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Article

Labor 4.0 concept : theoretical-applicable principles of formation and development

Economy and forecasting

Reference: Kolot, Anatolij/Herasymenko, Oksana (2020). Labor 4.0 concept : theoretical-applicable principles of formation and development. In: Economy and forecasting (1), S. 5 - 28. http://econ-forecast.org.ua/?page_id=189&lang=uk&year=2020&issueno=1&begin_page=5&mode=get_art&flang=en. doi:10.15407/econforecast2020.01.005.

https://doi.org/10.15407/ econforecast.2020.01.005
УДК 331-043.7 "20"
JEL: J00, J21

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LABOR 4.0 CONCEPT: THEORETICAL-APPLICABLE PRINCIPLES OF FORMATION AND DEVELOPMENT

The article presents a scientific and applied substantiation of the construct and argumentation of the components of the new mental model of labor and employment "Labor 4.0" as a social and labor reality of the beginning of the 21st century. Theoretical and practical provisions are revealed to explain the relationship between changes occurring in the surrounding realms (technologies, institutions, etc.) and the transformations of the sphere of labor and employment in their indivisible integrity.

The authors outlined new aspects of labor in social activities at the beginning of the 21st century. The authors' vision of a new format of the model of labor and employment is represented adequately to the conditions of the first half of the 21st century. The mega causes of the creation of a new platform of socio-economic and socio-labor development are detected. The authors present the external conditions of development and internal characteristics of the model "Labor 4.0". It is emphasized that in the author's theoretical construction "Labor 4.0" appears as a labor paradigm inherent in the new economy on the technological basis of "Industry 4.0" as well as a platform and institution for utilizing labor resources in the coordinates generated by the Fourth Industrial Revolution. The features of the components of the new type of labor process, that is, objects of labor, means of labor, and the working person are revealed.

The authors substantiated the essence of the phenomenon of "Labor 4.0" through the prism and social and labor dimension of the aggregate worker of the new (digital) economy; globalization processes; forms and types of employment and related relationships; network based organization of work; content and trajectories of the development of labor processes; labor income, in particular, its level, differentiation, tendencies and dominants; and a new format of social and labor relations. The influence of demographic component of the global economy stagnation on social and labor development is revealed. The authors identify the challenges for the social-labor sphere, benefits and

losses for the workers and the new asymmetries of social-labor development that give rise to the present and future formats of globalization.

The authors reveal the influence of the new technical and technological base "Industry 4.0" on the formation of social and labor platform "Labor 4.0". They formulated the trends in professional and qualification structure of labor in the new economy and opportunities for expanding the professional field of activity. The phenomenon of digital labor organization and the dramatic changes in the entire social structure of the new (digital) economy and post-industrial society is emphasized.

Keywords: *new economy, new globalization, social and labor development, factors of social and labor development, model "Labor 4.0"*

The world of labor and social and labor relations of the new economy are in its infancy. Every day this world acquires new features and demonstrates different, often unexpected facets. In general, this world is a very complex social and labor "fabric", woven from both new opportunities and new challenges and threats. The tendencies, dominants, trends in the development of social and labor sphere are so contradictory and multi-vector that not only the average citizen, but also the political and scientific community find them increasingly difficult to recognize in order to understand the depth of modern challenges.

We have to state that the issues of the world of labor and social and labor relations, adequate to the conditions of the new (digital) economy, are extremely limited and fragmented in both domestic literature and foreign scientific journals. Even the most recognized, widely cited social and labor publications show simplification, unilateralism and limited perceptions of trends and dominants of social and labor development while the new model of work and employment is seen as exotic or distant future. However, the future has already arrived and only obscurity, stubbornness of thoughts and the obsolescence of mental schemes prevent the establishment of a modern, full-scale idea of the present and future labor world and the world of people themselves.

Under the conditions of large-scale, multi-vector changes both in the social division of labor and in labor processes and forms of employment, the importance of scientific study of yesterday's atypical but now familiar aspects of labor in social production of the early XXI century is growing. However, one of the current paradoxes is that the social and labor "fabric" of the new (digital) economy is formed by the laws of nature, rather than by the patterns and tools developed and proposed by the scientific community. The economic literature on these problems now shows inadequate judgments, manifestation of antinomy, the shift of the emphasis, eclecticism and concepts substitution, and the misunderstanding of causes and effects, or even their confusion. Due to the lack of scientific study of the nature and consequences of the transformation processes experienced by economy and society at the turn of the Millennium, a global mismatch (a "clot" on the path of sustainable development) was created. This is a mismatch (gap) of technological, organizational, and institutional phenomena and processes that in practice determine the formation of a new economy and post-industrial society, with mental schemes and models formed

in the minds of the major share of the economically active population. Moreover, the population is guided by these models.

In order to develop our ideas, we focus on the following. Intuitive, everyday understanding and perception that the digital revolution in combination with other today's realities (demographic, globalization, technological changes) radically changes human life, giving a new format to the social and labor space, until the emergence of a sound theory capable to systematically outline the transformations in the world of labor and employment and explain their causes and prospects for further drift.

World economic thought about the future of the economy and society at the turn of the Millennium and in a further perspective has increased in recent years by a number of pioneering studies by Baldwin R. [1], Diton A. [2], Collins R. [3], Inglehart R. [4], Mason P. [5], Milanovich B. [6], Picketti T. [7], Sachs D. [8], Stiglitz J. [9, 10], Watson R. [11], Schwab K. [12]. Multifaceted and wide-ranging issues of technological innovations and caused by them socio-economic transformations within coordinates of the new economy are reflected in the works of Ukrainian scientists, such as Amosha O. [13], Antonyuk V. [13], Blyzniuk V. [14], Heyets V. [15], Hrytsenko A. [15], Zaloznova Yu. [13], Libanova E. [15, 16], Lukyanenko D. [17], Makarova O. [15], Novikova O. [13, 18], Petrova I. [14], Poruchnyk A. [17], Stolyarchuk J. [17], Shevchenko L. [19], etc.

However, there are still many blind spots on the way to understanding the nature of modern social and labor development. The scientific community has failed to explain to the modern society the complex social and labor transformations that occur in the formation of a new economy.

The purpose of the article, offered to potential readers, is to develop a theoretical and methodological basis that can reveal the relationship of changes occurring in the world (technologies, institutions, etc.) with the transformation of labor and employment in their inseparable integrity, and outline a new format of labor and employment model, adequate to the conditions of the first half of the XXI century.

In the authors' opinion, the main reasons of the unstable, non-human-centered development in the global dimension are the inconsistency of many existing paradigms and concepts of economy and society with the realities of modern times, in the dominance of outdated mental schemes and models.

An important prerequisite for overcoming the inconsistencies and above mentioned asymmetries is the awareness of the nature of phenomena and processes under whose influence a new economy and a new social order are formed. We insist that at the present stage there should be a change in the theoretical and philosophical understanding of reality (in technological, economic, social and labor terms). It is possible that the economy itself and its social and labor sphere in the near future should be considered as the embodiment of completely different paradigms and relevant relations.

The authors' concept of phenomena, processes, and institutional global transformations, which radically change the format, semantic characteristics and mechanisms of the functioning of social and labor sphere as a whole and the world of labor in particular is a component of their own research that is published in the leading

domestic and foreign scientific media [20–32]. Some of these phenomena are highlighted in Fig.1. They are the mega-reasons for building a new platform for socio-economic and socio-labor development (demographic change, a new format of globalization, technological innovation, organizational factors, and the Global ideology).

