



Financial Strategy of Development of Industry 4.0 in the Countries with Developing Economy

Estrategia financiera de desarrollo industrial 4.0 en países con economía en desarrollo

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ABSTRACT:

The purpose of the research is to develop the framework financial strategy of development of industry 4.0 in the countries with developing economy. The methodological support for verification of the offered hypothesis is provided by the method of horizontal analysis of statistical information, with the help of which the depth of underrun of the countries with developing economy from the countries with developed economy and from the world economy is studied. The information basis consists of the statistical materials of the International Monetary Fund for 2017 and 2020. The authors show that the problem of overcoming the developing economies' underrun requires deep transformations that allow increasing the rate of economic growth and its quality. A perspective means of activation of economic growth in the countries with developing economy is interception of the initiative in development of industry 4.0. As the key restraining factor on the path of implementation of the strategies of increasing the quality of economic growth in the

RESUMEN:

El propósito de la investigación es desarrollar la estrategia financiera marco de desarrollo de la industria 4.0 en los países con economía en desarrollo. El soporte metodológico para la verificación de la hipótesis ofrecida es proporcionado por el método de análisis horizontal de información estadística, con la ayuda de la cual se estudia la profundidad de la infrautilización de los países con economía en desarrollo de los países con economía desarrollada y de la economía mundial. La base de información consiste en los materiales estadísticos del Fondo Monetario Internacional para 2017 y 2020. Los autores muestran que el problema de superar la falta de desarrollo de las economías en desarrollo requiere profundas transformaciones que permitan aumentar la tasa de crecimiento económico y su calidad. Un medio de perspectiva de activación del crecimiento económico en los países con economía en desarrollo es la interceptación de la iniciativa en el desarrollo de la industria 4.0. Como el factor restrictivo clave en el camino de la implementación de las estrategias para

countries with developing economy is the deficit of financial resources, the financial aspect of development of industry 4.0 is paid special attention. The authors present a framework financial strategy of development of industry 4.0 in the countries with developing economy.

Keywords: financial strategy of industry development, industry 4.0, countries with developed economy, countries with developing economy.

umentar la calidad del crecimiento económico en los países con economías en desarrollo es el déficit de recursos financieros, se le presta especial atención al aspecto financiero del desarrollo de la industria 4.0. Los autores presentan una estrategia financiera marco de desarrollo de la industria 4.0 en los países con economía en desarrollo.

Palabras clave: estrategia financiera de desarrollo industrial, industria 4.0, países con economía desarrollada, países con economía en desarrollo.

1. Introduction

Division of countries in the global economy is one of the most important modern global problem of humanity. Differentiation of the level of socio-economic development of the countries in the global economy is so strong and sustainable that two categories of countries have formed by now. The first category includes the countries with developed economy which possess the highest competitiveness in world markets and are leaders as to the level of socio-economic development.

The second category includes the countries with developing economy, which are peculiar for low competitiveness in world markets and are behind the countries with developed economy as to the level of socio-economic development. From the initial stages of the integration process, they had limited possibilities in the sphere of socio-economic development, providing resources for intensive development of countries with developed economy.

While this tendency was initially caused by the pressure of the countries with developed economy, which were interested in their quick development, as of now it is related to accumulated internal problems of the countries with developing economy. In order to overcome the disproportions in the global economic system, the countries with developed economy make efforts for supporting the countries with developing economy.

However, neither the activity of the countries with developing economy in the sphere of overcoming the underrun through modernization of their economic systems nor the help from the countries with developed economy, which is provided through the corresponding international organizations in the form of subsidies, credits, etc., provides significant results, which is proved by preservation and deepening of the gap between these categories of the countries with time.

Our hypothesis is that the problem of solving the underrun of the countries with developing economy requires deep transformations that allow increasing the rate of economic growth and its quality. This is caused by the fact that economic systems of the countries with developed economy are based on high technologies and innovational goods and services that allow them to be leaders and show high quality of economic growth, while the countries with developing economy are oriented at the existing technologies, goods, and services, due to which they reach high growth rates with its low quality, establishing their "underdeveloped" position in the global economic system.

