

Problems & Prospects of Interdisciplinary Approach

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Abstract

Humanity is now living in a tightly-integrated world, and this integration rapidly continues to grow. The forces of this integration are well-known: they are the Third and the Fourth industrial revolutions and their natural and social consequences. The aim of the article is to show that all sciences and social practices should follow to such integrative process that is they should be the systemic and interdisciplinary ones. It follows that recently any social action, including all environmental transformations, and their relationships have in essence the systemic nature and therefore should be represented in interdisciplinary manner. The metabolic processes i.e. the qualitative transformation of a particular social organism, matter and energy, are the key moments in such interactions and transformations.

Keywords

Crisis, Critical Situation, Globalization, Industrial Revolution, Integration, Metabolism, Monodisciplinary and Interdisciplinary Research, Volunteers

1. The Issue: An Integrated World vs. Mono-Disciplinary Research

We are now living in a tightly-integrated world, and this integration rapidly continues to grow. The forces of this integration are well-known: they are the Third and the Fourth industrial revolutions (Schwab, 2016). The matter isn't only in the new technologies but in their numerous outcomes such as the development of various means of transportations, information and communication and in their consequences such as a shaping of the second, technologically-constructed socio-sphere and its still unknown impact on the biosphere, its structure, regularities and a global turnover of a matter and energy.

Of course, the so-called “normal accidents” (Perrow, 1984; Sagan, 1993) mainly of a local or regional scale are still existed and will exist but the global structures, processes and disasters with unknown feedbacks to the biosphere and humanity came to the forefront. In sum, the scale and amount of global risks and disasters are growing while the mono-disciplinary organized sciences couldn’t prepare humanity to the struggle with new and integrated global threats. And the only one way out as been the tough administrative measures as isolation and self-isolation.

2. The Historical and Social Roots of the Mono-Disciplinary Approach

The division of integrated body of science into a particular disciplines had been introduces by the fathers of the Enlightenment in the XVII century and onwards. In those times it seems necessary, because such division has allowed to establish and to develop many of recently existed branches of natural sciences.

Besides, such mono-disciplinary approach has been profitable to the scientific bureaucracy allowing it to govern this social institution in its own interests. And such situation still has existed up to now. But the further the more the above governmental process lags behind the integrated structures and processes generated by the very movement of a historical process. As the result, a scientific comprehension of it doesn’t reflect a true picture of ongoing global transformations. As the historical studies clearly showed, not only the scientists and scholars but the ordinary people as well began to realize that our world including a cosmic space have been tightly interrelated. In other words, we are now living in closely integrated global world, and this state of matters should be adequately reflected in a new type of a scientific knowledge, that is in the interdisciplinary one. Stating that, we didn’t neglect a necessity of a craft or any other forms of hand-made inventions. As Russian physicists, the Noble laureate acad. P. Kapitza rightly stated, that sometimes the experimenter is much more important that a theorist because the former is capable to join something un-coordinated.

3. The STR-3 and the STR-4 as the Integrating Forces

There are two sides of the same coin that is the biosphere and the socio-sphere. The basic underpinning of the global process of integrating them has been the unification trends of mode of production and consumption. Of course, each of natural and social science has step by step to realize that the above two sphere are tightly interrelated, for example, by a set of voyages round the world, climate and astronomic observations, etc. But the leading force in that integrative process has been played by mass industrial production that gradually spread across the world.

The emergence of the modern information-communication revolution in the end of XX century radically speeded up the integrating processes because this revolution has been the all-embracing and all-penetrating. The dark side of the above processes that they all of them have nonlinear, uncertain and therefore

risky character because the particular communities and humanity at large hasn't been prepared to such quick and all-embracing transformations.

The gap between these very uncertain and complicated processes and their mono-disciplinary interpretation is rowing every minute. But the main impediment for the development of global interdisciplinary approach to the above integrative processes is the very conservative structure of existing structure of social institutions which doesn't want to reorganize them in accordance with global integrative processes. In particular, it has been one of the reasons of inadequate response to the emergence of current pandemics.

4. The Metabolic vs. Digitization Processes as a Main Integrative Power

The above discrepancy couldn't exist for a long time. The development of our nature, that its uninterrupted evolution hasn't been possible without various metabolic processes. It's going on about the processes of interactions and transformations of various species or environments resulted in their one-sided or reciprocal transformations. The metabolic studies are widely spread in the biology and other natural sciences, especially in those that are dealing with natural ecosystems and their environment.

