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Technology Development in the Terms of Built Environment Creation. Philosophical Analysis

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ABSTRACT

This paper is dedicated to the philosophical analysis of creating an integral worldwide built environment, resulting from technology development. The aim of the research is to define the built environment's self-sufficiency degree and manageability of this technological reality. The study reveals the technology's place in the ecocentric worldview and presents an anthropological measurement of technology during its integration into the built environment. Using the system-structure and functional analysis the authors examine the search for the philosophical definition of technology is inextricably associated with the search for its essence and implies an adequate reflection of this essence: firstly, as an instrument of labor, with the help whereof natural objects are transformed; secondly, as a complex of artificial systems, facilitating natural ecosystems transformation; thirdly, as a culture integrating element, defining a civilization's development level.

KEYWORDS
Globalization; technosphere; technocentric approach; sociocultural processes; modern technology philosophy

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Introduction

Technical system globalization, its coming to an ultimate (planetary) integrity level is a very important tendency, resulting from objective technology development laws. It is implemented by creating a single technological chain, covering the entire planet, and a global information and technical environment, based on modern communication networks (Losev, 2003). Natural resources consumption, production activity forms and everyday domestic human life are being increasingly defined by this tendency.

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Technical system globalization creates a qualitatively new human interrelation and interdependence level, forms a single built environment (Simonenko, 1994). At the same time, when facing constants, which define the integrity of separate communities, this technology development process begins destroying value systems, traditional for certain countries, whereon the community's survival method, personality identification means and its interaction with the community are based (Nougier, 1992).

Alongside globalization ("broadways" development), the scientific and technological progress is characterized by an "inward" movement, mastering of new material world patterns, creating instruments of manipulating its in-depth structures and human psyche (Vernadskiy, 2003). For instance, biotechnology and genetic engineering development are means to overcome provisions deficit and environmental crisis, but they render possible unpredictable and, perhaps, irredeemable results of biosphere pollution by alien genetic material. Biosphere integrity, its self-regulation capability is one of the most obvious problems facing the unwinding of the scientific and technological progress.

Can note that philosophical questions associated with technology are quite manifold. Technology has become an integral part of human life. The human himself, by using technology, has transformed the environment to such an extent that he now lives in a world, which is quite reasonably called a built environment (Kudrin, 2004).

One of the modern encyclopedic dictionaries provides the following definition of equipment: "Equipment is a collection of human activity instruments (machines, constructions, devices), created to perform certain production and non-production processes" (Big encyclopedic dictionary, 2003). However, is this equipment definition sufficient for understanding its essence? In the authors' opinion, it is not, since this definition lacks the revealing of equipment phenomenon essential aspects. Therefore, it is necessary to refer to philosophy with its principle of all-round examination of studied objects.

For instance, the element approach perceives equipment in its traditional instrumentalist understanding: as a collection of artificially created, improved and used by humans material systems, based on a purposeful application of materials, processes and natural laws, having elements and a structure, necessary for these systems' functioning as material instruments of practical human activity (Meleshchenko, 1970). According to O.D. Simonenko (1994), equipment is a "collection of objective, material instruments, created to satisfy society's production needs".

However, according to V.S. Stepin's and V.I. Tolstykh (2001) researches, even within this traditional understanding, the analyzed equipment has a manifold interpretation: as a collection of technical means (artifacts) – from the simplest tools to extremely complex technical systems; as a collection of technological activity types with a view to creating these devices (from scientific-technological researching and designing to their production and operation); as a collection of technology-related knowledge (from specialized formulary and technical to theoretical).

For example, M. Heidegger (1993) saw in equipment the result of human perception of nature as a material to satisfy their needs and showed the existence of a total dependence of human life on equipment: out entire civilization is accomplished in the form of technological processes' reproduction.

The scientist rejects the traditional opinion, which comes down to equipment being a neutral instrument in the hands of man. While pondering the essence of equipment, the philosopher believes that it is not limited to the narrow technical aspect and attempts to include a broader context into modern technology, since equipment is not only an instrument to achieve aims.

