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THE PROCESS OF FORMATION OF THE METAVERSE - A NEW STAGE IN THE CYCLICAL DEVELOPMENT OF SOCIETY

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Abstract: *The purpose of this study - to study the essence of the metaverse in the context of its role in the cyclical development of society as a new stage. This article substantiates that, in terms of dynamism and influence on societal development, the processes of metaverse formation represent a new stage of cyclical development of society. The development of metaverse has the potential to overcome the long crisis-depressive dynamics of the global economy and the deployment of an upward wave of the 6th Kondratiev cycle. It has been established that the technologies of the metaverse contribute to transhumanism, the development of the metaverse poses threats and challenges to the most important component of society's productive forces - people, as well as has eco-destructive consequences.*
It is shown that, the formation of the metaverse plays a significant role in the transformation of the geopolitical system, providing more and more advanced tools of "soft power", as well as technologies for information and cognitive warfare and technologies for the development of "military metaverses". Thus, the technologies of the metaverse radically change the technical-technological, socio-economic, institutional, military, biological components of societal development, and thus the formation of the metaverse is a new stage in the cyclical development of human civilization.
Keywords: *metaverse, "military metaverses", world-system, cyclical development, threats.*

1. INTRODUCTION

Cyclical societal development has a spiral form, which is formed on he basis of cyclic repetition of phases of formation, development and decomposition of economic systems of particular historical forms of society. Today capitalist society enters the phase of decomposition, in other words, its deep internal contradictions are aggravated and not properly resolved, so the world-system plunges into a deep crisis.

The way out of the crisis in historical retrospect was the "great transformations" forming a new techno-economic and institutional paradigms of the world being.

In modern conditions, large-scale ("great transformations") - technological and societal - can give rise to a new form of capitalism - information-network capitalism - or lead to the emergence of new forms of society - neo-feudalism or posthuman society. The scientific and technological basis of such transformations is the fourth industrial revolution; its scale, dynamism and orientation will largely determine the future path of capitalism. The development of artificial intelligence, one of the basic technologies of the metaverse, plays a leading role in the formation of the prerequisites of posthuman society.

The most relevant in terms of the degree of dynamism and impact on societal development, the emergence of the fourth industrial revolution is a metaverse - a three-dimensional virtual world in which all actions can be performed with the help of augmented and virtual reality services (Damar, 2021).

The metaverse exists and is evolving, including social networks, video game worlds, and interactive online practices, primarily through the Internet. In the course of its evolution, the metaverse creates more and more opportunities for users to actively create "information", experience it, and perhaps even live in this created reality without needing a significant physical world (Talin, 2024), which contributes to the escapism of an increasing number of people, especially in the context of the current complex crisis of capitalist society.

The development of the metaverse contributes to overcoming the protracted crisis-depressive dynamics of the global economy, which began in 2008, and also stimulates the upward wave of the new 6th Kondratiev cycle.

At the same time, the rapid development of the metaverse creates threats and challenges to the most important component of society's productive forces - people, and also has eco-destructive consequences.

The basic technologies of the metaverse are becoming a driver of transhumanist processes, and they also play a significant role in the transformation of the geopolitical system. In the cyclical development of the world-system, today there is a period of aggravation of geopolitical contradictions and their military resolution (in the form of local-global conflicts) has begun. The metaverse is also becoming a space for the resolution of geopolitical contradictions.

The purpose of this study - to study the essence of the metaverse in the context of its role in the cyclical development of society as a new stage, to identify the main challenges and threats posed by the technologies of the metaverse, to determine the main directions of overcoming these threats.

2. Literature review

The most relevant in the context of the cyclical development of the capitalist world-system today are studies devoted to global cycles, first of all, the scientific works of N. Kondratiev (Kondratieff,1926), G. Modelski (Modelski, 1995). and I. Wallerstein (Wallerstein, 1983). Today, the formation of the metaverse corresponds to the logic of the development of the sixth Kondratiev cycle, namely, its upward wave, the essence of the concept of the metaverse is revealed in scientific publications of M. Damar (Damar, 2021), B. Talin (Talin, 2024)., G. Wang (Wang G. et al., 2022).

3. Methodology

In this research we applied primarily logical and historical methods, as well as dialectical ascent from the abstract to the concrete, including general scientific methods of analysis and synthesis, induction and deduction, data from UN, UNCTAD, World Bank were used.

