SOCIO-ECONOMIC CONTRADICTIONS OF THE SIXTH TECHNOLOGICAL MODE

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Abstract The new scientific-technological revolution brought a new quality of life to the mankind. However, not every country or corporation is ready to make a transition to new technologies and new resources as this process is knowledge-intensive, costly and implies long payback periods. At the same time, everyone realizes that by making the transition to the latest technology and resources countries and corporations will gain a competitive edge in the long run. In the presented work, the authors set a goal of identifying the main socio-economic problems, both at a domestic and international level, that were brought about by a switch of some developed economies to the sixth Kondratieff cycle. The authors conducted their own research and compared the results with studies by the world's leading universities and laboratories. The authors conducted analysis of socio-economic development and discuss for mitigating negative consequences accompanying some economies' transition to the sixth technological mode.

Key words: Social security, unemployment, the sixth technological mode

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Introduction

A series of scientific discoveries, social and geopolitical events make us think that Humanity is on the verge of a new round of development. Achievements in such branches of fundamental science as physics, chemistry, mathematics allowed a number of productions to pass to such technological processes as "nano", digital and manfree production with application of robotics. That changes have also affected the service sector. And the discoveries made in the field of biology and chemistry make it possible to switch to new fuels, energy resources, raw materials. Most scientists and practitioners agreed that the core of the sixth technological order will be nano - and information materials, and technology; cognitive science and socio-humanitarian technologies. Thus, the sixth technological mode is represented by the convergence of nano -, bio -, info - and cognitive technologies (NBIC). (Bainbridge & Roco, 2005, 2011 Kovalchuk, 2011)..

On the one hand, all these innovations solve many everyday problems, save time and effort to find and purchase the right product.

On the other hand, what will the time of Mankind be spent on? What to do with the part of Humanity that is freed from work? And, given the fact that for most people, work is the only source of income, the question arises: what will replace the source of income from work for the unemployed person?

Scientists from the University of Salford studied the problem: changes in the labour market, accompanied by an increase in unemployment to reduce mental health and well-being of the population of different countries. As a result of the study, scientists conclude that the risk of dissatisfaction with life (quality of life) and a decrease in mental health will be low if the unemployed receive generous unemployment benefits. (Kameraden & Bennett, 2017)

Some researchers believe that the robotization of production will lead to a reduction in employment (Beg & Sertic & Druzic, 2017), others believe that there will be redistribution between production and services, and the demand for certain professions will increase (Desmet & Rossi-Hansberg, 2007).

Results:

In his book titled "The Third Industrial Revolution; How Lateral Power is Transforming Energy, the Economy, and the World ", American social theorist and economist Jeremy Rifkin presented his idea that new economic patterns based on individual production, primarily on renewable energy and lateral power, will replace traditional centralized hierarchical business models created by the first and second industrial revolutions. (Rifkin, 2011).

Unlike Rifkin, in modern market economies, representatives of authorities and business see the main goal of the new industrial revolution in the manifestation of the positive effect of the economy of scale in the long run, which will ensure a competitive edge in the international market thanks to higher labour efficiency, better quality of manufactured products and lower production costs, especially the cost of labour, energy and materials.

However, this concept may come into collision with manifestations of the economy of scale at an interregional level as cross-country specialisation in certain industries where the effect of mass production is registered may become a kind of externality. The authors of this theory also point out that a broad market is required for mass-production to take effect, so the market, too, should be divided into sectors.

It is obvious that a country's narrow specialisation will turn it into a resource-based or resource-dependent economy, which, for its part, may be regarded as a threat to economic sovereignty and security.

At the same time, according to Erik S. Reinert's and Jaroslav Vanek's theory (Reinert 2004), when countries at different stages of economic development start free trade relations, the more developed country tends to step up its specialization in high-technology sectors where this country has a comparative advantage. In the less developed country these sectors will deteriorate and eventually disappear, and specialization will persist in more primitive production areas such as raw materials extraction, agriculture, etc. Thus, the developed country begins to develop sectors with a growing profit margin, while the less developed country – those with decreasing returns. As a result, the former gets richer and the latter gets poorer (Reinert, 2004).

