ontology of the General System Theory within the current academic discourse, which over several past decades had become indifferent to the fundamental theoretical premises of the holistic approach presumably inherent to any attempt of a comprehensive analysis of the modern international system.

Analysis of the latest research and publications. The analysis of international relations using the ontology of the general systems theory in the late 1950s and early 1960s made a breakthrough in both theoretical research and applied studies of international politics. However, over time interest in system analysis in international studies gradually began to lose its scientific relevance. Nevertheless, the ontology of the systems approach, in our opinion, is the most relevant to the current state of international relations at conceptualizing global historical trends that will shape the appearance of the political picture of the world soon.

As of date, the author maintains that continued existence of at least two schools of international relations analysis, which both use the ontology of general systems theory as their theoretical basis, are the structural neorealism and the world-system theory.

The constructivism, whose authors position themselves as an alternative to the realistic and liberal tradition in the international relations theory, use the systems approach very inconsistently from the point of view of the general systems theory in its authentic version. Constructivists define the international actor as a set of material interests together with a metaphysical identity, which, in its own right, dominates material interests and, thus, has a decisive influence on the formation of the primary motivations of its foreign policy behavior (Wendt, 1992).

According to constructivist ontology, the structure of the international system exists as a result of inter-subject interaction of international actors, which do not necessarily have to be sovereign states. The interaction of international actors itself is discursive in form, which implies that it is social communication in a wider discursive space that includes diplomatic correspondence, media agenda, and social networks. In contrast to the ontology of political realism, which insists that the configuration of the structure of the international system is determined by its anarchic nature, that is, - the absence of supreme power, - constructivists argue that anarchy is only the result of the political elite's misperception of the reality of international politics (Copeland, 2000).

At the same time, the authors of constructivism, in addition to the category of "system" itself, do not use other possibilities of the categorical apparatus of the General Theory of Systems, not to mention the laws formulated within its framework. Thus, considering constructivism as a promising direction for bringing the system analysis of international relations closer to the standards of the General Theory of Systems is a dead end perspective (Zehfuss, 2002).

The neorealist concept of theoretical studies of international relations from its inception had been focused on presenting the structure of the international system as an uneven distribution of power between nation states perceived as elements of the global international system, - the

international actors, - and, fore and foremost, between states with outstanding military and economic capabilities.

The most consistent example of use of the ontology and categories of General Systems Theory within the framework of classical neorealism are the works of K. Waltz, M. Kaplan and R. Rosecrance.

In the works of K. Waltz, the concept of structural determinism is actively used, according to which the configuration of the structure of the international system acts as a determinant of the foreign policy behavior of an international actor (*Waltz, 1979*) Morton Kaplan introduced the scientifically valuable notion of "rules of behavior", according to which the international system remains in a stable state when a critical number of states follow these rules, which fully corresponds to the category of the General Theory of Systems "functional requirements" (*Kaplan, 1975*). R. Rosecrans was one of the few who, within the framework of the neorealist tradition, used the term "mechanism of self-regulation of the system" to characterize the ability of international systems to restore their stable peaceful state (*Rosecrance, 1977*).

Within the framework of the "world-system" theory, their most prominent authors e.g. Samir Amin, Andre Gunder Franc or Immanuel Wallerstein, mirror their neorealist opponents in that they viewed the structure of international relations exclusively in terms of the distribution of power, although they defined it as an economic monopoly on the distribution of economically significant factors, such as capital flows, trade preferences, technology, and investment (*Amin Samir, 1991*), (*Frank, Andre Gunder, 1980*), (*Wallerstein Immanuel Maurice, 1976*).

At the same time, most authors of the "world-system" theory do not use the rich ontological arsenal of General Systems Theory, such as: functional requirements, functional equivalents, structural equivalents.

Nevertheless, among the authors of the "world-system" theory there are some scholars who have adopted some, but very significantly basic concepts of the General Systems Theory, for example, their thesis about the progressive process of the System's self-organization. In this regard, most notably are the articles of George Modelsky, who in some of his recent works maintained the concept of progressive development of the global system of international relations according to the logic of the Lewontin-Campbell self-learning algorithm, an assumption that implies the existence, in some distant future, of the historically terminal stage of globalization and, thus, completion of the self-organization process of international system itself (*Modelski George, 2005*).