4. Results

The activation of the processes of metaverse formation corresponds to the logic and chronology of the deployment of large Kondratiev cycles. According to N. Kondratiev's theory, before the beginning and at the beginning of the upward wave of each major cycle, profound changes occur in the conditions of economic life of society, one of the most important manifestations of which are significant changes in technology, preceded by significant technical discoveries and inventions (Kondratieff, 1926).

The modern world-system is on the threshold of the 6th Kondratiev cycle, and metaverse technologies are one of the types of basic innovations that are necessary to start the deployment of the upward wave of the next Kondratiev cycle. The development of the upward wave of the 6th Kondratiev cycle will occur on the basis of the fourth industrial revolution - the scientific and technological basis of the coming "great transformations".

The fourth industrial revolution: began at the beginning of the 21st century, is based on the digital revolution, its main features - "ubiquitous" and mobile Internet, miniature manufacturing devices (which are constantly getting cheaper), artificial intelligence and learning machines, at the center of the fourth industrial revolution is the convergence of the physical, digital and biological worlds (Schwab, 2016).

The unfolding of the fourth industrial revolution has led to the emergence of a new form of existence - the metaverse - that combines physical and virtual realities, allowing people and their avatars to interact in an environment supported by technologies such as: high-speed Internet, virtual reality, augmented reality, mixed and augmented reality, blockchain, digital twins, and artificial intelligence (AI) (Wang G. et al., 2022). And it also led to the growth of the digital economy.

Today the digital economy is already booming, according to UNCTAD estimates:

- annual smartphone shipments have more than doubled since 2010, reaching 1.2 billion in 2023,
- the number of Internet of Things (IoT) devices is projected to grow 2.5 times from 2023 to 39 billion by 2029,
- new data from 43 countries, representing about three-quarters of global GDP, shows that business e-commerce sales grew by nearly 60% from 2016 to 2022 to reach $27 trillion (UNCTAD, (2024).

The World Bank estimates that the digital sector has been a source of innovation, economic growth, and job creation:

- value added in the IT services sector grew at 8 percent per year from 2000 to 2022, almost twice as fast as the global economy,
- IT services employment growth reached 7 percent per year, six times faster than overall employment growth,
- digital adoption accelerated after the COVID-19 pandemic, adding 1.5 billion new internet users from 2018 to 2022,
- the share of companies investing in digital solutions globally more than doubles from 2020 to 2022 (World Bank, 2024).

The UN predicts that the total artificial intelligence market will reach $4.8 trillion by 2033, making it one of the key drivers of digital transformation (UN, 2025a).

The implementation of technologies of the Fourth Industrial Revolution, including military technologies, is changing the structure of the economy, moving more and more of it

into the metaverse space, as well as radically changing the military sphere through the increasing use of artificial intelligence and strengthening the role of information-psychological warfare. Recently, leading technology corporations have intensified their activities on the development of sectoral metaverses focused on further digitalization of political and military spheres of societal life.

Distributed interactive modeling and high-level architecture have facilitated the integration of disparate training simulators, allowing the military to train in a virtual space, simulating a new concept of military operations and testing new types of AI-based weapons. The armed forces of the world's technological leaders have been using effective simulation for basic military training and the development of advanced AI-based tactical weapons for several years. Thus, AI wargames, an algorithm capable of accurately simulating real-world combat operations, have been introduced into regular military training.

The rapid and all-encompassing spread of metaverse technologies poses threats and challenges to the most important component of society's productive forces - people, and also has eco-destructive consequences. The challenges of transhumanism also deserve special attention.

Regarding the impact on humans, the major threats posed by the rapid development of the metaverse occur in three main directions: 1) influence on consciousness - threatening to destroy the integrity and identity of the individual, 2) impact on economic activity - the threat of increasing displacement of people from the process of societal reproduction, especially the loss of their ability to set goals, 3) increasing social inequality, in particular digital inequality, as a component of social inequality.

The metaverse has the potential to augment the physical world with augmented and virtual reality technologies that allow users to interact seamlessly in real and simulated environments through avatars and holograms. As the metaverse evolves, the clear boundaries between the physical and digital are likely to be somewhat blurred compared to today's perception. However, the interaction of avatars in the metaverse - even if they look real - cannot replace real human interaction (European Parliament, 2022), so the deeper immersion of humans in the metaverse space leads to deformation of their social interaction skills and an increased tendency to escapism.