Consequently, there is a hypothesis that the transition to a new technical and technological level can lead to a significant increase in the standard of living in rich countries and further increase the level of poverty in countries with low levels of high-technology production.

1 Express assessment of the transition of national economies to a new technological level

As part of the national economy and individual sectors, the positive effect of the scale of the transition to a new technological level expect a positive impact of the economy of scale only in case the following factors are present:

- a stable position in a major market;
- availability of up-to-date scientific and technical solutions and technologies, material and technical resources;
- availability of raw materials;
- tight deadlines of implementation of new technologies and products.

1.1 Analysis of important indicators for economies' transition to a new technological mode.

According to leading experts, only developed countries will be able to take production to a new technological level.

For the sake of analyzing the impact of the new tecnological mode and the new industrial revolution on social processes we looked at national economies' potential and at the share of the population that will be able to use the results of these processes. The table 1 features only selected countries that score the highest value of the indicator of innovativeness of enterprises and personal interest.

We also took into account the opinion of some experts, that the highest level of innovativeness, the use of nano materials and technologies, creation of products for digital technologies is typical of the defence industry. Regrettably as it may seem, it is the countries that are actively developing new kinds of weapons that have higher chances of transition to a new technological mode (Korostyshevskaya, 2011).

Most experts agree that the US, China, Japan, Germany, France, Great Britain and a number of other countries, mostly in Europe, will be able to convert production to the six technological mode in the near future as their economies are shaped by multinational companies.

1.2 Analysis of global trends in the structure of employment and living standards

In order to assess the socio-economic advantages and disadvantages of a technogenic society, which will follow with the widespread use of NBIC-technologies, it is necessary to assess such indicators as: employment; poverty level; the ability of the state to provide a normal standard of living for vulnerable segments of the population.

The current structure of employment in countries with potential to move to a new technological structure in the near future is summarized in table 1.

Tab. 1: The structure of employment and the level of poverty in 2018, %

Наименование страны	Сфера услуг	Промышленность	Сельское хозяйство	Уровень бедности	Уровень платежеспособности населения (класс)
China	26	24	50	9,9	A+
India	18	15	67	22,1	BBB-
USA	80	18,3	1,7	14,3	AAA
Russia	55	30	15	11,2	BBB-
Japan	65	30	5	16,3	A
Germany	63,8	33,4	2,8	11,0	AAA
France	71	25	4	6,2	AA
Czech Republic	55	40	5	8, 6	A+
Austria	68	29	3	5,9	AA+
Switzerland	69,1	26,3	4,6	7,5	AAA

Source: http://www.mir-geo.ru/

A comparative analysis of the data suggests that countries with high innovation potential already have a high level of employment in the service sector, compared with employment in industry and agriculture. However, in the countries with the largest population, most of them are engaged in agriculture (India, China).

The countries with the largest population have not only high unemployment but also high poverty (India, China).

Tab.2: Indicators characterizing the level of innovative development of the countries and the quality of life of the population

Country	population, million people	*GDP per capita 2017**		Living standards, 2017 г.**		Unemployment-rate		Employment-rate	Market potential index*	The Global Innovation Index 2017****	High-technology exports, (billion US$)***
		Country rating	*$*	rating	Coefficient	%	rating				
China	1379	75	8583	51	91,3	4,1	41	82,5	10	52.54	549
India	1282	142	1852	43	110.3	4,9	44	46,9	48	35.47	No data
USA	326	8	59495	9	167,5	5,0	56	60,3	-	61.40	154
Russia	142	67	10248	50	91,7	5,8	59	59,6	23	38.76	10
Japan	126	25	38550	17	155,8	3,3	28	59,6	44	54.72	92
Germany	80	19	44184	3	178,9	4,5	45	75,6	39	58.39	186
France	67	23	39673	19	154,4	9,7	112	65,7	32	54.18	104
Czech Republic	11	40	19918	20	153,7	5,9	61	74,1	26	50.98	21
Austria	9	15	46436	4	178,5	9,5	110	72,9	29	53.10	16
Switzerland	8	2	80837	6	172,8	3,7	27	79,9	35	67,69	53