The important research results. The international system may be conceptualized as a global network of interactions that occur with a certain level of intensity and produce a characteristic pattern of organization, which unites humanity into a historically integrated civilization. The international system that emerges as a result of interactions and interdependence of its internal parts, exists as an entity because of these interrelationships. The systemic coherence, which begets the self-referencing character of the system, is maintained by the functionality of internal systemic processes. The international system represents a strain of social systems with complex internal dynamics, previous path dependence, and extreme sensitivity to its initial conditions.

The international system comprises elements that interact not solely among themselves, but also influence the entire system as a whole, which in return strictly determines the existence of its internal parts. Hence, this pattern of interaction produces the kind of systemic quality that could not be reduced to the mere attributes of any single element itself. Therefore, each individual element is regarded as a secondary to the whole system, being deprived of any individual existence. They are the primary components of the system that they maintain but provide for only the basic premises of its existence save for its total integrity. Because of this, the systemic analysis treats the individual elements of the system, - the international actors, - as entities bereft of any qualitative meaning, but bestowed only with quantitative attributes.

Taken in its totality, the effects of international actors' interplay with each other create a new reality that supersedes the existence of individual actor. Therefore, the relationship between the actor and the structure is characterized by the domination of the later. This new reality becomes embedded in the structural constraints of the international system. The structure determines the existence of an actor by laying down the framework of possibilities for its individual action. This dialectic of

alienation within the systemic stand-off between the actor and the structure represents a hallmark of any complex systems including the international system.

The interaction is intrinsic to the system and the very notion of systemic structure as something that has been organized, ordered, arranged, invests the international system with its core substantial quality. The structure emerges out of interdependence of each individual element with its peers because of interaction between them. At the highest level of an abstract reflection, this theoretical construct of a "structure" may be conceived as spatial and temporal morphology brought about by the interplay of continuity and discontinuity that become reflected in the syntax, describing how these perceived separate clusters form a unified system.

The structure provides a sense to the internal order of international system and concentrates its systemic properties what makes the international system invariable in its basic features for the total lifespan of existence.

The structure determines the parameters specific to a given system by accumulating the properties of the entire system, hence superseding the qualities of its individual components. Changes acting upon one element trigger the chain reaction with effects onto the whole of systemic interactions, thus creating a new reality beyond the event space of each individual international actor or any of the subsystem it is made of.

Most social systems feature hierarchical internal order. The hierarchy manifests itself as structural and functional causation imposed upon individual existence of each element and subsystem that make up the entire system. Power relations are pretty much indicative of how the underlying hierarchy has been shaped. The structural requirements of a hierarchically organized international system are primarily reflected in the functional and rank stratification of the international actors. The systemic level of hierarchy is being manifested either through the concentration of transaction capabilities of every individual international actor as determined by its social rank or through the concordance of the scope and the pattern of their interactions with their respective ranking status.

Systems with high score on these parameters belong to the hierarchical systems featuring clear discernable prevalence of vertically laid down ties of subordination and submission within a given historic configuration of its structure. Systems with low score on these parameters are classified as egalitarian type of systems. One of the important characteristics of the structurally laid out international system is the actor's systemic exposure which reflects to what degree its individual existence is determined by systemic factors and trends. This variable indicates to what extent and how fast the systemic transformations begin to influence the behavior of a single international actor.

The structure of the international system lays down the principles of establishing and arranging communications between the system's elements. The element's communications localized within its immediate environment are in juxtaposition with the totality of communications transcending the entire system. The interpenetration level of network interactions between individual subsystems along with their degree of uniformity with the overarching structure of the entire system form together some of the basic structural requisites of a given international system. The overarching structure of international system may be either dependent on the inputs from its subsystems or determine all the way down their respective structural composition and functioning.

Judging by its structural topology, the international systems may vary in the degree to which they preserve the inner symmetry. Their subsystems may differ in the scope their micro-structure remains equivalent to the macro-structure of the entire system. Assuming this perspective, we may introduce a structure specific variable of fractal dimension, which when increasing indicates the growing level of differentiation within the international system and consequently leads to the emergence of a loosely organized system with no similar structural traits between the levels of its internal stratification.

Ties that exist between different levels of the social hierarchy are subject to a variety of systemic influences featuring multiple dynamics and forms. Yet, the system dynamics on the highest levels of hierarchy usually tend to be of long-term effect and cyclical nature. This cyclicity is engendered by the fundamental contradiction between the system's quantitative characteristics and its level of internal organization. At a certain point in time the increasing intensity of contacts, exchanges, interactions, and relations that throughout all known human history inevitably accompany the accelerating rate of population growth, result in the collapse of the previously formed unifying

structure of the international system. Thereby the process of system self-organization restarts in a new cycle, thou at a different level of complexity and with time specific forms as well as spatial and temporal characteristics.