According to the resolution of the Conference of the European Trade Union Committee for Education (ETUCE), AI poses a real threat to humans. From an ethical point of view, the ability of a machine to influence human choices can hinder the independence, freedom and creativity of humanity (ETUCE, 2021).

In the historical retrospective of pre-industrial, industrial and the initial stage of post-industrial epochs of societal development, the main productive force of society was a human - a carrier of knowledge, innovative ideas, skills and abilities for their realization.

The uniqueness of the modern stage of cyclic societal development lies in the fact that scientific and technological progress displaces a human from the system of societal production, and most importantly, the development of artificial intelligence creates a threat of depriving a human of an active role in goal-setting and decision-making in the most important spheres of societal existence.

The emergence of artificial superintelligence, which is developed to the point where it is able to make decisions based on its own motivation, while being qualitatively different from human intelligence, can lead to an intellectual explosion, which is closely related to the technological singularity, the essence of which is superhumanity (superhuman intelligence) (Vinge, 1993).

The benefits of automation often benefit owners of capital rather than workers, which could increase social inequality and weaken the competitive advantage of cheap labor in developing countries.

The UN predicts that artificial intelligence will affect 40 percent of jobs worldwide and help increase productivity. While the technology brings new opportunities, especially through productivity gains and new industries, it also raises serious concerns about automation and job displacement – especially in economies where low-cost labour has been a competitive advantage (UN, 2025).

The metaverse creates new employment opportunities (primarily in areas such as virtual commerce and services, content creation and curation, virtual events and entertainment). At the same time, it generates increased unemployment - routine tasks and services can be automated (Carenina, 2023).

In the context of the formation of the metaverse, such a component of social inequality as digital inequality has become relevant.

According to UN Secretary-General A. Guterres, "digital inequalities exacerbate social, economic and gender inequalities, affecting both urban and rural populations, children and the elderly, and affecting everything from education to health care" (UN, 2022).

The digital inequality manifests itself primarily at the cross-country level:

- Today, access to AI infrastructure and expertise remains concentrated in a few countries. Just 100 companies, predominantly from the US and China, account for 40 percent of global corporate R&D spending. Major tech giants such as Apple, Nvidia and Microsoft are valued at $3 trillion each - comparable to the combined GDP of the entire continent of Africa. This market dominance could deepen the technological divide, leaving many developing countries without the benefits of AI (UN, 2025a).
- Digital innovation such as artificial intelligence (AI) is accelerating in high-income countries, while low-income countries are lagging behind. While more than 90 percent of people in high-income countries were online in 2022, only one in four people in low-income countries used the Internet, and their connection speeds were typically a fraction of those in wealthier countries. The growing digital divide exacerbates the poverty and productivity gap between richer and poorer economies (World Bank, 2024).
- Artificial intelligence is emerging as a critical driver of the economic future, yet according to UNCTAD, 118 countries, mostly from the Global South, remain outside key international discussions on its regulation (UN, 2025a).
- Many developing countries face digital infrastructure deficits, data shortages and skills shortages (UN, 2025a).
- UNCTAD has developed the Advanced Technology Readiness Index, which takes into account ICT penetration, skills, R&D activity, industrial capacity and access to finance. The leading positions in the ranking are occupied by developed countries of Europe and North

America, as well as Singapore. Among the BRICS countries, China (21st), Russia (33rd), India (36th), Brazil (38th) and South Africa (52nd) have high positions.

- Only a limited number of developing countries, including Brazil, China, India and Russia, have supercomputers and large data centers. In terms of data, China stands out in terms of both quantity and availability. In addition, countries such as Germany, the UK, Russia, the US and Hong Kong, China have significant data sets that can be used for AI development (UN, 2025a). As the digital economy grows, its eco-destructive effects and resource intensity increase.

Digital technologies and infrastructure are highly dependent on raw materials, and the production and disposal of more and more devices, along with growing water and energy demands, are increasingly damaging to the planet. The production and use of digital devices, data centers and information and communication technology (ICT) networks account for between 6% and 12% of global electricity consumption. This growth is taking an increasingly heavy toll on the environment.

Environmental damage occurs throughout the lifecycle of ICT devices and infrastructure, including through e-commerce.

Digital waste is growing faster than the rate of collection. Waste from screens and small IT equipment grew 30% between 2010 and 2022, reaching 10.5 million tons

The growing demand for data transmission, processing and storage for new technologies such as blockchain, artificial intelligence, fifth-generation (5G) mobile networks and the Internet of Things is increasing emissions. For example, the ICT sector emitted between 0.69 and 1.6 gigatonnes of CO2 equivalent in 2020, corresponding to 1.5% to 3.2% of global greenhouse gas emissions (UNCTAD, 2024).