Sources: * https://knoema.ru/BIEDS2017/educational-statistics-of-burundi
** http://investorschool.ru/rejting-stran-po-vvp-na-dushu-naseleniya-2017 Information provided by the IMF as of 22 April 2018
*** https://data.worldbank.org/indicator/TX.VAL.TECH.CD?end=2015&start The World Bank statistics
**** www.globalinnovationindex.org

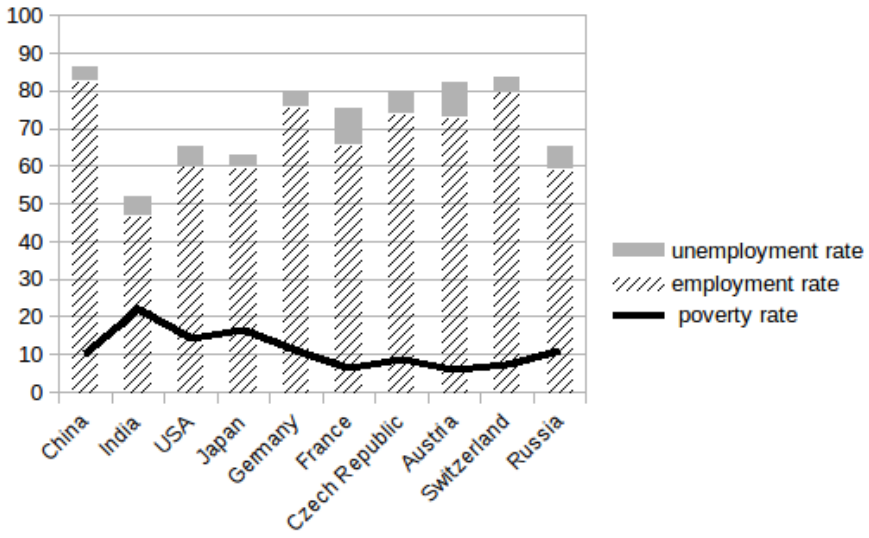
A comparison of the statistical data in Table 2 suggests that the countries with the largest population and the highest innovation activity index also have a high level of unemployment among the economically active population, and the indicators of living standards and solvency of the population are average and below the average in the world ranking (among more than 180 countries).

An analysis of the data presented in table 1 and 2 allowed us to compare the rate of the population below the poverty line with the unemployment rate. As can be seen from Figure 1,

statistics on employment and unemployment rates in total do not provide 100 %, as is assumed by the category of economically active population. However, the poverty rate in most countries is much higher than the unemployment rate, which leads us to the conclusion that there is hidden unemployment and it is higher than the official one.

In the transition to a new technological structure, priority may be given to countries with smaller populations but high levels of employment, proportionally distributed across all major sectors of the economy, for example (among those considered): Germany, Austria, Switzerland and others. The employment in the service sector will not completely resolve the unemployment problem as unmanned production (robotization) will affect this industrys as well.

Fig. 1: The comparison of employment and poverty indicators in the countries studied



Source: done by autors on Table 1 and Table 2 data

At the World Economic Forum in January 2017, it was stated, that fourth industrial revolution will fundamentally change the global economy: by 2050 the world's population may reach nine billion people. This trend will result in the growth of consumer demand. People's ability to pay is a pre-requisite of demand, and most people earn their income not only by working for hire. So Gulin and Uskov (2017) came to the conclusion that some 47% of occupations in the US, mostly office and administrative support workers, will be automated.

It is noteworthy that the abovementioned research was conducted for the country most prepared for the transition to the new technological mode - the USA.

2 Some aspects of the Impact of the sixth technological mode on social and economic processes

The generalizing category of efficiency of socio-economic processes is the quality of life of the population. For most people employment is the only source of income to meet their needs. Therefore, the analysis of the impact of the new industrial revolution, based on man-free production, was based on the unemployment rate of the population.

2.1. Econometric estimation of the influence of unemployment on the production of medium and high-tech products

The authors conducted an econometric estimation of unemployment for countries which are to a certain degree ready for the introduction of the advances of the fourth industrial revolution but are not among the world's leaders as regards population and GDP levels. For analysis the authors used data provided by the World Bank for 16 industrially developed countries (including newly industrialized countries and a number of countries featured in Table 1) for the period between 1993 and 2016. The research results are presented in Table 3 which provides an econometric assessment of the influence of unemployment (Unempl) and per capita GDP (GDPpercap) on manufacturing of medium- and high-technology products (Medhiind).