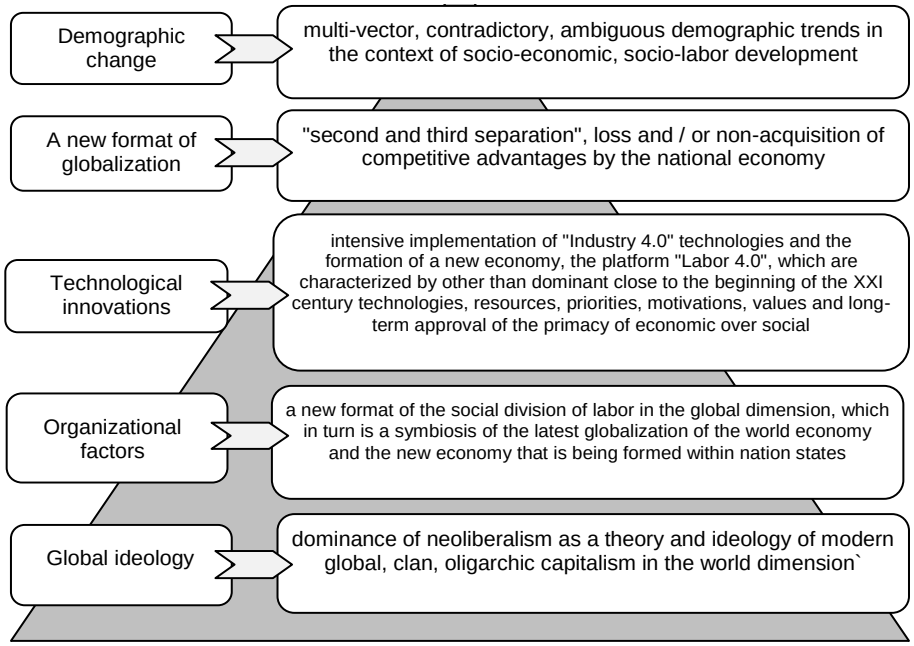

Fig. 1. Mega-reasons for building a new platform for socio-economic and socio-labor development

Source: data compiled by the authors.

The above-mentioned mega-reasons and mega-trends of the transformation of the social and labor sphere are at the same time the main transformation factors of the labor world. Indeed, new demoeconomic realities, a new format of globalization of the new economy (the so-called second and third separations), a new technological, network, digital, and virtual reality lead to the formation of a new social and labor reality, a new world economy where life and human behavior are changing radically. Demographic, globalization and technological processes, known as "Industry 4.0", are radically changing the world of labor, its institutions, organizational structures, labor market parameters and the emergence of a new model of labor and employment, which can be called "Labor 4.0" (Fig. 2).

It is a grounded claim that "Labor 4.0" is a new social and labor reality at the beginning of the XXI century, which is being formed under the influence of a number of today's realities.

In the authors` theoretical construction, "Labor 4.0" appears primarily as a labor paradigm that is immanent to the new economy, whose network-digital and the technological basis is "Industry 4.0". At the same time, the authors consider "Labor 4.0" as a platform, an institution that ensures the use of labor resources in the coordinates generated by the Fourth Industrial Revolution.

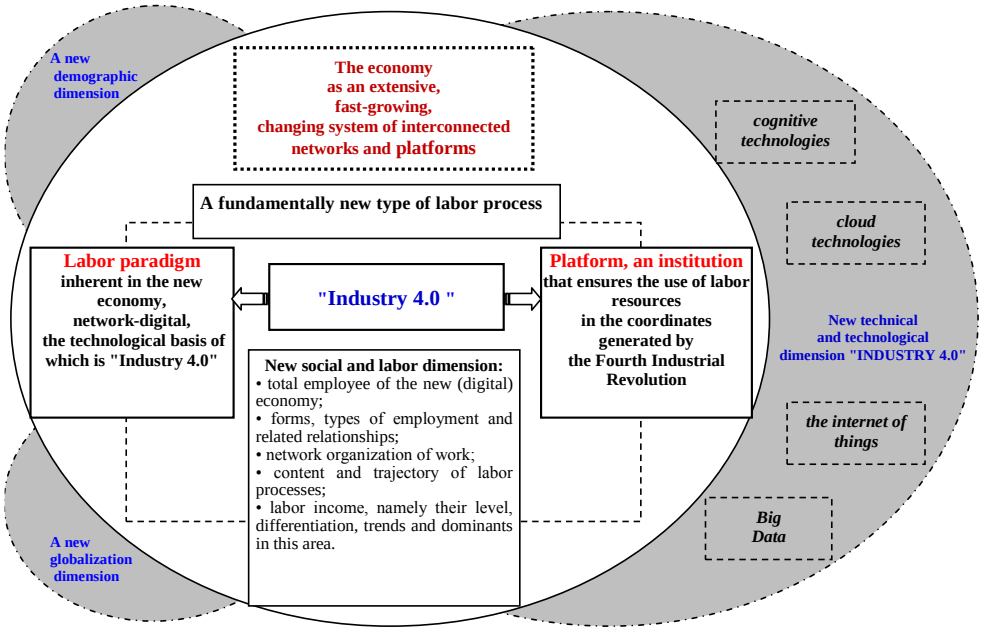

Fig. 2. External development conditions and some internal characteristics of the model "Labor 4.0"

Source: data compiled by the authors.

The component of the platform "Labor 4.0" is a fundamentally **new type of labor process**, its components are objects of labor, means of labor, Homo ergaster ("working man"), and they acquire new features and content. As to the **objects of labor**, under the conditions of the new economy whose digital network segment is growing rapidly, they are increasingly becoming electronic. Fundamentally different are the **means (tools)** of labor, which are increasingly represented by digital devices, network cyber systems, etc. **Homo ergaster** working in the digital era appears as a carrier of new competencies, his activities are carried out in the coordinates that are different from previous ones and include mobility, autonomy, self-responsibility, transparency, and network control. At the same time, the values of working life are being significantly transformed.

Digital technologies, network systems and other technological achievements of Industry 4.0, figuratively speaking, permeate and fill all niches of social production, including industrial production. All components of the labor and employment world become fundamentally new so the profile of the employee is transformed as well as the requirements to him.

"Labor 4.0" and **"Industry 4.0"** are, metaphorically the two sides of the same "coin" representing a new economy. One side is the social and labor one, and the other one is technical and technological.

What is the real dimension of the platform "Labor 4.0"? What is "behind the scenes"? What determines both new format and characteristics as well as the content of the new "world of labor"?

First of all, we emphasize that this phenomenon, this platform is not a set of linear, single-vector transformations and mega changes. In fact, "Labor 4.0" is a symbiosis of large-scale, multi-vector, ambiguous transformations, some of whom open up new opportunities and cannot be but welcome and inspiring; the others require the reaction of all subjects of social and labor relations, changes in motivational guidelines, and value orientations; some others frighten, and it is not an exaggeration. So evident questions arise: "Why do modern capitalism

and tomorrow's post-capitalism not want a society to be happy?", "Why is anthropocentrism not becoming not exception but an everyday norm of global capitalism?"," Who or what is forcing us to build "the economy of superfluous people?".