Recently, the Russian and foreign researchers are widely studied various forms of an integrated i.e. multisided metabolic processes ranging from different degrees of one-sided impact to mutual transformations including the mutual extermination of both sides. We'd like to underscore that the natural metabolic processes exerts impact on the social and natural ones whereas the social processes have influenced both natural and technical, and so on and so forth.

As to the digitization processes as an integrative power, this phenomenon deserves special attention. Shortly speaking, the information structures and processes have initiated total transformation nearly any social structures and processes. And as the current pandemics clearly showed it, by and large the old and new branches of production and social reproduction have been transformed into online ones. It doesn't mean that social metabolism has to be excluded from our analysis. On the contrary, social metabolism makes the current integrative processes more complicated. It means that the studies of various metabolic processes should be in the global scientific and political agendas.

5. A Systemic Approach as a Main Prerequisite of the Multidisciplinary Approach

In essence, the systemic approach is the ecological one. The laws of this approach had been laid down by the US biologists B. Commoner areas following: the all tightened with all, the all is going somewhere, and the nothing is given gratis, i.e. free of charge (Commoner, 1971). As any other systems of our world, all earth systems are living at the expense of the consumption of matter and energy. In other words, the above laws are based on the second law of the thermodynamics.

The above turnover of matter and energy and as it has been showed earlier the various metabolic processes means that there is no other way out except to master these complex processes in the terms of interdisciplinary studies. In turn, it means that an underlying principle of these studies is the ecological approach. And the sooner the representatives of various adherents of mono-disciplinary studies will realize it, the better and more efficient will be our struggle against unintended consequences and after-effects of global development.

But it's a halfway only. The other and the most difficult task will be the invention (creation) the methods of translation of results gained by a particular discipline into the language of another one.

6. The Pandemic as the Best Example of Modern Critical Case

The social sciences and especially the economics are accustomed to consider the global life as a set of the crises replacing one another. Up to now, the leading theorists in global economy are still confined themselves to this wavy model of global development. But the current pandemic has confused all the maps because the pandemic isn't the crisis but *the global critical situation with unknown economic, social and technological consequences*.

What are the main difference between the crisis and critical state? *Firstly*, the pandemic has all-embracing and all-penetrating character, and its emergence and character have been the results of uncontrolled techno-science development.

Secondly, the crises have a periodical rhythm i.e. they are coming and going away and the state of matter after the crisis are usually becoming better. It's a kind of the process of a renewal. Any global critical state has quite another character.

Thirdly, a main distinguishing feature of such critical state is its all-embracing character. As the current pandemic showed to all of us, we are turned out totally unprepared to it.

Fourthly, the biosphere is rapidly began its transformation into a global socio-bio-techno-sphere which structural-functional organization and tempo-rhythms of spatial space as well as its feedback are practically unknown to us.

Fifthly, we turned out unprepared to make any prognoses concerning both its and our future.

A lot of global plans, projects and prospects of their implementation have been suspended for unknown time. It's enough to mention the Minsk agreements related to the state of affairs of the Ukraine.

Sixthly, it seems clear that so-called techno-science has appeared neither capable to explain what are the reasons of that critical case nor to make any prognoses related to its further development. It has been well understandable because its research apparatus hasn't been based on any concept of the global socio-bio-techno-sphere development.

7. The Integrative Transformations, Their Degree and Tempo-Rhythms

To our mind, it's the most difficult challenge to all sciences because these transformations are the very complex and mobile grid of interrelated challenges and nonlinear processes with different tempo-rhythms. Therefore, the majority of astrophysics has inclined to consider our planet as the result of cosmic processes and transformations.

Who is the creator of the above tempo-rhythms? It depends on the period of the earth and humanity histories. For a long while, such creators had been both the cosmic and global geological forces and processes. Then, by and large humanity has enlarged its role in shaping the biosphere. After then, the role of humanity in the processes of the biosphere transformation has begun to grow more and more rapidly, and in a certain moment the sustainability of our global ecosystem has been questioned. For example, the smoke from the summer forest fires may cause additional number of pneumonia illnesses with a lethal outcome.

But now we are entering in a new epoch, not only extremely complex and mobile but which accompanied with unknown challenges and global critical situations. To our mind, it is the very risky turn with earlier unknown consequences, trajectories and tempo-rhythms.

8. Gradual Transformation of the Biosphere into the Socio-Bio-Techno-Sphere

One of us has offered this term in order to this multisided transformation (Yanitsky, 2016).

This process deserves special attention for the following reasons. *Firstly*, it should be underscored that this process cannot be regulated or directed by human beings. It is in essence a self-governed process or more exactly it is governed by the cosmic forces beyond human capacities.