A perspective method of activation of economic growth of high quality in the countries with developing economy is the attempt to intercept the initiative in the sphere of high technologies and innovations. One of the promising innovational technologies is industry 4.0, which, according to the experts, is the fourth industrial revolution that is to take place in the 21st century.

As the key restraining factor on the path of implementing the strategies of increase of the quality of economic growth in the countries with developing economy is deficit of financial resources, the financial aspect of development of industry 4.0 should be paid special attention. The purpose of this research is to develop the framework financial strategy of development of industry 4.0 in the countries with developing economy.

2. Materials and method

The methodology of verification of the offered hypothesis includes the method of horizontal analysis of statistical information, which is used for studying the depth of underrun of the countries with developing economy from the countries with developed economy and the global economy. The objects of the analysis are such indicators of socio-economic development of economic systems as growth of GDP, GDP per capita, volume of investments, gross national savings, growth of the volume of import and export of goods and services, growth of export of goods and services, unemployment level, and total national net debt.

These indicators are studied for the current year (2017) and near perspective (2020). For the purpose of provision of presentability of data within this research, the average values are used for the categories of countries, calculated as direct average for 153 countries with developing economy and 39 countries with developed economy on the basis of official data of the IMF (Table 1).

Table 1
Average values of the indicators of socio-economic development of the main categories of the countries and the global economy for 2017 and 2020

Indicator	Developing countries		Developed countries		Global economy	
	2017	2020	2017	2020	2017	2020
Growth of GDP, %	3.47	4.14	2.22	2.09	2.85	3.,11
GDP per capita, USD	6,219.87	7,077.64	40,741.02	44,462.80	23,480.44	25,770.22
Volume of investments, % GDP	35.28	38.20	21.31	21.80	28.29	30.00
Gross national savings, % GDP	19.35	20.87	24.44	24.79	21.89	22.83
Growth of the volume of import of goods and services, %	5.03	5.81	4.91	5.11	4.97	5.46
Growth of the volume of export of goods and services, %	6.72	5.62	3.36	3.50	5.04	4.56
Unemployment level, % of the total number of labor force	8.99	6.73	6.88	6.37	7.94	6.55
Total national net debt, % GDP	21.05	20.27	25.95	24.21	23.50	22.24

Source: (International Monetary Fund, 2017).

3. Discussion

Industry 4.0 is totality of the spheres of economy in which the fully automatic production processes are based on artificial intellect and Internet technologies with the help of which machines interact and create new machines without human participation. In industry 4.0 machine is not just an equipment for manufacture of products but an information carrier that is capable to request information from other machines, process it, and make independent (without human participation) decisions. The basic characteristics of industry 4.0 are the following:

- flexible decentralized industrial production, oriented at “scale effect” and based on Internet technologies (electronic collection of orders by industrial companies);
- full-scale implementation of the automatization systems into production processes in industry;
- widespread usage of artificial intellect and Internet technologies in industrial production;
- full elimination of human from the production process in industry.

At present, among the countries that started the process of development of industry 4.0, the countries with developed economy are among the leaders. For example, Germany has been implementing the initiatives in the sphere of implementation of cyber physical systems into industrial production for five years (since 2011), and the USA has been supporting cooperation between the leading industrial companies in the sphere of Internet technologies development for 3 years (since 2014).

Genesis and various aspects of the current development and perspectives of industry 4.0 are discussed in the works (Moeuf, A. et al., 2017), (De Aguirre, 2017), (Chiu et al., 2017), (Martin-Montes et al., 2017), (Popkova et al., 2016a), (Ragulina et al., 2015), (Bogoviz et al., 2017), (Orudjev et al., 2016), (Bogdanova et al., 2016), and (Popova, et al., 2016b).

A serious gap in the system of the modern scientific knowledge in the sphere of industry 4.0 is domination of theoretical studies devoted to the essence, peculiarities, and advantages of industry 4.0 as a new economic phenomenon, while the practical aspects of its development are not sufficiently studied.

The applied issues of development of industry 4.0 in the countries with developing economy, including the financial aspect, are poorly studied – which leads to necessity for further research aimed at filling this gap.