In order to have more or less relevant idea of the phenomenon of the future that has already come, namely "Labor 4.0", we will try without slogans and quasi scientific phrases, and based on scientific grounds, to reveal the present and the near future of the world labor through the prism of **socio-labor dimension**:

– aggregate employee of the new (digital) economy;
– globalization processes;
– forms, types of employment and related relations;
– network organization of labor;
– content and developmental trajectory of labor processes;
– labor income, namely its level, differentiation, trends and dominants in this area;
– a new type of social and labor relations.

What is the aggregate employee in the future, which has already come in its various dimensions, including demographic and professional qualification, etc.? We must state that the aggregate worker of the new (digital) economy in the demographic dimension takes over all (or almost all) characteristics of the population of the post-industrial era.

Among the current demographic trends, which have a global manifestation, we should highlight the most significant ones, such as:

– declining population growth in most countries;
– increasing average age of the population;
– reducing share of children and adolescents in the population;
– increasing share of older people;
– increasing demographic burden on the working age population;
– reduced share of the working age population;
– permanent intensification of migration processes and strengthening of their influence on indicators of demographic changes;
– increase in the number of working pensioners in the labor force.

All demographic trends mentioned above show that the **social and labor layer of the aggregate labor force** of the XXI century digital economy has been formed under the following changes:

– reduced share of young age groups;
– increased average age of workers ("silver" population of the "silver" economy and society);
– reduced share of employees in working age;
– increased number of working pensioners.

How should we assess these trends in terms of their impact on social life and development? How will the demographic factor affect the operation of the "Labor 4.0" platform?

Due to the polarity of existing views on the changing demographic picture of the world, and the correlation of gains and losses of an aging society, as well as other components of demographic development, it seems extremely important to study these issues avoiding superficial assessments and to implement an interdisciplinary and systematic approach to the study of demographic, technological, social and labor development under the conditions of the evolution of a new economy and post-industrial society.

Demographic changes, which are gaining new scale and intensity, must be seen not only as risks and challenges, but also as real and potential opportunities for a society. Developing a strategy and building a "silver economy" and a society of healthy and active longevity, state

and public institutions have to eliminate asymmetries in the demographic structure of the population and soften intergenerational conflicts. It should be emphasized that population ageing, as a leading component of current and future large-scale demographic changes, is taking place both "below" and "above". This refers to population ageing as a symbiosis of declining birth rates and increasing life expectancy.

The demographic component of stagnation of the world economy and asymmetry of social and labor development

According to existing theories of economic stagnation, the leading factors of the slowdown of economic growth are of demographic, social and labor origins. Given that a number of countries that were previously considered successful are experiencing a period of long-term stagnation, and the world economy has been showing a sharp decline in economic growth for more than a decade (since the 2008 crisis), the scientific community is trying to find and explain the causes of this phenomenon.

It should be noted that the results of that research were unexpected for many researches of this problem. They showed a significant impact of demographic factors on the slowdown of economic growth. So far, the effect of these factors has been considered in another context and direction in terms of its impact on the results of socio-economic development.

In accordance with the above mentioned facts, we emphasize the following. According to a number of fundamental foreign economic studies on the long-term stagnation of the economy conducted in recent years, the demographic factor ranks second in terms of the impact on the slowdown in economic growth.

The mechanism of the influence of demographic factors on the labor and the rate of economic growth is multifaceted. It is worth focusing on the following. The results of special studies show a relatively low productivity of older workers in many circumstances. It can be explained by both the decrease in the working capacity of employees of these groups (despite their experience and relevant skills) and the decrease in the adaptive capacity of older workers in the face of rapid and multi-vector changes in labor processes and forms of labor and production. We cannot ignore the fact that the decline in population growth has a downside, namely the reduction of investment needed to maintain the achieved level of capitalization as well as the reduction in the growth rate of output in the stable economy.

Let us pay attention to this aspect of the influence of demographic factors on the pace of economic development. The increase in life expectancy as a global trend motivates people on a global scale to save more. Savings do not contribute to the intensification of entrepreneurial activity and participation of older workers in the implementation of investment projects. According to the available research, countries with a rapidly growing share of older age groups are characterized by a higher level of savings than investment.

Justifying his own concept of the slow recovery of the world economy after the 2008 crisis, one of the world-renowned modern economists Ruchir Sharma notes: "My team and I shifted our focus from supply to demand: to the side of the economy that is busy supplying labor, capital, land – the basic components of growth. And we have found the reason. Oddly enough, one of the main reasons for the lack of growth was the declining stock of active labor resources. This discovery was so contrary to popular warnings about ousting people from their jobs by robotics and artificial intelligence that it was hard to believe. How can a shortage of workers be a problem when, with the development of technology, they become unnecessary? However, the numbers really do not lie" [33, p. 44].

Quantitative and qualitative parameters of the population in general and quantitative and qualitative parameters of the working population, especially younger age groups, have different, often diametrically different, tendencies of formation and development. This issue is especially relevant in the most developed countries, where at the same time we can observe contradictory trends, such as: the population decline (depopulation), population ageing, namely, population growth in older age groups; reduction in absolute and relative birth rates; intensification of migration processes; cross-cultural challenges as a consequence of change in the population structure in terms of nationality, age, cultural characteristics, priorities and values.

In OECD countries, the problem of human resources, especially young, and creative workers, has become so acute that in the mid-2010s, two-thirds of OECD countries implemented or launched immigration programs in order to strengthen the labor potential of their countries. According to available data, within previous years, these programs led to an increase in the number of immigrants with higher education to the OECD countries up to 70%. Their number reached 35 million in the 2000s, despite the collapse of migration policy. Now the struggle for highly qualified, imaginative, creative potential workers is going on.

The impartial analysis shows that one of the paradoxes of modern era is the human resources problem, especially concerning younger and middle-aged groups. This problem becomes even more acute in the absence or less significant importance of demographic issues in relation to the population as a whole. Taking into account that the share and number of young people with higher education who have creative thinking and are ready to take risky professional decisions is declining, it could be argued that in 40-50 years, people over working age would not have a better level of professional and general training. This creates negative preconditions under which the elderly population will be neither more active nor more educated and would not have opportunities for higher incomes.

This information demonstrates the **demographic dimension of aggregate labor force** and the "Labor 4.0" model in general, and this dimension, as we can see, does not have any direct assessment.

Our ideas about the world of labor in the near future will be incomplete, fragmentary and simplified without considering the impact of globalization on the basic parameters of the platform "Labor 4.0".

The results of our research, which correlate with scientific and applied judgments and conclusions of many scientists, mostly foreign ones, show the urgent need to shape and establish *a broader view of the current and future globalization* in the context of the Fourth Industrial Revolution technologies and the new format of social division of labor, and their impact on people and their social and labor existence. Preliminary research suggests that the technologies of the Fourth Industrial Revolution are changing the nature of globalization. Under the influence of digitalization and networking, as well as other new technologies, an intensive formation of both the new economy and the new globalization is going on.

The explanation of the old, new and future globalization, or the so-called first, second and third separations

The history of humanity "before globalization" is a history when production and consumption, figuratively speaking, were connected by force. During the “before globalization" era produced goods were consumed on the territory of their origin and production. The so-called **first separation** became possible with the creation of conditions for the development

of international trade, namely the emergence of new vehicles and reduction of the transportation costs. At the beginning of the twentieth century, markets became global while production continued to be local until the 1970s and 1980s.