Tab. 3: The results of the panel model in the estimation of the impact of unemployment and GDP per capita on the production of medium-and high-tech products

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	9.18842	1.72723	5.3197	<0.0001	***
Unempl	0.200884	0.0917115	2.1904	0.0292	**
GDPpercap	8.41386e-05	4.09302e-05	2.0557	0.0406	**
Medhiind_1	0.721043	0.0317516	22.7089	<0.0001	***

Mean dependent var	47.33882	S.D. dependent var	14.03199
Sum squared resid	2720.785	S.E. of regression	2.858413
LSDV R-squared	0.960632	Within R-squared	0.694985
LSDV F(18, 333)	451.4193	P-value(F)	1.6e-221
Log-likelihood	−859.3942	Akaike criterion	1756.788
Schwarz criterion	1830.197	Hannan-Quinn	1786.002
rho	−0.088667	Durbin-Watson	2.086884

The results of the panel analysis with fixed effects indicate first-order auto-correlation of the variable in question. Factors of unemployment and per capita GDP have an impact with the level of significance set at 5 per cent.What is especially important is that the signs in front of variable coefficients are positive. Moreover, while per capita GDP has a rather small

impact on manufacturing of medium- and high-technology products, a 1-per-cent growth in unemployment rate may result in the growth of medium- and high-technology production by 0.2%, provided that all else is equal. The paradoxical conclusions can be explained by wide-spread introduction of automation and robotization for manufacturing of these kinds of products. To a certain degree, these results are indicative of insufficient readiness of the national economies of the countries in question for the adoption of the achievements of the fourth industrial revolution. Thus, Erik Reinert's and Jaroslav Vanek's theory saying that in case of free trade relations, a more developed country tends to develop sectors with higher profit margins while a less developed country – those with decreasing returns, may become a reality for some countries.

At the same time, when we study the process in question it is necessary to determine not only the role of the national economy but also the role of multinational companies operating in foreign countries and using their resources.

The presented results are not final and require verification. At the same time they do not contradict with conclusions of leading researchers saying that the risk of a drop in general employment does exist. At present, the risk is considered to be insignificant. This can be explained by the following: first, a generalized study would require more statistical information on the key factors over a significant period of time; second, methods of evaluation of employment and unemployment levels require a specific approach as the labor market is affected by a number of factors. The employment rate used in the study included part-time employment, employment of migrant workers and self-employment.

Conclusion

As a result of the research, it was found that in total the unemployment rate and the employment rate do not correspond to 100 %, which should form the economically active population, which leads to the conclusion that the statistics do not take into account hidden unemployment. The rate of hidden unemployment in industrialized countries is significant.

The analysis of the structure of the employed population showed that in economically developed countries, employment in the service sector significantly exceeds employment in industry and agriculture.

The econometric analysis has proved the existence of a positive relationship between medium - and high-tech production and unemployment. The impact of unemployment on production exceeds that of GDP per capita. Thus, the further development of the high tech

production sector may be accompanied by an increase in unemployment in developed countries.

Speaking about the preliminary results of the study into advantages and disadvantages of a transition to the new technological mode we have to validate the conclusion of researchers from University of Florence (Italy): it is necessary to consider not only technical and technological innovations but psychological innovations as well (Palazzeschi, Bucci & Di Fabio, 2018). However, we believe that psychological innovations should take a different focus and include preparation of the population for inevitable and constant changes in the ongoing social and economic processes and phenomena. That is why we have decided to start by looking at the development employment in the course of the transition to a new technological mode since work for hire is the only source of income for a significant part of the world's population. The study is based on two conflicting concepts. Concept one: robotized production will not affect total employment as labor resources will be re-distributed between manufacturing and the service sector. Concept two: the transition to robotized production will affect all spheres of the economy and will result in a significant drop in employment.

The analysis showed that even if the transition to a new technological mode should improve the standard of living of the population, there are risks of increasing unemployment and the growth of the proportion of the population living below the poverty line.

The study has enabled the authors to make the following tentative conclusions: the transition to unmanned production may cause the growth of state expenditures for the purposes of ensuring certain living standards for all population groups, on the other hand.

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