The instrumentalist understanding of equipment has become a habit. According to M. Heidegger (1993), the notions of equipment imply a much more in-depth understanding. Equipment is not a simple instrument. Equipment is a way to reveal that, which is secret. This field is brought out from that, which is secret, the fulfillment of truth.

M. Heidegger (1993) also emphasizes the fact that philosophy has to examine not equipment itself, but its concealed essence, which lies in the compulsion of nature. Modern equipment is notable for a special "revelation" process character. Equipment is transforming from a constant being revelation into a production, extraction revelation, wherefore being, having become an entity, is posed as something available, functionally used by man. In this case, the ontological nature of equipment, its contingency with the Secret Being disappears and is eliminated from our consciousness.

A human who treats equipment as an instrument and result of his activity always misses the essence of equipment. Therefore, as M. Heidegger (1993), notes, it is not the human who possesses equipment, but the equipment that initially "fashions" and forms a human it needs – the "technological" or "technocratic" human type and thus determines all human relations. "The final sense of M. Heidegger's "mill" is that being culminates as equipment and equipment culminates as being" (Smirnov, 2009). By revealing the unknown, extracting, processing, accumulating, distributing and transforming, equipment changes the face of the environment. Moreover, as a truth revelation means, a way of understanding, equipment changes the very human perception of the world, changes the worldview as a whole.

Despite the fact that technology is an interdisciplinary research object and the various systems of its impact on the human being are studied by numerous scientific disciplines, it is the generalizing philosophical analysis that can become a starting point for the relevant formation of the theory that reveals not only separate aspects, but also the essence of technology-related development. The practical result of this analysis had to consist in the rationalization of global environment protection and humanitarian programs, controlling and correcting influences on technology-related processes in a course that is favorable for humanity's development and environment preservation.

Although technology philosophy itself as a natural and engineering sciences methodology, it is advisable for the technology concepts content to reflect real technology development processes as deep as possible, which would facilitate a more in-depth understanding thereof. By recreating a given ideal development model of technology and its separate types, technology philosophy facilitates understanding the orientation of modern technology toward forming a man-sized built environment.

However, unfortunately, there are still no researches conducted by domestic science and technology philosophy in respect to the problem of integrating technical equipment into an integrity, i.e. a built environment.

The relevance of studying the integrated built environment creation is preconditioned by the practical value of the obtained results for the theoretical and methodological understanding and cognition of acceptable industrial-technological and innovative development paths of modern Kazakhstan.

According to this, the aim of the paper is to research integral built environment creation problems at the philosophical reflection level.

The aim is achieved by completing a number of interrelated tasks, which can be defined as follows:

– to conduct the analysis of technology (equipment) and built environment as notions and phenomena;

– to reveal technology's place in the ecocentric worldview;

– to present an anthropological measurement of technology during its integration into the built environment;

– to reveal the "science-technology" system as a built environment creation determinant;

– to demonstrate the need to use a universal technology, involving all the best achievements of natural, social and engineering sciences, while structuring an integral built environment;

– to present the state, level and prospects of built environment creation.

Methods

The given research draws upon methodological researches, recognized by domestic science and technology philosophy. The basis of the research are the works of classic philosophers, modern domestic and foreign philosophers and scientists, including the works of modern western philosophers specified above, were used as the main sources.

The given research applied the principles of philosophical analysis – the unity of logical and historical, the unity of abstract and concrete, integrity, contradiction, comparative studies and the system-structure and functional analysis.

Data, Analysis, and Results

Philosophical Worldview and Theoretical Problems of Technology and Built Environment Development

The idea of technology development in the ecocentric worldview

In ancient times, the role of natural factors in social life was not felt as strongly, but was already noticeable. During the early Paleolithic Age, when the struggle for food supply covered the entire human activity and foraging and hunting were the only way to obtain means of sustenance, human life was almost dissolved in nature.

However, at the same time, albeit slow, instrument of labor development was performed. While foraging wild plants, edible herbs and hunting, the human first used natural objects that turned up by chance and were discarded after having been used once. By the time of the second interglacial period, the production of stone instruments emerges (Childe, 1989). A rather high level of

their development is observed in the findings dating back to the Upper Paleolithic Age.