The second acceleration and the so-called **second separation** became possible due to a chain of events, phenomena and processes, namely:

– creation and mass introduction of information and communication technologies;

– reduced cost of transferring information, and know-how;

– relocation of manufacturing workplaces with the control over administrative and economic activities, remote coordination, video communication, etc.;

– changes in global value chains of added value;

– a combination of G7 technologies with low wages in developing countries.

The **third separation** is the third stage of future globalization. This is the movement of not only goods, industries, information, but also people; it is the establishment of a new labor process. We are talking about the future of the next stage of globalization.

We have every reason to believe that in the near future there will be at least two technological innovations that will create the conditions for the so-called alternative movement of people across national borders.

The **first innovation**, the first technology is the so-called remote presence or remote work, and this is no longer a science fiction.

The **second innovation** is remote robotics under the remote control over robots, cyber and other systems, carried out by specialists at a distance (from other countries and continents).

In the coming decades, these innovations, technologies and phenomena, taken together, will radically change the nature of globalization. They will allow professionals who are in one country to solve professional problems in other countries without physical presence. Such virtual immigration (also known as remote employment) can dramatically expand the list of jobs open to international competition. Many professional jobs and tasks that need to be performed and solved in rich countries will be able to be implemented remotely by specialists from poor countries.

Finally, the **third separation in the context of globalization**, which will take place in the near future, will cover the phenomena, and processes that were the essence of the second stage of globalization, and at the same time will include the ability of workers living in one country to provide services for companies in other countries without their physical presence. In other words, the third separation will be a real manifestation of the virtualization of labor process, and its separation from the workers themselves.

Moreover, the process of relocating production to other countries will continue. In the world where competitiveness is largely determined by firms that outsource production, it is almost impossible to predict which professions and types of work will be redundant in the future. This is another challenge to the social and labor sphere.

But let us discuss the features of the current stage of globalization, which are the result of the second separation, as it was mentioned above. In the largest, simplified interpretation, the root causes of a new stage of globalization are changes in the social division of labor and the functioning of the global economy under the influence of technologies of the Fourth Industrial Revolution. Under the influence of the latter, the transfer of knowledge, and ideas, know-how, as well as the cost of the related transactions increased. At the same time, there were radical changes in the organization of global production.

Fundamentally important for understanding the essence of modern globalization are the statements of one of the most influential researchers of modern problems of globalization

Richard E. Baldwin, who emphasizes: "In other words, based on advanced ICT, the moving of production abroad has formed a new type of industrial competitiveness that combines knowledge (know-how) of the G7 countries with the human resources of developing countries. As this combination of high technology with low wages has been a global achievement, the simplified transfer of ideas has created a massive flow of know-how from North to South. These new streams of knowledge determine the essential difference between the new globalization and the old one" [1, p. 20].

In order to understand the deep foundations of modern globalization, it is important to emphasize the following: the formation of a new format of the social division of labor and global value chains is now carried out in such a way that the owners of the latest technologies of the Fourth Industrial Revolution continue to be the companies of the G7 and some other countries. These countries direct the latest technological and managerial achievements to the developing countries not as moderators of "auctions of unprecedented generosity" demonstrating the wonders of selflessness and morality. On the contrary, the companies headquartered in the developed countries are aimed at maintaining control over intellectual capital exported abroad, and keeping it their property. A new form of social division of labor (international reorganization of production, moving not only production of goods but also know-how, information, and knowledge) combined with changes in the value chain have formed and continue to form a new image of the global economy, leading to a new platform of social-labor development.

The changes that occur in the ratio of production and non-production processes (pre-sale and post-sales ones) and in the value chain can be presented in the form of a certain theoretical construction. The theoretical model proposed by Stan Shea, the founder and CEO of Acer, is worth serious attention. This model fits in the theoretical foundations of many theorists and is a reflection of modern business practices, where the stage of production of a social pie (from the standpoint of added value) is less important than pre- and post-production stages.

In this regard, the above-mentioned researcher Richard Baldwin notes: "An increasing share of added value is created by services around the production, and a decreasing share by the production itself. In other words, a significant share of added value, which previously (before the second separation) appeared at the stage of production, is transferred mainly to the service stages preceding and accompanying the stage of production" [1, p. 215]. Stan Shea suggests considering the changes in the ratio of pre-production, production and post-production (after sale) stages of creating a social product and value chain in the form of a “smile curve”. (Fig.3).

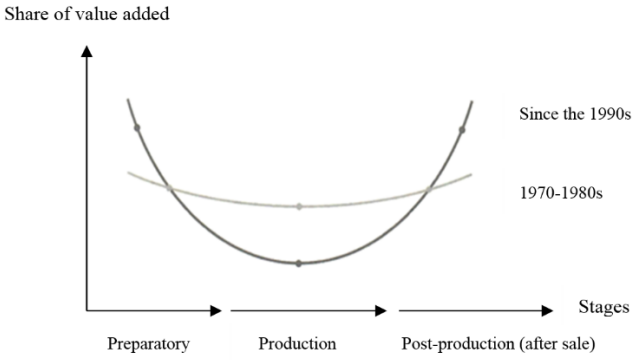

Fig. 3. The share of value added depending on the life cycle of products

Source: [1, p. 217].

What does this "smile" mean for different countries? As a rule, "good" jobs that create most of added value are found mostly in highly developed countries. But 'bad' jobs with low level of added value are transferred to poor developing countries.

It is worth mentioning that outsourcing production abroad, which is practiced mainly by the G7 countries and a number of other most developed countries, creates a phenomenon called the "polarization of the labor" or "midsegment deletion".

The results of special studies on the benefits and losses of employees in different qualification segments are as follows. Employees placed at the top of the qualification spectrum remain successful; workers on the opposite flank remain in their interests; and for those who find themselves in the middle of the spectrum, moving production abroad becomes a real problem.

The conclusions on employees' benefits and losses, as a consequence of the new format of the current globalization, agree with the study of real incomes of households in the period 1988–2008 and their distribution with reference to specific groups (Fig. 4).

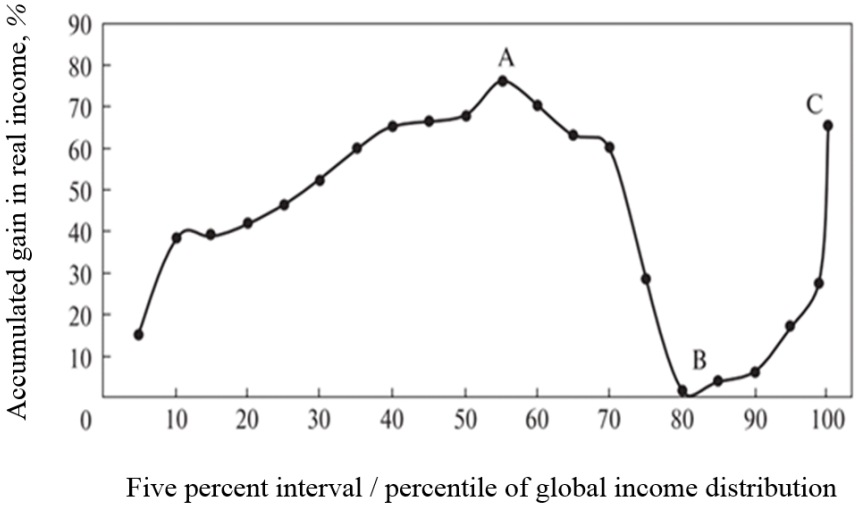

Fig. 4. Relative gain in real per capita income depending on the level of world income distribution, 1988–2008

Source: [6, p. 26].