Secondly, nobody is still well-inquired about the structure of the above a very complex object-subject and the regularities of its development and/or transformations. The regular studies of the socio-bio-techno-sphere are still at the very beginning.

Thirdly, it follows that very concept of the biosphere is questioned. In any case, there are no signals the biosphere is gradually transforming into the noosphere i.e. into the sphere of a Reason. To our mind, on the contrary, the process of chaoticization of the global SBT-system is going on.

Fourthly, on the other hand, we have no integrated scientific apparatus to study the global SBT-system-evolution and its possible fluctuations. The creation of integrated scientific apparatus means that we already have in integrated science. But it isn't so because we are still living in the world of numerous monodisciplinary sciences.

Fifthly, the gap between the integrated and permanently transforming world and the process of the divergence of social and natural sciences as well as within the natural ones is continued.

9. The Relationships between the Totally Digitalized and Cultural Worlds

It's a not an easy question because from the beginning of the Third industrial revolution and onwards the so-called techno-science has dominated. The more the human beings have constructed their own world, the more this world has become a built one i.e. it turned into artificially-constructed, that is the uncertain and hybrid one and therefore more risky (Yanitsky, 2019).

It signifies the principled change in the process of transformation of the biosphere into the SBT-sphere. Every moment the man has replacing the natural laws by man-made laws of life and functioning. But at the same moments the man has destroyed natural ecosystems transforming them into man-made ecosystems using the energy and matters accumulated in the biosphere.

To our mind, the further digitalization generated by the Fourth industrial revolution is the process of continuation of the digitalization of our cultural sphere.

Under this we mean, first of all, *the replacement of Russian and other languages of the world by the very simple and world unified technical language*. Recently, we observe a rapidly going process of unification of all products of mass consumption, be it food stuffs, shoes, medicine or the arms. Until now, this process has no limits, be it a science fiction, films or everyday language. And what is the most dangerous that such illness has affected first of all the children and the teenagers.

How to protect the world cultural heritage? How to prevent the already going processes of the simplification of social communication? It's not an inherent illness of global culture—it's the outcome of permanent speeding up of the processes of mass production and mass communication. We're deeply convinced that we are now living in two worlds: the cultural and the technical ones. But such fundamental contradiction cannot continue endlessly, either the techno-science will took over or they will find the golden mean. Anyhow, that contradiction has to be resolved.

10. The Role of the Volunteers in a New Global Civil Society

The pandemic clearly showed that the role of civil society and the volunteers in particular is growing. The state and civil volunteers have rendered an invaluable assistance to the state rescuers. But it has been the volunteers of the previous epoch. It means that that the volunteers have rendered a necessary aid post factum that is they followed the principle of the struggle with the after-effects. It was necessary but insufficient.

The current pandemic is the all-embracing phenomenon across the world, and it follows that the modern volunteers should follow this new principle, that is they have to be multi-disciplinary trained and equipped. Who had been the most efficient volunteers in the past epoch? Right, it have been the "Doctors without the borders", the "Liza Alert", the "Barefoot Doctors" and some other similar civic groups and nongovernmental organizations. In sum, if current state

of global matters has become very mobile and complex in its essence, the civil rescuers should follow this principle. As our current studies in this realm have shown, the further the more the volunteers' movement should be transformed in the way which fits to the complexity, variety and dynamics of this new global ecosystem.

But it's not all. In accordance to the abovementioned principles of the global SBT-system organization and dynamics the current volunteers' movement should be prepared to the challenged generated by the transformations of the above SBT-system in our everyday life. It means that the transformations of the above two actors are the two sides of the same coin.

11. Conclusion

Any social action, an environmental transformation and their relationships have in essence an interdisciplinary character. The metabolic processes i.e. the qualitative transformation of a particular social organism, matter and energy, are the key moments in such interactions and transformations.

Nowadays, the global community suddenly entered into a highly risky situation. Its specificity is in the real all-embracing losses of people, destruction of businesses, communications and logistics, etc. It's not a case of periodically happened economic crises—it is a global critical situation.

The more the development of global SBT-system is becoming the nonlinear, uncertain and risky the more efforts are needed for the prediction of its future structure and evolution. Humanity has entered in the turmoil epoch full of earlier unknown risks and threats. We have entered the epoch in which the earth's population should retrain permanently and complexly its nationals and global heritages.

As to the volunteers' movement, it should be prepared to the challenges generated by the transformations of the above SBT-system irrespectively whether it's going on about cosmic and global transformations or about changes in our everyday life. The volunteers should follow the general integrative trends which are going on in the natural and social sciences and human practice. And, of course, in accordance with the above integrative trends, the volunteers should be multidisciplinary trained and equipped.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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