The transition from the Paleolithic Age to the Neolithic Age was marked by the emergence of agriculture and animal husbandry, which caused a true revolution in the life of ancient societies. The process of active transformation of natural resources, flora and fauna of separate regions has begun. At that, a particularly important role was played by the appearance of production of materials, not encountered in nature. This became possible due to the practical mastering of certain chemical processes (especially reduction reactions), which enabled the production of clayware, the development of metallurgy, etc.

By actively transforming nature, the human himself has changed; his mind developed. This process is known to have been rapid, usually when facing difficulties and completing set tasks, in complicated and harsh environment. At that, the generation of new ideas, ways and means to overcome encountered obstacles did not occur immediately, but rather during the course of a more or less extensive development of contradiction between available technological means and the need for their multiplication and upgrading, necessary for completing new tasks.

The analysis of Paleolithic and Neolithic Age instruments of labor showed a remarkable uniformity of technological operations used in widely differing regions of our planet. For instance, "in all the great space where hand axes are encountered – in Western Europe, all across Africa, Western Asia and the Indian subcontinent – during the 100 or 200 thousand years of their application, the same four-five types of axes are encountered with surprising consistency" (Childe, 1989). However, this uniformity is subsequently broken. Although the intrinsic logic and laws of technology development generally remained the same for all countries, the implementation of said laws went along different paths (Semenov, 2008).

In ancient agricultural countries – Babylon, Egypt, China, India – the struggle against droughts and floods was crucial. The creation of irrigation systems and other hydraulic constructions began here several millennia before the Common Era and led to considerable, sometimes even impressive, achievements. Suffice to say that a part of said constructions not only stood the test of time, but, in some places, are still operating. At the same time, the expansion of irrigation systems in Ancient Eastern countries, having preconditioned a stable supply of crops, considerably weakened transformation activity stimuli and further development of agricultural techniques.

The value system of the Ancient East remained virtually unchanged for millennia. Furthermore, religious motives prevailed therein. In particular, anemic aspects were preserved for a long time in philosophical systems of India and China. All this strengthened the worshipping of nature, which appeared back in the Prehistoric Age, and led to the giving of absolute priority to esthetic reality learning, which was considered the best way to learn the truth (Zavadskaya, 1995). A peculiar "bifurcation" of technological activity, particularly its purposiveness, was also strengthened. Society's main efforts were put into constructing various temples and shrines. Only inconsiderable resources were allocated to irrigational system operation.

During the Medieval Age, the pragmatic attitude to nature was provided by a number of circumstances, an important role among which was played by the

domination of the church and Christian ideology (in terms of European countries). Spiritual life was mostly defined by the Bible, which affirmed the idea of the necessity to lead a self-denying way of life in order to go to heaven. This idea was one of the important reasons why the Renaissance inherited from the Medieval Age mostly numerous churches and a certain amount of declined cultural centers.

However, the renaissance of Europe's social and economic life, associated with the rise of capitalist production, which began after a long break, inevitably had to cause a change in the dominating system of values. The ancient tendency strengthening of utilitarian nature treatment emerges, or rather is reborn. Here it is worth noting the considerable influence of the Arab Muslim culture on the creation of Renaissance's system of values, particularly the human emancipation from the biblical "original sin" (Watt, 2006). At the same time, more and more attention is paid to the nature use ideas in their Christian interpretation, according to which God intended man to maintain domain over all lands and all living things thereon.

All technological inventions before the Renaissance were based on mundane knowledge. With the advent of this great era came the understanding that equipment capabilities can be immeasurably expanded by using scientific discoveries. This was first mentioned by the great Leonardo da Vinci (1952): "He who loves practice without theory is like the sailor who boards ship without a rudder or compass… Practice must always be founded on sound theory".

As of today, the influence of technological activity on nature has reached a stage of global change in all its components (for example, over 70% of forests have been devastated). Human activity has become the reason of biological species' mass extinction (extinction rate has exceeded the natural one by five thousand times) (Sokolov, 2002). Changes in the biosphere also occur indirectly – through modified atmosphere, hydrosphere and lithosphere. Resources that were considered renewable cease to be such – they are no longer renewed in their former quality and quantity. Natural systems have been destroyed and replaced with manmade ones in 63% of Earth's territory (Losev, 2003).