What conclusions can be drawn from the analysis of data in Fig. 4?

The gain in real incomes of households in the period 1988–2008 was the largest among those who belonged to the 50th percentile of the global income distribution (median, mark A) and among the richest households (top 1%, mark C). Households with approximately the 80th percentile of the global income distribution (mark B) had the lowest gain; the majority belonged to the lower middle class of the wealthy countries.

The meaningful answer to the question: who benefited and who lost from globalization over the last two decades in terms of relative income growth can be formulated as follows – the poor and middle class of many Asian countries won more than others, and the "lower middle class" of the rich world lost.

What is the technical and technological dimension of the new (digital) economy? How does "Industry 4.0" influence the formation of the "Labor 4.0" platform? What tools are used?

Answering this question, we emphasize that "Industry 4.0" has already had a significant impact on all the components of social life. In the near future, there will be dramatic changes

in economy and society, and in the world of labor and employment, under the influence of information and communication, other innovative technologies and increasing access to digital infrastructure. There are at least four groups of technologies that will have the greatest impact on people's business and activities. We are talking about cognitive technology, cloud technology, the Internet of things and Big Data.

Everything related to "Industry 4.0", including blockchain, cryptocurrency, Big Data, information networks, cybersystems, platforms, etc., have quickly entered our lives, radically changing the current forms of life, motivational guidelines, and values.

We insist that there are three main phenomena of nowadays – demography-XXI, globalization-XXI and "Industry 4.0". They have changed and continue to radically change the world of nature, economics, institutions and the human world itself. We observe the interweaving, symbiosis, and layering of the above mentioned phenomena of modernity. Which of them is the priority in terms of the level of impact on human life and society in general? It is difficult to give an unambiguous answer to this question. We consider that it is "Industry 4.0" that most influences the world of labor and employment.

The "Labor 4.0" model and platform are so closely linked to "Industry 4.0" technologies that we do not assume that it is possible to discuss these two phenomena separately at the professional level. The large-scale and super-intensive reduction of labor intensity of low and medium complexity is associated exactly with the introduction of these technologies. So a sharp decline in the share of the middle class becomes obvious because their workplaces and functions and workplaces are increasingly automated and robotized.

The labor is significantly influenced by cloud technologies, which are information technology platforms that provide on-demand access to a common array of information resources that can be quickly provided at minimal operating costs. It would not be exaggeration to say that cloud technology has, metaphorically speaking, laid the foundation for a rapidly growing digital economy. The contribution of cloud technologies to the formation of the digital economy is not limited to the technological component, but covers the institutional, organizational, and economic components. The introduction of cloud technologies is associated with the emergence of today's phenomena such as production on demand, software as a service, etc., that will become the core of most business models of the future.

Technologies of "Industry 4.0" combined with the changes in the structural, organizational, and institutional spheres cause the formation of a new type of production – production of low labor, capital and assets intensity [25]. Deep transformations of technical, technological, organizational, and institutional nature, which could be defined as "Industry 4.0", determine the situation when the boundaries between the physical, informational, digital, network, biological and social spheres are blurred.

A characteristic feature of the new economic phenomena and new technological foundation "Industry 4.0" is the integration of the branches of knowledge, economic activities, and areas of human life. The nature of this integration is connected with the merger into the network of technologies "Industry 4.0", which leads to deep structural transformations, and a new configuration of economy. The vision of the economy as an extensive, intensively growing, and **changing system of connected networks** opens up new horizons and shapes a different socio-economic reality.

The innovations that are the product of "Industry 4.0" have a significant impact on all components of the process of using labor resources, and on the professional and qualificational structure of employees. In general, the main consequences of the development and functioning of "Industry 4.0" in the sphere of labor are:

– potentially significant, and favorable technical and technological prerequisites for increasing productivity;

– a sharp decline in the complexity of social production and reduced demand for labor;

– diversification of employment forms, the dominance of its atypical forms over typical ones, and of those non-standard over standard ones;

– increasing differentiation of the workforce according to the level of training and level of competence;

– increasing requirements for training, personal qualities and abilities of those employed in the new economy;

– dramatic changes in the nature and organization of labor;

– new preconditions and opportunities for communication, dialogue and cooperation;

– strengthening control over the labor process, including remote one;

– increasing labor intensity in most types of work;

– transformation of many types of work from complex and super-sophisticated to simplified and simple ones;

– reduced "life cycle" of the use of acquired knowledge and actualization of their updating and augmentation;

– new competencies (abilities, skills) that, in the platforms of "Industry 4.0" and "Labor 4.0", become critically important for economically active people, such as:

– readiness and ability for self-learning, retraining and continuing education;

– readiness for change and desire for something new;

– ability to adapt to constantly changing living conditions;

– ability to work in a team;

– readiness for professional mobility;

– ability to take reasonable, responsible risk;

– ability to think critically;

– ability and willingness to work remotely;

– ability to work with a large amount of data;

– ability to formulate and realize the true values of working life.

The formation and development of the platform "Labor 4.0" is taking place on the background of dramatic changes in the professional and qualification structure of those employed in social production. The most important trends in the field of professional qualification structure of the labor force of the new (digital) economy are:

– the emergence of new types of work and, accordingly, professions, which yesterday were not on in the staff lists of organizations, and today become widespread due to the changes in the social division of labor, and diversification of economic and labor activities;

– mass disappearance of various current positions, and even entire professions from the social and labor landscape;

– intensive filling of both new and traditional professions with new meaningful characteristics (work skills).

Fig. 5 shows the data that reflect the change in demand for basic work skills until 2020, which were presented at the World Economic Forum in 2016.

New development vectors of "Industry 4.0" and "Labor 4.0" create opportunities for expanding the professional field of activity. Based on the forecasts of Cognizant's Center for the Future of Work, the edition Business Insider compiled a list of professions that will replace traditional activities. They include data detectives, interlocutors / companions, urban cyber analysts, expanded reality travel designers, business development experts, fitness motivation advisors, medical technicians working with artificial intelligence, personal data

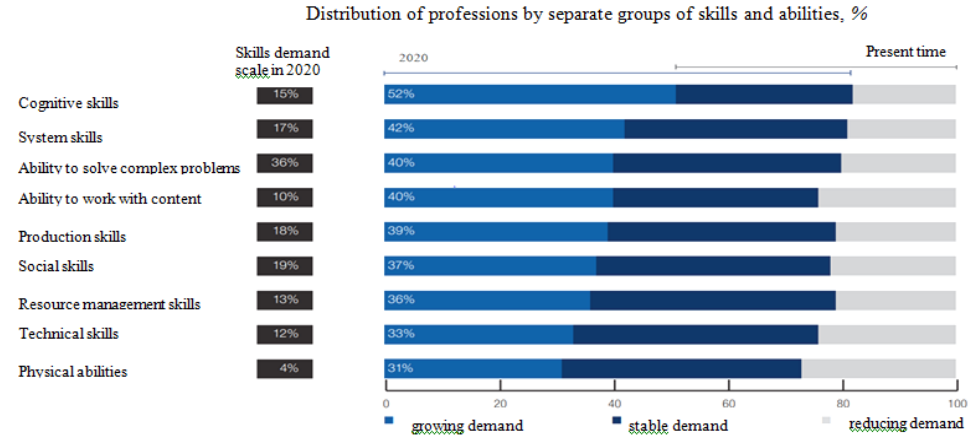

Fig. 5. Change in demand for basic work skills up to 2020

Source: [12, p. 256; 34].

brokers, road traffic controllers, digital designers, genetic diversity specialists, IT coordinators (coordinators of IT services), crypto coaches, personal curators of memories, guides in the virtual store, genetic portfolio directors, team managers to work with equipment and machinery, proxy CEOs, quantum machine learning analysts, peripheral computing experts, and ethical supply specialists.