As digital devices become more sophisticated, they require more mineral resources. In 1960, phones used 10 elements from the periodic table, in 1990 they used 27, and in 2021 they will use 63. As a result, the demand for critical minerals needed for both digital and low-carbon technologies is rising sharply. For example, according to the World Bank, demand for cobalt, graphite and lithium is expected to increase by 500% by 2050.

The access to critical minerals is becoming an increasingly strategic priority for many countries, increasing global competition and the risk of geopolitical challenges (UNCTAD, 2024).

The main difference between the current stage of the cyclical development of the capitalist world-system and all previous stages is that scientific and technological progress influences man not only through the transformation of the material conditions of life, but is increasingly acquiring the ability to radically transform the biological body of man, his cognitive abilities.

Transhumanism - in the simplest sense - is the process of improving the cognitive and physical abilities of a man by integrating technology into the human body. Transhumanism and the metaverse are closely connected, because on the one hand the technologies of the metaverse are able to provide opportunities for human improvement, on the other hand the metaverse needs a cyborgized person, a person maximally immersed in the space of the metaverse (in work, recreation, hobbies, communication), in other words, a person for whom virtual reality becomes equivalent or even more important than material reality.

The Fourth Industrial Revolution envisages the mass introduction of cyber-physical systems into production and servicing of everyday human needs. The development of "web 4.0" (predicted to replace "web 3.0" in the 2040s), "university 4.0" (digital university), the Internet of Things, Big Data, artificial intelligence, global robotization are radically changing the living space and a human himself/herself, bringing closer the posthuman existence, in which there will be a comprehensive fusion of a human with new technologies.

Three main model variants of posthumanity can be distinguished: 1) Homo genetically transformed, 2) Nano-cybernetic homo organism, 3) Homo Virtualis (Belyaev, 2017).

Transhumanist technologies are one of the components of the technological basis of the fourth industrial revolution and, consequently, of the metaverse. Their development generates threats of destroying the integrity of the biosocial essence of a human and establishing such a form of social inequality as biosocial inequality, in other words, the inequality of "improved" and "unimproved" people.

5. Discussions

In order to overcome the threats posed by the rapid development of the metaverse, it is necessary to:

1. To neutralize the threat of destruction of the integrity and identity of the individual:
- development and implementation of ethical norms in the practice of institutional regulation of public life, which should be followed by all developers of technologies that form the metaverse and users of these technologies,
- reaching an institutional consensus between corporations, governments and civil society on the need to adhere to ethical norms that should regulate the development of metaverse technologies in order to prevent destructive effects on human consciousness
- pausing the training of artificial intelligence systems more powerful than ChatGPT 4 for at least six months to develop appropriate security protocols during this time, as suggested by scientists and representatives of the IT industry (Future of Life Institute, 2023),
- the creation of special agencies for licensing metaverse technologies, especially artificial intelligence.

2. To neutralize the threat of human displacement from societal reproduction:
- development of skills relevant to the digital sphere, including virtual collaboration, digital marketing and content creation;
- retraining and professional development;
- cooperation between sectors: governments, educational institutions and industries should collaborate to develop effective training programs and policies (Carenina, 2023).
- transitioning to a circular and inclusive digital economy that promotes economic opportunity and job creation while addressing environmental challenges (UNCTAD, 2024).

3. To neutralize the threat of growing digital inequality:
- ensuring opportunities for developing countries to participate in shaping norms to regulate the development of meta-intelligence technologies, especially artificial intelligence, so that technologies serve the interests of all humanity and not just a narrow circle of states (strengthening international cooperation will create a global regulatory system based on the principles of fairness, transparency and universal benefit) (UN, 2025a),

- the signing of a global societal contract on digital technologies, which includes the principles of avoiding digital colonization (when residents of less developed countries are able to connect, but only as participants providing data to monopolies located in other countries, and never as entities able to independently derive economic and social benefits) and inequality (Mulligan, 2025), developing public-private cooperation to reduce the digital divide,
- increasing public investment in digital literacy,
- private companies introducing digital literacy programs for their employees,
- making digital literacy programs accessible to all segments of society, including users from rural areas, from marginalized communities, from countries where access to the Internet is difficult.