4. Results

The results of the performed horizontal analysis are given in Table 2.

Table 2

Ratio of the average values of the indicators of socio-economic development of the countries with developing economy to the values of the indicators of the countries with developed economy and the global economy

Indicator	Ratio to the countries with developed economy		Ratio to the global economy	
	2017	2020	2017	2020
Growth of GDP, %	156.08	198.17	121.90	132.92
GDP per capita, USD	15.27	15.92	26.49	27.46
Volume of investments, % GDP	165.52	175.27	124.68	127.34
Gross national savings, % GDP	79.16	84.17	88.37	91.40

Growth of the volume of import of goods and services, %	102.55	113.59	101.26	106.36
Growth of the volume of export of goods and services, %	200.08	160.67	133.35	123.27
Unemployment level, % of the total number of labor force	130.70	105.64	113.31	102.74
Total national net debt, % GDP	81.12	83.72	89.58	91.14

Source: compiled by the authors.

As is seen from Table 2, despite the larger growth rate of GDP as compared to the countries with developed economy (by 56% in 2017 and by 98% in 2020) and to the global economy (by 22% in 2017 and by 33% in 2020) and intensive growth of export of goods and services, the relative growth of which reduces with time but still remains large (twice as large as compared to the countries with developed economy and by 1.3 times larger as compared to the global economy in 2017), the countries with developing economy do not obtain social advantages from this advantage.

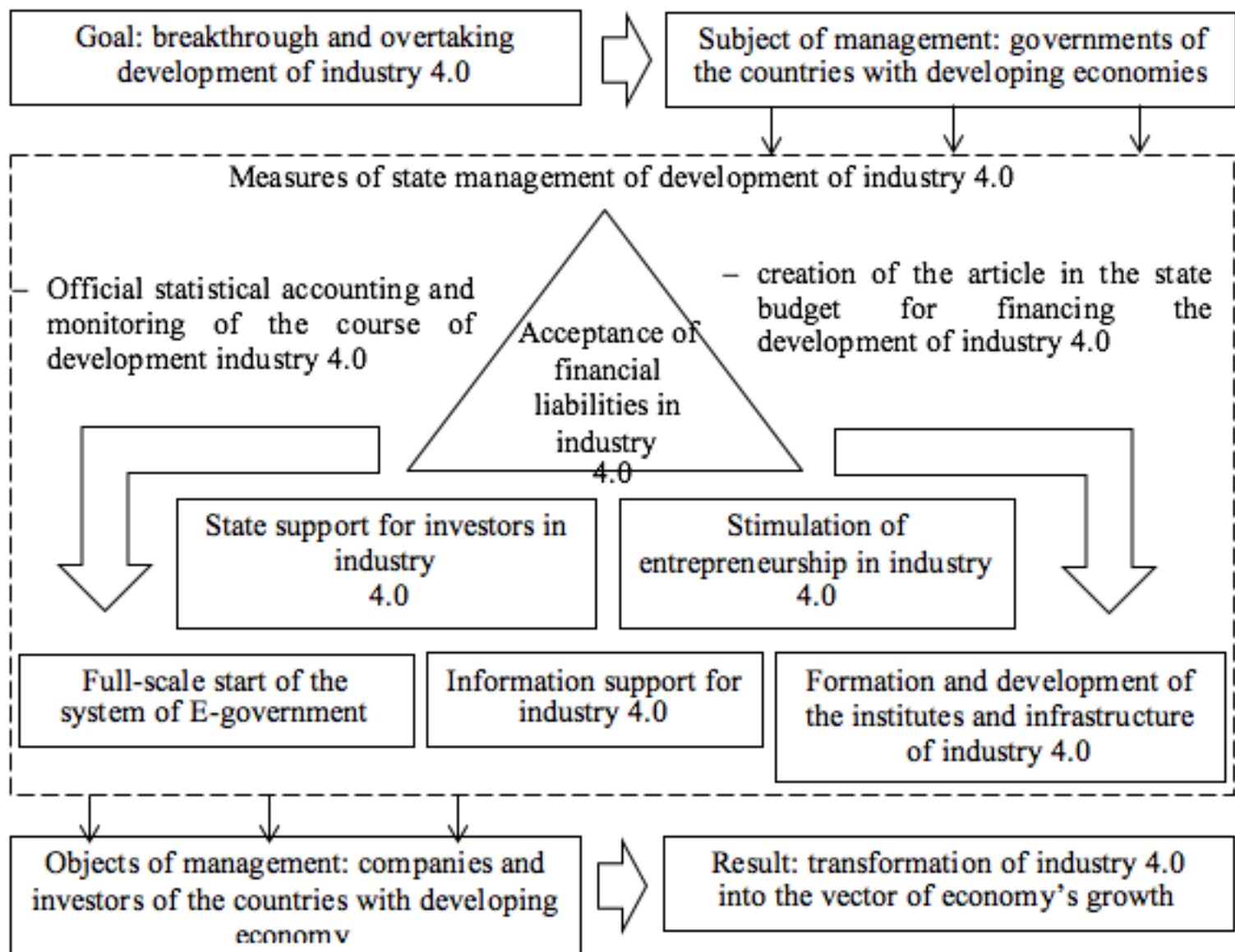
This is shown by their critical underrun from the countries with developed economy (by 85% in 2017 and 2020) and from the global economy (by 26% in 2017 and by 27% in 2020) and by GDP per capita. Countries with developing economy are peculiar for increasing dependence on import of goods and services, growth of which, as compared to countries with developed economy, is larger by 2% in 2017 and by 13% in 2020, and as compared to the global economy – larger by 1% in 2017 and by 6% in 2020.