The current state of the environment is often characterized as a global economic crisis. It can be defined as a worldwide geochemical and biological processes orientation violation, which can cause the creation (within terms comparable to a generation's lifespan) of a biosphere with new, pathological geochemical properties (i.e. inadequate for human life).

It is worth noting that the experienced environmental crisis transforms the nature of the entire planet. The modified biosphere negatively impacts its subsystem – humanity.

Anthropocentric approach to researching built environment

A considerable share of researchers' interest in technological reality and the built environment it creates is caused by not the *aspiration to understand* its own patterns, but to explain *its influences on other fields* – nature and social life.

The most important *social and political life tendencies* of mostly manmade causality, which are also signs of increasing manmade transformations of the society, are: changes in the social structure of the society, reflecting the transformation of production and the human role in the technological process; change in the forces equilibrium between government and global institutions,

leading to globalization increase; built environment discretization increase (despite globalization), whereupon the technological and economical gap between regions grows larger, while political contradictions escalate; contradictory social and grassroots processes, causing the weakening of democracy, the enhancement of massification and a threat of totalitarianism.

The torrent of technological novelties being implemented into production forces humans to constantly defend their place in the labor market. Unemployed persons can no longer be considered a "reserve army of labor", which is not needed as of today, but can be brought back into production in case of a favorable turn of events. Z. Bauman (2003) comes to a disappointing conclusion that people who have found themselves out of the game are not needed as potential goods producers. The average layer of the postindustrial society "shrinks", people who are incapable of constantly adapting to new technologies and refreshing their skills drop out of the said layer.

Hence, as M. Castells (2000), notes, the postindustrial society is reduced to a two-class system, divided into "informed producers" and semi-skilled laborers, who are in an increasingly lower demand due to the substitution of physical labor by machines. Thus, the first social consequence produced by manmade development during the modern age is the *structure change of societies*, transitioning to a postindustrial development type.

The democratic system has been frequently compared to a giant mechanism (Stepin & Tolstykh, 2001). Having emerged as a child of the industrial civilization, it was based on a collection of social technologies, which rationally organized the society and took the place of traditional or ideological bonds. However, increasingly perfect technologies, including social ones, appear. It has been noted that technological development generates factors that gradually destroy democracy (Kravchenko, 1996). In particular, mass media have become the main political system participants. M. Castells, (2000), for instance, shows that politics has become "informational" and is mainly carried out by "manipulating symbols in mass media", while the ordinary people "are going to be more and more detached from corridors of power and disappointed in the collapsing civil society institutions". As a result, battles for power in the modern age mainly take place not in the field of actual politics, but in mass media, since it "is contained within information exchange and symbol manipulation networks".

Main Forms and Courses of Integral Built Environment Construction

Interaction between science and technology as a base for creating a modern built environment

Three main opinions regarding the interrelation between science and technology within the society can be emphasized.

1. The defining role of science is affirmed, while technology is perceived as an applied science. This is a science-technology interrelation model, wherein science is viewed as knowledge generation and technology – as its application. Such a model is quite a unilateral reflection of their real interaction process.

2. The science-technology mutual influence model, wherein they are viewed as independent, individual phenomena, interacting at certain stages of their development. Aspiration to truth is claimed to drive cognition, while technology

is claimed to develop with a view to solving practical problems. Sometimes technology uses scientific results for its own purposes, sometimes science uses technical devices to solve its own problems.

3. The third model affirms the leading role of technology: science has developed under the influence of technological needs. Technology creation was defined by production needs, while science appears and develops as an attempt to understand the technological devices' operation process. Indeed, the mill, the clock, pumps, the steam engine, etc. have been created by practitioners, while respective scientific branches emerge later on and are a theoretical understanding of the technological devices' operation.

