

IDENTIFICATION OF PROBLEMS AND DIRECTIONS OF INDUSTRY 4.0 CONCEPT IMPLEMENTATION UKRAINE

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В статье исследованы содержательные аспекты концепции «Промышленность 4.0» и связанные с ними понятия. Определено, что процессы диджитализации в бизнесе и социальной сфере - не цель, а инструмент реализации концепции «Промышленность 4.0». Особое внимание было уделено определению состояния внедрения в Украине мероприятий этой концепции, в частности, в стратегически важных отраслях экономики. Использование концепции Smart Grid в энергетике рассматривается как пример возможного внедрения цифровых технологий в стратегически важных сферах экономики Украины.

Ключевые слова: оцифровка, промышленность 4.0, умные технологии, интеллектуальные платформы, модель Smart Grid.

У статті досліджено змістовні аспекти концепції «Промисловість 4.0» і пов'язані з ними поняття. Визначено, що процеси диджиталізації в бізнесі та соціальній сфері - не мета, а інструмент реалізації концепції «Промисловість 4.0». Особливу увагу було приділено визначенню стану впровадження в Україні заходів цієї концепції, зокрема, у стратегічно важливих галузях економіки. Використання концепції Smart Grid в енергетиці розглядається як приклад можливого впровадження цифрових технологій у стратегічно важливих сферах економіки України.

Ключові слова: оцифровка, промисловість 4.0, розумні технології, інтелектуальні платформи, модель Smart Grid.

Introduction. Presently the domestic business terminology taken root word «digitalization». At the same time, the situation with the implementation of real measures that reflect the meaning of these word, unfortunately, is far behind. And this illustrates not only the difference between the desirable and the real, but also points to a real gap in the paradigms of the domestic – industrial and foreign – digital format of industrial development.

The aim of this study is to form a clear understanding of the content of the concept of Industry 4.0, its relation to the concept of the 4th Industrial Revolution, as well as to determine the realities and prospects of implementation of this concept in Ukraine.

To achieve this goal, the following methods were used:

- a dialectical method for analyzing the process of forming the content of the concept “Industry 4.0” in the context of the evolution of scientific views on the nature of its origin;
- synthesis method for studying economic phenomena and processes in the course of implementation of the concept “Industry 4.0”.
- system-analytical method, according to which the concept “Industry 4.0” is considered as a factor of socio-economic development of the country.

The main theoretical and practical provisions. The term “Industry 4.0” was first introduced in 2011 in Germany at an exhibition in Hanover as a designation of a high-tech strategy of the German government.

The principle of Industry 4.0 is that by connecting machines, parts and systems, as well as intelligent networks, are created a chains, the elements of which can control each other autonomously. This will lead to the transition to an extremely flexible cloud based intelligent factory. In short, it is a coordinated, national initiative to mobilize all national resources to accelerate technological change and maintain German leadership in global competition. Thus, initially, this term refers specifically to technology in the manufacturing, that is, industrial sectors. Today, Industry 4.0 brings together several thousand companies working in the fields of research, innovation, training, etc. in the field of production technology.

The development of this concept implies that subsequently networked machines and production systems will be able to independently exchange

information and process it to control industrial production processes. Industry 4.0 is a transition from the paradigm of «centralized» to «decentralized» production, which is made possible by technological advances that represent the abolition of the traditional logic of the production process.

Industrial production is now not just a service to the product, but the product itself communicates with the machine to tell it exactly what to do.

New world trends formed by modern information and communication technologies have been talked about for a long time. In the last decade, terms such as Smart or Digital Factory and Digitalization have been heard. In the USA, the world's largest innovators talk about technologies like IoT, Big data, Cloud computing, Remote & Mobile access, Wireless Communication, 3D printing and more. In 2013–14, this was called the trend of industrial automation.