The processes within the international system are characterized by the dialectics of routine functioning and progressive evolution of the system. The functioning of the system entails no significant changes of its parameters, whereas the system evolution is accompanied by a large-scale transformation of its historically entrenched configuration exceeding the previously set parametric limits. The international system exhibits in its key features the ability of self-organization with the appearance of ever more complex structural topologies as the result of its self-referencing development.

The self-referencing nature of systemic transformations implies that the underlying trends are mainly determined by the system internal mechanics and are largely independent of quantitative features such as its geography or the intensity of inter-actor communications.

The functional requirements of the current international system, can be outlined in terms of grade of internal interdependence within the system, its adaptability to the environmental challenges, the system's feedback mechanism, the system capacity to insure internal integration, the system's balancing capabilities to enable its intrinsic resilience, the self-adjusting potential, the effectiveness of resource allocation throughout pan-system context, the scope of its mandatory behavior standards and the conflict resolution procedures obligatory to individual member states.

Under the existing international system countries had agreed to allow free communications between them, which, in all evidence, had let to their interconnectedness, where actions in one state can have global repercussions, affecting the whole of international community. This presents a major challenge to the current state of the post-bipolar international systems as we know it.

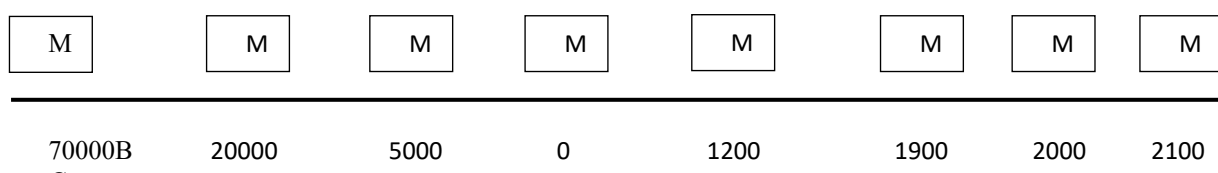
The international system must be flexible enough to adapt to changing global dynamics, including economic shifts, environmental and social changes, which in the current state state of world politics is no longer guaranteed, given the ground breaking change in the US foreign policy under Donald Trump's administration in the USA.

Effective feedback loops are crucial for adjusting policies and practices based on outcomes and emerging issues. This involves monitoring and evaluating the impact of international agreements and actions. However, the post bipolar international system and the one that succeed it failed in securing effective mechanism of counter-balancing dis-functional tendencies within the current international system.

The author maintains that the fundamental process underlying the very formation of the international system, is the population growth in its most global civilizational aspect. The appearance of the first *homo sapiens* anthropologically identical to the modern humans may be traced back to some 200 000 years ago.

However, speaking of human society in modern terms with its highly sophisticated network of social liaisons and inter-connections, it is plausible to presume that the beginning of the modern kind of international relations coincided with the appearance of human social entities around 70000 ago in the south-most regions of the today's South Africa, in which the internal group integration was based upon symbolic common conscience that manifested itself in art and, possibly, religion and the most primary forms of polity as well (15).

Picture 1



The first stage of the development of the international system was marked by explosive demographic processes and the gradual propagation of settlement of the anthropological modern people from their historical homeland, South Africa, across the rest of Earth's continents except Antarctica.

The next macro-event in the development of the international system was the emergence of the first ancient states approximately 5000 years ago. Starting from this moment, a new level of its structural organization appeared in the system, namely the level of political institutions. This was the completion of the first cycle of iteration of political unification of the international system, which from now on was invariably repeated throughout the entire known history of mankind. During the next period of the development of the international system, an evolutionary increase in the intensity of international communication was observed, which ended approximately in the 1st century BC with the formation on the sways of Eurasia of a number of large empires, the development of which was marked by a high degree of synchronicity of socio-economic and political processes. An important stage in the evolution of the global international system was the implementation of the first social project of political unification in the history of mankind within the framework of the world state of the Mongols in the 11th - 14th centuries. The subsequent fragmentation of the Mongolian confederation did not mean the cessation of globalization processes, and already in the 18th century an international system arose, which from now on had a truly planetary character. The modern stage of development of the international system began in the 20th century during which, along with the emergence of the first universal international institutions, the concentration of power opportunities led to the emergence of the phenomenon of a "superpower", - an international actor, - whose actions are capable of destroying the international system as a whole.