By creating technology, the human, since ancient times, wittingly or unwittingly copied nature, including his own organism, and then explained through technology the configuration of nature and himself (Karr, 1877). The human use and creation of instruments is intended and fixed in special forms of social memory and traditions, while among animals it is fixed evolutionally – by biological means. In both cases, "ready" natural objects are initially accidentally used as instruments. However, an animal's actions are automated and instinctive (Engelmeier, 1992). Certainly, researchers find the task of identifying early forms of human instruments during the transition period from animal to man complicated and difficult. However, at the same time, the remarkable similarity of prehistoric instruments found thousands of kilometers apart shows the objectivity of this process (Nougier, 1992). At that, prehistoric instruments were multifunctional and convenient to use.

Already at that time, technological progress could be registered, albeit very slow for today's ideas. Here is an example from a book by L.R. Nougier, (1992). In order to produce a prehistoric chisel with a useful cutting edge of approximately 10 cm, the first craftsmen (from Abbeville) required a kilogram of material, usually flint; their successors (from Acheuleen) produce chisels with a cutting edge of up to 40 cm; last ice age craftsmen (Mousterein), by using special inventory, craft a chisel with a 2 m cutting edge; finally, Magdalenian craftsmen, by dissecting pieces of flint to craft thin blades and plates, achieve a remarkable result of 6-20 m of cutting edge. As is obvious, judging by the equal instrument weight, the result has improved by 200 times.

Now, only 5000 years were required to double the tool's efficiency. Technological inventions influence the change of human way of life (Nougier, 1992). For instance, the invention of a bone needle revolutionized clothing.

The need for a new complex technology of worldwide built environment creation

"Technology (from Greek *techne*): 1) a collection of processing methods, production, changing of state, properties, raw material forms, material or prefabricates, performed during the product's manufacturing; 2) a scientific discipline studying physical, chemical, mechanical and other patterns, operating during technological processes; 3) the operations of extraction, processing, transportation, storage, management, which are part of the general production process" (Big encyclopedic dictionary, 2003).

Equipment modification demands technology modification. Without this, from a certain point, equipment becomes unproductive and its development decelerates. On the contrary, technology modification sooner or later has to

cause the creation of adequate equipment. Otherwise, technology becomes unrealizable. Equipment and technology constantly influence one another, although the temporary and historical intervals, during which these mutual influences become apparent, may be quite significant.

The notions of "equipment" and "technology", despite being interrelated, are not identical. Equipment and technology are interconnected subsystems of a single production and economic social activity. Equipment reveals its essence only during a technological process; at the same time, technology is implemented by means of technical objects.

Technology has always attracted philosophers' attention, which is easily explainable. The fact is that human activity is technological by its nature. By standing out, due to labor, among animals, the human being, essentially, transformed labor activity and notions associated therewith, skills and ways of communication into fundamental bases of his being.

I. Kant (1966) and G. Hegel (1934) viewed equipment as a peculiar means of making a consciousness breakthrough into the objective world. However, if G. Hegel understood technology as an objective-defined object, I. Kant believed that technical expedience of nature related neither to nature's mechanism, nor to the "heuristic rhythm" of the consciousness. According to I. Kant, equipment refers to the mind algorithm modus operandi under a general management of expedience as such.

Discussion

The socio-natural approach researches the contradictory influence of built environment on human life: on the one hand, it supports human existence by creating a comfortable artificial world and satisfying their material needs, on the other hand, manmade influence has an increasingly negative impact on the biosphere and sociocultural processes. Therefore, technology development philosophical assessments are opposed to each other. Some researchers believe that as technological reality grows and becomes more complicated, it naturally gets out of people's control; others believe that the tendency (and aim) of technological innovation is human control over the technosphere and the creation of an artificial environment as adapted to humans as possible.

The technosphere is understood as an empiric object by traditional, naturalistic approaches to studying the technosphere, which view it as an external reality, given in subject-object perceptual-conceptual repertories. The overcoming of the objective, naturalistic opinion and the transition into the *reflexive position* takes place during disobjectification via a critical analysis of notions and ideal objects, followed by objectification – the construction of new notions and ideal objects.