Share of gross national savings in the countries with developing economy is lower than in the countries with developed economy and the global economy – however, it constitutes 19.35% of GDP as of 2017. The volume of investments into countries with developing economy is higher as compared to countries with developed economy and the global economy. At that, the total national net debt is lower – this shows the presence of financial assets.

The high relative and absolute levels of unemployment (8.99% as of 2017) emphasizes that the potential of human resources in the sphere of economic growth is depleted by the countries with developing economy, and they have to look for new growth sources. We're confident that such source should be the newest leading technologies – for example, in industry 4.0. For that, we developed the following financial strategy of development of industry 4.0 in countries with developing economy (рис. 1).

Figure 1

The financial strategy of development of industry 4.0 in the countries with developing economy



Source: compiled by the authors.

As is seen from Figure 1, the offered strategy's goal is breakthrough and overtaking development of industry 4.0, which allows corresponding to the level of its development in countries with developed economy, achieving a substantial advantage, and taking the leading positions in this sphere. The strategy is implemented with the help of the managerial mechanism, the subject of management in which are governments of countries with developing economy, and the objects – companies and investors (both domestic and foreign).

The starting point of implementation of this strategy (the first stage) is the state's accepting financial liabilities in industry 4.0. This supposes creation of the article in the state budget for financing of development of industry 4.0, as well as conduct of the official statistical accounting and monitoring of the course of development of industry 4.0.

The next stage requires state support for investors and entrepreneurs in industry 4.0, which supposes creation of favorable and preferential investment and business climate. At the final state, it is recommended to start the system of E-government. Also, it is important to finance the information support for industry 4.0 and to form and develop the institutes and infrastructure of industry 4.0.

As a result of implementation of the offered strategy, industry 4.0 turns into the growth vector of countries with developing economy. This allows achieving high quality of their economic growth due to simultaneous growth of GDP and GDP per capita. The living standards will also grow, as economy will be dominated by intellectual jobs, and the total labor load on the population will decrease with growth of the volume of accessible benefits.

5. Conclusions

It is possible to conclude that the offered hypothesis is proved - industry 4.0 is a perspective sphere, development of which can reduce the gap between countries with developed economy

and countries with developing economy. The offered framework financial strategy forms the financial basis of development of industry 4.0 in the countries with developing economy.

Financial support is a critically important component of success of strategy of development of industry 4.0. At that, the organizational and managerial component is also important – development of recommendations for its practical implementation is a perspective direction of further scientific studies in continuation of this article.

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