Table 1

Mn, Mn+1	7000BC	2000BC	500BC	0	1200AD	1900AD	2100AD
ΔMn, Mn+1	50000	15000	5000	1200	700	200	
ΔΔMn, Mn+1	35000	10000	3800	500	500		
lnΔΔMn, Mn+1	10,46	9,21	8,24	6,21	6,21		

The Table 1 represents the dynamics of the self-organization of the international system, which suggest that the apparent logarithmic linearity of the human global self-finding project as apparent in its second derivative follows, to a certain extend, the dynamics of the Earth's population growth. It seems permissible to presume the next macro event, which will force humanity to begin a new stage of self-organization at the global scale of international relations system, will begin somewhat earlier. According to the UN forecasts, starting from the end of this century, the planet's population will begin to steadily decline.

Based on modern understanding of the general model underlying the dynamics of demographic process in its global civilizational magnitude, it is logical to assume that the upper limit of the existence of the current international system should be the moment when the number of mankind stabilizes and the great historical period of demographic growth, known to us from the very beginning of human civilization, will come to its end. According to existing forecasts, this may happen as soon as within the next 100 years from now. UN's data on Earth's population growth asserts that by 2080 it might reach its peak of 10.3 billion people with subsequent decline down to 10.2 by 2100 (14). It is then that the international system, as we had known it for centuries, most likely shall cease to exist and a new global economic, social and political system might arise in its place and the rest of human civilization will continue. Hopefully.

However, the onset of this key moment in the history of mankind, which is associated with a substantial increase in the risks of a large-scale re-configuring of the global system of international relations, eventually can be significantly precipitated by global climate change and the depletion of critical natural resources, which significantly actualize the need to find new configurations of the architecture of the political organization of the international community.

The decline in population on the global scale of the entire world economy is bound to have negative planetary repercussions, such as frequent and prolonged periods of deflation with all the negative effects for economic growth, especially for the most advanced and innovative economies of North America, Europe, and the Far East, especially Japan and South Korea. Less innovative economies, especially those lacking democratic political regimes, such as China, Malaysia and Indonesia, will face not only the problem of ongoing economic depression, but also the aggravation of long-standing internal social and political conflicts. Moreover, the intensity of such conflicts will

very quickly lead to their externalization and, as a consequence, to a general increase in the conflict potential throughout the entire international system.

Further increase in temperature on the planet Earth will lead to frequent and intense extreme weather conditions, - droughts, hurricanes and floods, - which will lead to increased unproductive spending in developed economies such as the US or the Netherlands, but will also, for example, cause a large-scale humanitarian catastrophe in the Sahel region of Africa and possibly Bangladesh, Afghanistan and Pakistan, which will become an even greater source of immigration to the EU.

Rising temperatures will lead to a shift in contemporary climatic zones, altering ecosystems and threatening biodiversity, as well as worsening conditions for highly productive agricultural production in Europe, North America and, possibly, in Ukraine that is highly likely to have to deal with the problem of water scarcity, especially in its southern regions. The sheer scale and depth of all these overlapping negative and, possibly, even catastrophic long-term trends and developments shall force humanity into rethinking its format of global organization that, if realized, is bound to supersede in magnitude all previous forms of international order known from the history of human civilization.

Conclusions. The analysis of international relations using the ontology of the General Theory of Systems, especially within the framework of non-Marxist school of the "world-system" theory, as well as within constructivism, seems to become the most promising tendency for the further development of theoretical studies of international relations. Such development should consist in expanding the use of the categorical and conceptual apparatus of the General Theory of Systems, especially those that reveal the nature of the processes of self-organization of the self-referencing non-guided systems, the kind of complex systems to which the system of international relations belongs.

The essence of the phenomenon of international relations consists in the process of globalization, which manifests itself as a transcendental trend throughout the entire history of human civilization, and is marked by emergence of increasingly complex forms of organized coexistence of social entities, along with increased interdependence within the international system. Globalization is not a static process and could evolve, slow down, or reverse depending on global circumstances.

The reason for historically sustainable globalization is the constant growth of human population throughout all known history of mankind. A turning point in this global historical trend, which is predicted by the end of the current century, will lead to an existential crisis of modern civilization, which will become an important factor in a new and cardinal stage of self-organization of the system of international relations. While globalization may face significant challenges, complete "deglobalization" seems unlikely in the next decades of 21st century. Instead, we may see a reconfiguration of how nations and societies interact on a global scale. If the global society should continue in its existence, it would have to adjust its present institutional conditions to a more internally coherent global society.

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