All professions and all those engaged in production will critically require all of the following:

– possession of the most modern competencies in a certain field of professional activity;

– ability and willingness to constantly update skills and improve skills;

– readiness to perform work duties at any time and anywhere;

– ability to self-responsibility, autonomy, and self-regulation of their own work and career;

– ability to control the results of activities and assess the competitive advantages, benefits and disadvantages of proposals for the implementation of work tasks;

– ability to perceive the inevitability of high competition for access to working tasks.

Therefore, in order to meet the requirements of the platform "Labor 4.0" any network professional must be intellectually advanced, responsible, independent, able to work in a team (project), ready for changes, and have professional competencies that are imminent in terms of the new (digital) economy.

In general, the workforce of the new (digital) economy based on professional qualifications is becoming more variegated, diverse, and differentiated combining trends of innovation, and creativity and at the same time "washing out" skilled labor (professions) from the new economy. Let us discuss it in detail.

We do emphasize again and again that the scale, and range of work in terms of complexity, and intellectual component in many areas of the new economy tends to expand. At the same time, a new trend appears where complex, super-sophisticated, innovative and intellectual tasks are combined with the tasks that are simple in their content. The phenomenon of diluting, and depleting the economy, that the authors have repeatedly drawn attention to in many presentations and publications, is gaining momentum. The digital human often becomes an addition to tools and technologies of "Industry 4.0".

The "depletion" phenomenon has many manifestations and causes, and the main one is the intensive saturation of social production with information systems, the elements of artificial intelligence, cybersystems, nanotechnology, cloud technologies, etc., which **assume** communicative, analytical, intellectual, and mental functions. Figuratively speaking, former technological devices were controlled by humans but now the human is controlled by modern devices. Due to the fact that the technologies of the Fourth Industrial Revolution, as well as other technologies of the post-industrial era, are able to take over the performance of both simple and complex and super-complex functions that until now were performed by man, a multifaceted and large-scale depletion in employment is sure to happen and is already under way. We mean not only the disappearance of certain jobs, and replacement of well-paid jobs/positions by low-paid ones (due to the simplification of labor functions), but a depletion of entire segments of certain professional activities such as lawyers, accountants, and, in the future, truck drivers.

The ratio of simple and complex tasks, their dynamics in the development of a new (digital) economy is clearly demonstrated by the data of Figs. 6 and 7, as exemplified in the USA.

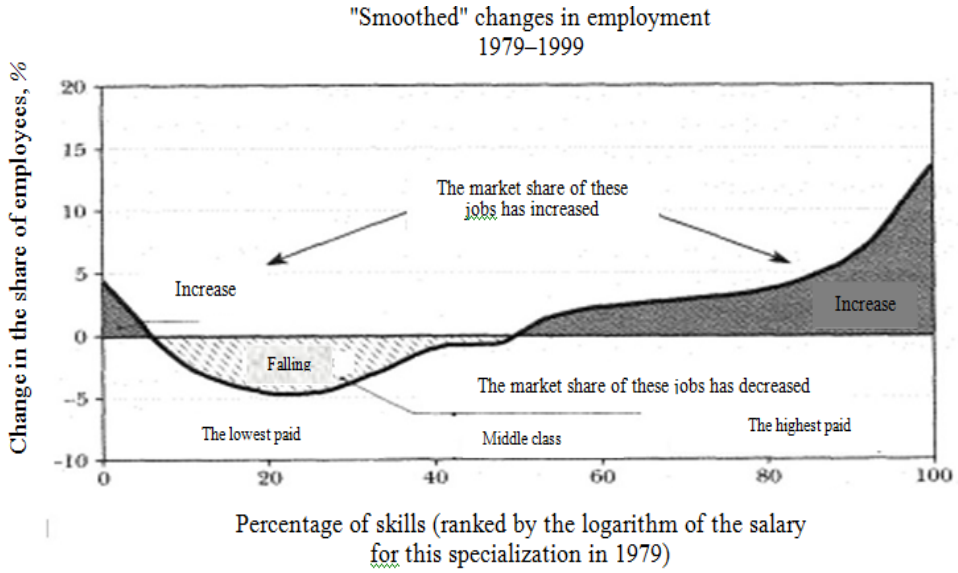

Fig. 6. Changes in the structure of the United States labor force in 1979–1999
Source: [4, p. 285].

According to Fig. 6, the number of employees increased during 1979–1999, while low-paid jobs were replaced by higher-paid ones, which required skilled workforce. The society was dominated by the idea that this trend would continue and each succeeding generation will have safer and better living conditions. However, after 1999, according to the figurative phrase of R. Inglehard, the "depletion" of the economy started.

In the period from 1999 to 2012 (Fig. 7) the share of middle class employment decreased. At the same time, low-paid, non-conventional jobs grew rapidly. The number and share of well-paid jobs that require high qualifications slightly increased. However, these figures were much lower than in the previous period (1979–1999).

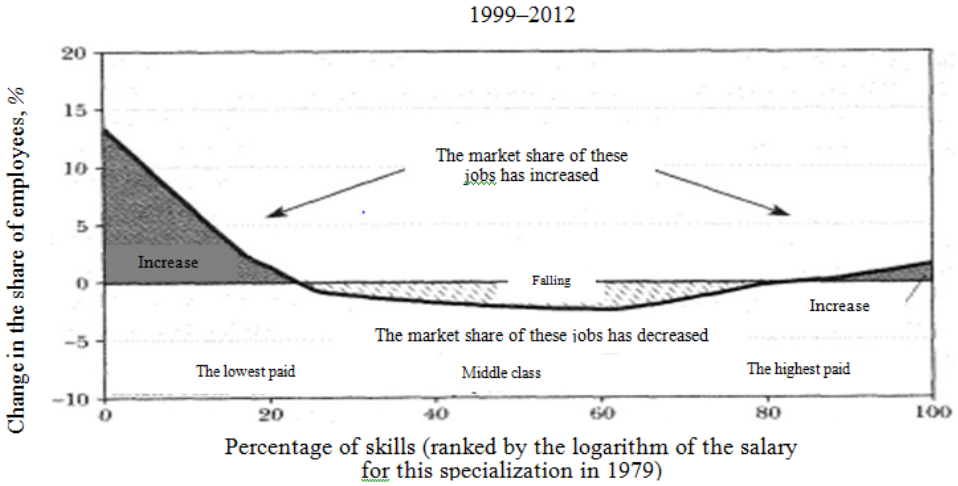

Fig. 7. Changes in the structure of the United States labor force in 1999–2012

Source: [4, p. 285].

We emphasize once again that information and communication technologies and the new economy in general cause labor substitution, while investment is becoming less capital-intensive.

The following basic characteristics of the "Labor 4.0" platform are cardinal changes in the forms, and types of employment and labor relations of those employed in the economy.