In this paper, the concept is understood as a means, which organize a certain reality perception method. Unlike an objective or univocal notion, the concept helps reveal the sense of an object, "grasping" it in the unity of the speech act; according to S.S. Neretina, (2000), unlike the objectivity and univocacy of a notion, it is formed by the speech as a subjective realization of sense and functions during verbal communication.

The manmade crisis showed that a single social and natural organism has already been formed on Earth and its future depends on not only the human being, but also the biosphere's ability to preserve its characteristics. Science

confirms the presence of an extensive natural resources consumption limit and warns of the coming catastrophic changes under the increasing environment transformation. The analysis of historical interaction between humanity and Earth's biosphere is very important for the solution of modern global problems.

It is pertinent to point out that R. Descartes (1950) agree with F. Bacon that the value of science lies not in the knowledge for knowledge's sake, but in the filling of production with technological novelties. Nowadays, the character and scale of modern production are such that natural balance mechanisms are at risk of failure and humans have to assume the environmental conditions reproduction function. Environmental balance disturbance in some regions has already become catastrophically dangerous.

V.I. Vernadsky (2003) postulated the new socio-natural development stage advent as a result of human geochemical influence on the biosphere. The established balance in elements migration is disturbed by human mind and activity. The scholar made a generally positive assessment of the biosphere-affecting technological human activity: he emphasized that thereby favorable conditions are created for the population of regions previously devoid of biological life. When characterizing V.I. Vernadsky's, concept, it is worth noting the points causing disputes among his followers. For example, he did not come to a final conclusion regarding the initial boundary of the planet's noospherization, indicating various terms – from the beginning of the XX century (when scientific thought becomes a geologically noticeable factor) to the appearance of the human being as a biological species.

More than 50 years have passed from the time when V.I. Vernadsky, created the planet noospherization concept; the growth of scientific knowledge and the appearance of new historical tendencies have to lead to its transformation by modern researchers with historical experience of the second part of the XX century.

Conclusion

The problem of quality and functioning of an artificial world during a philosophical analysis of technology and its development under globalization conditions is becoming an object of serious and concerned attention of philosophers, including domestic ones.

To sum up, technology development and expanding technology use in order to support human vital activity have naturally led to the formation of technological complexes, created by spatially concentrated production and technology systems; the growth of said complexes and the creation of technological connections between remote regions create these complexes' interdependence, which sometimes gives reason to talk about the existence of a special – manmade – planetary envelope. Therefore, technology philosophical analysis has to conclude with the examination of the technology development result – the built environment. Even the examination of separate technological systems, remaining at a local engineering level, requires the analysis of their interaction with the human being.

The search for the philosophical definition of technology is inextricably associated with the search for its essence and implies an adequate reflection of this essence: firstly, as an instrument of labor, with the help whereof natural objects are transformed; secondly, as a complex of artificial systems, facilitating

natural ecosystems transformation; thirdly, as a culture integrating element, defining a civilization's development level.

Technology is developing in two ways: on the one hand, its dynamics is increased by internal development patterns, the level and scale of the individual's (society's) technological creative work level, on the other hand, social needs activate necessary technology development courses, defining manmade dynamism and integrativity.

Built environment, the research whereof is relevant for scientific and practical activity and the understanding whereof is a problem facing philosophical cognition, has the following characteristics: it is made by man during social and economic interactions and willful aspiration to change the external world; it functions on account of resources – geological, biogenic and manmade, which it partially transforms into waste; as a result, it transforms the "natural" human habitat – nature, as well as the sociocultural environment.

The socio-natural approach considers possible the use of the "technosphere" notion not as a real object, but as a concept, revealing the unity of built environment at the general function level of all technical objects – intermediation between natural environment and humans.

The aim of the research was to define the built environment's self-sufficiency degree and manageability of this technological reality.

The built environment research method was the socio-natural historical approach, which examines technology development as human adaptation to objective environmental (natural and social) patterns.

The given approach is compatible with the ecocentric and anthropocentric approaches (since it does not contain opposing assumptions; it is incompatible with the elements and technocentric approaches, which deny the existence of a technosphere).

Disclosure statement

No potential conflict of interest was reported by the authors.

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