Results of the research. In fact, digitalisation - as the penetration of digital technology, automation and IT at all levels of life and economy - began in the last century. In recent years, there has been some rethinking of how companies doing business. Horizontal and vertical integration of IT, the combination of different technologies, the creation of new cyber systems and artificial intelligence are changing business models and ways of doing business. It is interesting to see the ratings of companies in the world change – in the top ten richest there is the complete dominance of software and service companies – not those producing oil, gas or metal.

To identify this phenomenon of changing business models through technology, the title Industry 4.0 has emerged. And as these technologies are used everywhere, over time, the term becomes more generalized and beyond the industry – smart city infrastructure, education, healthcare, and so on have begun to be included in this process. Other technologies have been added to the spectrum of technology – nano, bio, 3D printing, new energy-efficient technologies.

On this basis, the term Industry 4.0 is often confused with the concept of the 4th industrial revolution. Actually, there is a difference between that terms. Industry 4.0 is a part of the 4th industrial revolution and is related to the digitalization of production processes in the industry, as well as energy, transport, infrastructure and logistics. Instead, foreign experts do

not include other areas of the economy and social sphere in the concept of Industry 4.0 – such as banks, retail and distribution, telecom, healthcare, education, e-government, etc. Where the trends of digitalization are also popular. [1]

The divergence and ambiguity of the terms “digitalization” and the development of Industry 4.0 are due to the fact that they first appeared in the terminology of IT companies. For example, in the professional vocabulary of the IT sphere, the terms business processes and business models appeared for describing and formalizing business systems by software. The same thing happened with Industry 4.0 terminology.

Thus, summarizing open publications and sources, we identify that Industry 4.0 is the concept of moving to new digital technologies and production models in industry, energy, transportation, infrastructure and logistics. That is, in such a context, «digitalization» should be considered as a tool, not as a result for the implementation of the Industry 4.0 concept.

In Ukraine, quite common measures of ordinary digitalization (such as the implementation of electronic documentation) is considered as a revolutionary step towards the transition to Industry 4.0. For Western companies, these processes are standard office automation measures that have been implemented as early as Industry 3.0.

This peculiar substitution of the larger meaning by less meaning term due to the fact that in Ukraine the draft National Strategy of Industry 4.0 appeared only at the end of 2018. [2]

In this document, areas such as public security, education, health, tourism, e-democracy, ecology and environmental protection, urban life, cashless payments, harmonization with European and world scientific initiatives, public administration are also referred to the digital development.

The Concept defines that the integration of digital technologies into production processes, or the digitization of industry, is a priority of state industrial policy. The state policy of stimulating the development of Industry 4.0 has three directions:

- creation of infrastructure of Industry 4.0 - industrial parks, industry centers of technology, etc. ;
- access to capital for the creation of new innovative industries;

- developing digital skills to train staff capable of working with Industry 4.0 technologies.

The mirror of the state of Ukrainian economy modernization by «digital technologies» is the internal market of IT. The paradox of its development in Ukraine is that in one territory and in one environment there are two phenomena that, at first glance, should not coexist together:

- large-scale «digitalization» of foreign economies by Ukrainian IT companies;
- minimal «digitalization» of Ukrainian economy by the Ukrainian IT companies.

This is because in the international arena the demand for services of Ukrainian IT companies and their talented developers is higher than the demand for their services in Ukraine. It also means that foreign countries, economies and companies are making «digital» transformations, that is, becoming richer, more efficient and competitive in the global arena. Unfortunately, this also means that the Ukrainian economy does not do this, which means that it will continue to lag behind and become increasingly resource-agrarian.

Experts consider two variants of the situation with digitalization of Ukrainian economy:

- ukrainian industry is at the tail of the line for the introduction of new technologies, this process takes years, and as a result, enterprises continue to introduce outdated technologies at first;
- the economy immediately switches to the best practices and technologies of Industry 4.0 and speeds up all processes for their implementation.