Bioethics is becoming increasingly important to prevent threats associated with the use of transhumanist technologies. The development of bioethics contributes to the formation of institutional foundations for preserving the integrity of the biosocial essence of the human being, as well as guarantees of the rights and freedoms of an "unimproved" human being in a possible posthuman future.

Widely recognized are the principles of biomedical ethics developed by T. Beauchamp and J. Childress, namely: respect for autonomy; nonmaleficence; beneficence; justice. Complementing these principles are veracity, privacy, confidentiality, and fidelity (Beauchamp & Childress, 2019).

The implementation of these principles is aimed at avoiding interventions that harm the individual patient. Many modern transhumanists avoid radical approaches, take into account the risks generated by human enhancement technologies, and move from the concept of "posthumanity" to the idea of "humanity+".

The application of human enhancement technologies should take place within the limits delineated by the norms of bioethics. Bioethics itself is in urgent need of normative support and the development of bioethics law.

To reduce the eco-destructive impact and resource intensity of the digital economy, it is necessary to:
- implementing sustainable practices throughout the entire digitalization lifecycle - from design and production to use and recycling,
- encouraging the development of a circular economy (one of the components of the Fourth Industrial Revolution) that minimizes waste and maximizes resource use through reuse, recovery, recycling and product life extension (Only 7.2% of today's global economy is circular, and this share is declining due to increased extraction and use of materials, however, the global electronics recycling market is expected to grow from USD 37 billion in 2022 to approximately USD 108 billion by 2030, led by the U.S. and China) (UNCTAD, 2024),
- improving data collection and transparency of ICT companies' energy consumption
- implementing energy efficiency policies in data networks,
- offering companies tools for customers to measure, report and reduce greenhouse gas emissions from their cloud services,
- encouragement of companies developing devices using environmentally friendly materials, promoting longer product life cycles and supporting the "right to repair" by providing third parties with access to spare parts and repair information,

- using environmentally friendly or reusable packaging materials and automated packaging systems to adapt box sizes to the contents,
- improving supply chains and delivery logistics and promoting cycling (UNCTAD, 2023).

6. CONCLUSIONS

In the cyclical development of human civilization today, the prerequisites for the transition from a deep complex crisis to a phase of comprehensive transformations of the world-system have matured. The fourth industrial revolution and the development of the network economy are one of the most important foundations of such transformations. These processes form a new component of existence - the metauniverse, which inevitably affects production relations and productive forces of society, primarily people as the main productive force.

The uniqueness of the modern stage of societal development lies in the fact that scientific and technological progress is displacing man from the system of societal production, and most importantly, the development of artificial intelligence creates the threat of depriving man of an active role in goal-setting and decision-making in the most important spheres of public life.

The expansion of the metaverse creates such threats - the threat of destruction of the integrity and identity of the individual, the displacement of the individual from the process of societal reproduction, the increasing scale of social, in particular digital inequality, the emergence of bio- inequality due to the use of transhumanist technologies, and has eco-destructive consequences.

Today, the growing instability in the capitalist world-system due to the aggravation of geopolitical contradictions indicates the beginning of crisis-militaristic phases of global cycles (long cycles of world politics, cycles of hegemony, Kondratiev cycles). The unfolding of such forms of global cycles as long cycles of world politics, substantiated by G. Modelski and W. Thompson (Modelski, 1995), cycles of hegemony, proved by I. Wallerstein (Wallerstein, 1983), are cyclical processes of struggle of the leading actors of geopolitics for the status of hegemon.

The unfolding of the crisis-militaristic stage of the cyclical development of the world system has accelerated the formation of military metaverses and the use of new types of weapons based on the use of artificial intelligence and advanced VR-technologies; competition between leading states in the development and application of information and cognitive practices in the military sphere has intensified.

Certain areas of application of artificial intelligence in military operations are of concern from a humanitarian point of view. According to the position of the International Committee of the Red Cross, these are, first of all: the integration of artificial intelligence into weapons systems, in particular, into autonomous weapons systems; the use of artificial intelligence in cyber and information operations; military systems for supporting the decision-making process based on artificial intelligence (ICRC, 2023). The current geopolitical situation prevents full and effective institutional regulation of the development of the metaverse, primarily the regulation of the use of artificial intelligence for military purposes. Therefore, all constructive societal forces, primarily the scientific community, should direct their efforts to create institutional practices for regulating the development of the metaverse.

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