The results of the authors' research give the reason to single out a number of interrelated processes that have taken place in domestic and international practice over the past 10–15 years and are becoming more widespread and intense and are changing employment and established labor market parameters, namely:

– the spread of new, non-conventional forms of employment and atypical models of working time;

– increased flexibility of the labor market, which extends to all its parameters – demand, supply, labor services price;

– decentralization of collective bargaining regulation of employment relations;

– greater differentiation of segments of the labor market, characterized by an unusual combination of elements of the pre-industrial, industrial and post-industrial epochs;

– a strengthening trend, when a significant part of work with high and super complexity is combined with the same share of work with low and very low complexity;

– multi-vector processes occurring in the content and nature of work.

It is important to realize that the transformation of the employment institution is an unprecedented scale of application of non-standard (atypical, non-traditional) forms of employment, such as:

– part-time employment;

– employment on fixed-term employment contracts;

– temporary, non-permanent employment, including borrowed labor;

– secondary employment;

– remote employment;

– employment based on civil law contracts;

– informal employment, including self-employment;

– unregistered employment in the formal sector.

Finally, considering employment in the context of the new platform "Labor 4.0", we emphasize the following.

Until recently, unconventional forms of employment such as remote work, staff outsourcing, part time jobs and other flexible forms of employment were seen as abnormal and atypical in the negative sense in the research of employment, and social and labor market. How should unconventional forms of employment under the current network and digital capitalism be assessed? Is their presence and spread an anomaly or an objective reality? How should we assess the spread of precariat: according to G. Standing or according to those realities that are no longer exception but the norm?

We are convinced that we (the representatives of various schools of labor economics, as well as the entire scientific community) are on the eve of revising if not all but most of the postulates which were formed in the industrial era, on the eve of the rejection of socalled "eternal truths" in the field of socio-economic and socio-labor development; and on the of eve of abandonment of mental models that more or less "worked" yesterday, but today are becoming an anachronism and a clot on the path to sustainable development. We must realize that yesterday's typicality and today's atypicality; former standard nature and current non-standard nature; basis and superstructure; economic and social; economic and non-economic, as well as many other concepts in the new (digital) economy have changed places. We must learn to think differently and be socially responsible.

The next fundamental characteristic of the platform "Labor 4.0" is a radical change in the processes, content and organization of work, and personnel management in general.

Preliminary judgments and theoretical and applied foundations give grounds for the conclusion that a worker in digital era appears as a carrier of new competencies, and his activities are carried out in the new coordinates, such as mobility, autonomy, self-responsibility, transparency, and network based control. At the same time, the values of working life are significantly transformed.

Everything mentioned above gives grounds for claiming that, since the labor process becomes networked with the mandatory use of informational and communicational technologies, and the interaction of the employer with employees is increasingly becoming virtual and unconventional and acquires remote forms, we can speak about the transformation of traditional forms and methods of labor organization into a qualitatively new reality – **digital labor**.

Digital labor is formed in the following areas:

– development and implementation of network forms of labor division and cooperation;

– design of labor processes based on digital technologies;

– development and implementation of scientifically sound labor standards and other labor regulations;

– formation and implementation of labor mobility projects;

– introduction of adequate forms of training and retraining for the conditions of digital economy in order to form a new type of creative workers;

– introduction of a system of tangible and intangible motivation, which takes into account the conditions of digitalization and the new economy in general.

One of the trends of modern labor organization both at the production level (within one firm) and globally (within a multinational corporation) is the formation of project teams, and subsequently the project based nature of labor relations. According to this approach, the formation of labor relations can have a number of benefits, especially for the employer. We mean reducing the time of team selection for a particular project, the ability to attract skilled contractors from around the world, and remote access of employees to the project. These

factors increase productivity and competitiveness of business entities as well as their efficiency.

At the same time, we can observe social losses associated with a number of contradictions between individual and social goals, such as virtualization of labor relations, their temporary nature and the need for stability and predictability of labor activity.

One component of the "Labor 4.0" model is an increase in the share of work functions performed **outside the office** (remote employment, teleworking). According to surveys conducted by German experts, about 30% of employees already work remotely on a regular basis; 12% of employees and 4% of workers perform production tasks several times a week outside the officially established rates of working hours. At the same time, the pace of performance of official tasks is increasing [35].

According to the model "Labor 4.0", a mass phenomenon is the use of atypical schedules of working time, which are sometimes combined with extra hours work. According to available data for Germany, every fourth employee has to work extra hours in the evenings, and every tenth has to work at night. The same atypicality of work is characteristic for weekends. At the same time, a lot of working time remains unpaid and vacation is often unused. The following data are illustrative: in Germany during 2016 employees were employed 43,5 hours per week that is almost 5 hours more than fixed in the employment contracts.

A component of the development trends of the new economy in its social and labor dimension is the transformation of the labor management system.

We pay attention to a number of other dominant trends in this area, namely:

– the dynamics of staff turnover is growing, layoffs generally exceed hiring;

– there is a permanent shortage of certain categories of staff who are carriers of new, unique, unconventional competencies;

– stable remains the demand for creative, innovative employees who are able to appear in the place at a time when the company needs new resources and factors to gain competitive advantage;

– large-scale changes in working conditions and employment, including:

– labor conditions and employment undergo sweeping changes, such as:

– increased workload, the share of employees who have to work extra working hours increases;

– increased demands for labor mobility; workers are less and less tied to conventional workplace;

– the content of labor activity is constantly adjusted;

– requirements for professional skills as well as the ability to achieve results from the very start of professional career are in demand

– increased importance of personal, social, intercultural, moral and spiritual qualities and abilities;

– there is a growing need to find new, innovative incentives, while, at the same time, it becomes an axiom that the most perfect incentives and rewards cannot replace a professionally formed, cohesive, and success-oriented team.

Finalizing the *construction of proposed mental model*, which reflects the new opportunities, limitations and challenges in the field of social and labor development under the influence of the platform "Industry 4.0", we make the following generalization. The chain of changes associated with new trends in resources, technologies, costs, and productivity in the context of opportunities and limitations of social and labor development is as follows: intensive saturation of the new economy with new technologies, systems, networks ↔ significant

reduction in labor intensity ↔ decline in relative prices for means of production ↔ productivity growth (not according to Karl Marx) ↔ a new format of employer motivation ↔ concentration of profits with suppliers, and knowledge carriers (creative workers, inventors, and owners of both powerful human and financial capital) ↔ "depletion" of the economy ↔ the concentration of benefits and income in a small segment of economically active population and owners of capital ↔ rising technological unemployment ↔ reduced share of the middle class.

However, despite the obvious and indisputable facts that reflect the state of the platform "Labor 4.0", many scientists continue to argue that today's labor activity is exclusively dominated by work, which is complicated in content, and saturated with innovation and intellectual component. These statements are nothing more than a tale and wishful thinking. The "Labor 4.0" model, as follows from the above, is a symbiosis of new opportunities and risks both for the economy as a whole and its individual segments, and for those employed in social production. We will discover a new, more striking vision of growing opportunities and the reproduction of existing risks and emergence of new social and labor ones **by addressing the issue of labor income in the new (digital) economy**.