The first scenario today dominates in all areas of industrial ACS - IT and it is caused by a number of factors, above all, the secondary role of IT ACS in relation to investments in fixed assets. The implementation of the second strategy envisages a full-scale digitalization of key sectors of industry, energy and infrastructure:

- creating regulatory incentives to accelerate digitization, both among end-users and innovators 4.0.
- development of digital transformation roadmaps in target industries;

– large-scale IT fiction of industrial sectors – transfer of best business practices from the IT sector together with enhancement of digital knowledge and skills of managers and staff.

Unfortunately, nowadays the implementation of industrial digitization projects is reminiscent of the situation when wi-fi is being equipped in an old public tram. Actually, without developing a detailed roadmap for the implementation of digitalization at the level of an industry, and further to the enterprise, any measures will look like wi-fi in an old tram. Explaining the project's a foreseeable failure is that trying to activate a lot of 4.0 technology – against the background of Culture 2.0 (low or no digital competencies), and outdated assets is not only inappropriate, but also harmful.

Energy sector is among strategically important industries requiring the development and implementation of an effective roadmap for the transition to Industry 4.0. Today, the transformation of the world energy is taking place in 3D format: decentralization, decarbonisation and digitization. [3]

Digital solutions in energy are the basis of modern economy and energy security of the state. Power management programs themselves collect, transmit, and analyze hundreds of data. These are not only meter readings but also network status information. Know-how accurately determine the location and cause of failure. This helps to eliminate it quickly and deliver electricity to customers efficiently and safely.

Today, Ukraine faces an important task: to transform transmission networks into Smart Grids that allow energy companies to manage the entire energy supply network as a single system, consumers - to accurately regulate energy costs in homes and apartments, and for governments to build intelligent energy-stimulating infrastructure, creates new jobs, promotes continuous economic growth and enhances citizens' living standards.

In Ukraine, at present, the electricity loss rate reaches 15 %. In the developed countries of Europe it is only 6 %. Smart Grid technology can help achieve the same performance in Ukraine.

Smart Grid will help energy companies to upgrade their transmission networks through communications networks that are highly flexible,

secure and compatible. New technology architectures, solutions and related services from companies such as Cisco and General Electric address major energy companies' issues related to the cost, reliability, and scale of communications infrastructures.

The introduction of Smart Grid technology also means a fundamental reorganization of the electricity industry [4]:

- ensuring uninterrupted operation of the electrical network in conditions of increasing load;

- reduction of electricity losses due to the construction of «smart» accounting systems with the ability to account for the quality of electricity and limit the load;

- development of a communication environment capable of reliably and qualitatively supporting bidirectional information exchange between energy suppliers and consumers. One way to accomplish this is to use wireless intelligent communication devices;

- improving the quality of electricity through the use of reactive power compensation devices;

- the use of «intelligent» equipment and software systems to manage the network topology to ensure the reliability of operation;

- the use of high-capacity energy storage devices to align the load schedule, as well as to ensure the smooth operation of particularly important objects;

- development of market relations in the energy business with the involvement of electricity consumers (creation of separate sections of the network – analogue of microgrids) as possible suppliers of electricity at the right time in the required sections of the network; – development and production of high-tech competitive products by domestic companies to ensure the functioning of the «smart» electric grid;

- development of distributed energy, including cogeneration through the modernization of existing boilers, to cover maximum loads and eliminate energy shortages.

Summary. Summarizing the results of the study, we can draw the following conclusions:

The spread of digitalization necessitates the streamlining of the terminology apparatus of the modern digital economy. Therefore, there

is a need for a clear delineation of the concepts of Industry 4.0, which envisages the use of modern digital technologies in industry, energy, transport, infrastructure and logistics, as well as 4 industrial revolutions, which extend these trends to other spheres of society: education, healthcare, governance security and the like.

Ukraine needs a clear strategy for the transition to Industry 4.0 developing appropriate roadmaps for industries and businesses that will protect against fragmented implementation of advanced technology based on legacy assets and unskilled personnel;

Benchmarking of modern smart technologies for their use in basic industries. One of these is the Smart Grid technology in energy sector.

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