Among the numerous tendencies and trends in the field of labor income of economically active population in the global dimension and partly in Ukraine, we would like to highlight the following:

1) the galloping growth of labor income inequality at all levels (global, national, organizations and households) as a consequence of the simultaneous, multi-vector action of a number of factors;

2) reduced share of wages in global GDP, and hence reduced profitability of labor in social production;

3) transformation of the interaction of institutional, market, and corporate mechanisms and tools for regulation of incomes from labor activity with shifted priorities and changed dominants;

4) outstripping growth of property incomes in comparison with labor incomes, which becomes a dominant in the spread of inequality;

5) "compression" of labor incomes of the middle class as a result of large-scale multivector changes in employment and in the levels and differentiation of incomes of economically active population. This trend applies primarily to the most developed countries;

6) outpacing growth of labor income of those professions (activities) that are the embodiment of the Fourth Industrial Revolution;

7) galloping growth of differences in the levels of labor income between top management and low and medium skilled workers (up to hundreds or even thousands times);

8) reduced impact on the formation of labor income from traditional factors, which for many decades have played a leading role in determining the levels of labor income and their differentiation;

9) "erosion" of the established patterns of remuneration, which traditionally referred to the wage structure and other components of labor income;

10) increased gender inequality as a manifestation of the new nature of professional positions; it is expected that instead of the three lost "male" jobs, one new will appear, while one feminine position will replace five lost ones.

The issue of labor income in the new (digital) economy is considered more profoundly in a number of authors' publications [22; 24; 29; 31].

The changes that are taking place in the field of labor will only intensify in the future, affecting not only the content and nature of labor and labor income policy but the forms of

employment as well. At the same time, a new format and a new type of relations in the field of direct employment will be established.

In less than three decades (from the early 1990s to the present), there has been a global shift from "classical", structured relations between labor and capital at all levels of the hierarchical structure of the economy and society to the blurred hybrid relations that de jure are collectively negotiable or otherwise regulated, and de facto formal, translucent, unstable, and increasingly individualized, and asymmetric. As it has been repeatedly noted in the materials of the International Labor Organization, in the field of labor and employment, since the 90s of last century there has been a race towards the bottom of social guarantees.

The stable, numerous, vertically and horizontally structured working collectives of the industrial era with the formation of a new (digital) economy will no longer have the above characteristics. Low labor, material and capital intensity of modern and future production, in combination with the transformation of the social division of labor, are radically changing the format of entrepreneurship in the post-industrial era, i.e. its "labor" basis. The aggregate labor force (as deeply "immersed" in the global social division of labor) is becoming increasingly fragmented and divided. Labor relations are becoming more and more civil-law in nature, and the former dominant collective bargaining practice of regulating social and labor relations is rapidly losing its institutional basis and reducing its potential.

Digitization and virtualization of the economy, its hybrid nature, the emergence of various modifications, such as the economy of platforms, "on demand" economy, and economy of common consumption are changing not only the social and labor landscape of direct employment but the entire social structure of the economy and society, as well as the classical boundaries between producers and consumers, and between workers and employers. The former polarity of the relationship and interdependence between the owners of labor and the owners of capital is changing too. Thus, the social fabric of the new (digital) economy and post-industrial society acquires non-classical, atypical, changing, and unstable forms. And the whole system of social and labor relations follows the pattern.

Conclusions

The "big bang" that occurred in the social and labor sphere at the end of the XX – beginning of the XXI century is a synchronous layering in time and space of several global, large-scale and at the same time different vector phenomena of modernity, which are creating a fundamentally new social and labor reality. The point is that in time and space there has been and continues to be a coincidence of demographic, globalizational, technological, and institutional mega-changes and the adoption of a new model "Labor 4.0".

These mega-shifts and their consequences for the social and labor sphere cannot be unequivocally qualified as positive or negative. In fact, it is a complex symbiosis of new opportunities and new challenges and dangers and the corresponding ambiguous results. At the same time, an unbiased analysis of developments in the social and labor sphere gives grounds to assert that societies on all continents are increasingly concerned about the shortage of decent work and a global drift of labor relations in an “unhealthy” direction with a growing asymmetry in relation to the rights and responsibilities of the main subjects of these relations.

It goes without doubt that the academic community is among the first to take social responsibility for the trends in the global and national labor markets in the coming years, namely to contribute to the optimization of post-industrial forms of relations between the subjects of labor interaction towards the establishment of symmetrical and healthy relations.

An objective analysis of the condition and prospects of the social and labor sphere is a first step towards overcoming the undesirable developments in the field of labor and employment. We must do everything possible to ensure that this task is completed and that we all do not "miss" the future that has already arrived.

The prospects for further research. Further scientific investigations of the authors are aimed at finding agreed trajectories of social and labor development in the conditions of the formation of a new (digital) economy and network society. The horizons of the new scientific achievements are outlined by the elaboration of complex mechanisms and tools for regulating the social and labor sphere in the context not only of new restrictions and challenges, risks and threats, but also of new opportunities embodied in the "Labor 4.0" platform, which is immanent to the new economy with the technological basis of "Industry 4.0".

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Received 05.12.19
Reviewed 15.01.20
Signed for print 15.06.20

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КОНЦЕПТ "ПРАЦЯ 4.0" : ТЕОРЕТИКО-ПРИКЛАДНІ ЗАСАДИ ФОРМУВАННЯ ТА РОЗВИТКУ

У статті викладено науково-прикладне обґрунтування конструкту та аргументацію компонент нової ментальної моделі праці та зайнятості "Праця 4.0" як соціально-трудової реальності початку XXI століття. Розкрито теоретико-практичні положення, що пояснюють взаємозв'язок змін, які відбуваються у навколишніх світах (техніки, технологій, інститутів тощо) з трансформаціями сфери праці та зайнятості у їх нерозривній цілісності.

Окреслено нові грані праці в суспільній діяльності початку XXI століття. Викладено авторське бачення нового формату моделі праці та

зайнятості, адекватного умовам першої половини XXI століття. Виокремлено мегапричини розбудови нової платформи соціально-економічного і соціально-трудового розвитку. Представлено зовнішні умови розвитку та внутрішні характеристики моделі "Праця 4.0". Підкреслюється, що в авторській теоретичній конструкції "Праця 4.0" постає як трудова парадигма, іманентна новій економіці з технологічним базисом "Індустрія 4.0"; як платформа та інститут, що забезпечує використання ресурсів праці в координатах, породжених Четвертою промисловою революцією. Розкрито особливості складових нового типу процесу праці – предметів праці, засобів праці, працюючої людини.

Обґрунтовано сутність феномену "Праця 4.0" через призму та соціально-трудовий вимір сукупного працівника нової (цифрової) економіки; глобалізаційних процесів; форм, видів зайнятості та пов'язаних з ними відносин; мережевої організації праці; змісту та траєкторії розвитку процесів праці; трудових доходів, а саме їх рівня, диференціації, тенденцій та домінант у цій царині; нового формату соціально-трудових відносин. Розкрито вплив демографічної компоненти стагнації світової економіки на соціально-трудовий розвиток. Визначено виклики для соціально-трудової сфери, зиски та втрати для працівників, нові асиметрії соціально-трудового розвитку, що їх породжує нинішній та майбутній формати глобалізації.

Розкрито вплив нового техніко-технологічного базису "Індустрія 4.0" на становлення соціально-трудової платформи "Праця 4.0". Визначено тренди у царині професійно-кваліфікаційної структури робочої сили нової економіки та можливості для розширення професійного поля діяльності. Наголошується на феномені цифрової організації праці. Зроблено акцент на кардинальних змінах усієї соціальної тканини нової (цифрової) економіки і постіндустріального суспільства.

Ключові слова: *нова економіка, нова глобалізація, соціально-трудовий розвиток, чинники соціально-трудового розвитку, модель "Праця 4.0"*