

БАШИНСЬКА

Ірина Олександрівна  
i.bash@ukr.net

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к.е.н., доцент, Одеський  
національний політехнічний  
університетREALITIES OF UKRAINIAN INDUSTRIAL ENTERPRISES ON THE WAY TO  
SMARTIZATIONРЕАЛІЇ УКРАЇНСЬКИХ ПРОМИСЛОВИХ ПІДПРИЄМСТВ НА ШЛЯХУ ДО  
СМАРТИЗАЦІЇ*BASHYNSKA Iryna Oleksandrivna – PhD in Economics, Associate Professor, Odesa National Polytechnic University*

**Introduction.** The onset of the Fourth Industrial Revolution is already affecting all processes of humanity, in all spheres, at all levels. The industry is the driving force behind sustainable development. However, with technological advances in a few years, a completely new era will emerge that will change significant business processes, introduce new business models, use scarce resources and economically adapted products. Ukrainian enterprises do not stand aside from this process, but they do little to investigate the extent to which Ukrainian enterprises are ready for FIRs to emerge.

**The purpose of the paper** is to explore the achievements of Ukrainian industrial enterprises on the road to smartization.

**Results.** The Fourth Industrial Revolution is expected to turn manufacturing into a driving force for global development radically. Ukraine does not stand aside: in September 2015, at the 70th session of the UN General Assembly in New York, the UN Summit on Sustainable Development and the Adoption of the Post-2015 Development Agenda approved new benchmarks. Ukraine, like other UN member states, has joined the global process of sustainable development. To establish a strategic framework for Ukraine's national development for the period up to 2030, an inclusive process of adapting sustainable development goals has been initiated on the basis of the principle "No one left alone". Each global objective was considered in light of the specific nature of national development. Many goals have the same vector orientation as in the Fourth Industrial Revolution. Industry 4.0 movement in Ukraine was also created. Thus, we see that Ukraine is also moving towards the implementation of CRD, namely to promote the development and use of innovation; economical use of resources (conversion of production that requires fewer resources, more efficient and re-use); increasing the technological potential of industrial sectors. Promoting the rapid development of high- and medium-high-tech areas of manufacturing and high-tech engineering should be noted among national specifics.

**Conclusion.** In Ukraine, on the one hand, few existing technologies that provide high productivity, on the other hand, are above reasonable and highly skilled human resources that are currently being used by other countries. Thus, Ukraine needs to take advantage of the window of opportunity - to apply "jumping". However, even if one country or one company in the country accepts the choice to jump, it should be carefully managed because it has both potential and risks. That is, "jumping" must be reasonable, smart.

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**Вступ.** Настання Четвертої промислової революції вже впливає на усі процеси людства, в усіх сферах, на усіх рівнях. Промисловість є рушійною силою сталого розвитку. Однак із технологічним прогресом за кілька років настане зовсім нова ера, яка змінить значні бізнес-процеси, запровадить нові бізнес-моделі, використає дефіцитні ресурси та економічно адаптовану продукцію. Українські підприємства не стоять осторонь цього процесу, але наразі мало досліджень, наскільки українські підприємства готові до виникнення ПДЧ.

**Метою статті** є дослідження досягнень українських промислових підприємств на шляху до смартизації.

**Результати.** Очікується, що Четверта промислова революція радикально перетворить виробництво на рушійну силу глобального розвитку. Україна не стоїть осторонь: у вересні 2015 р. в рамках 70-ї сесії Генеральної Асамблеї ООН у Нью-Йорку відбувся Саміт ООН зі сталого розвитку та прийняття Порядку денного розвитку після 2015 р., на якому було затверджено нові орієнтири розвитку. Україна, як і інші країни-члени ООН, приєдналася до глобального процесу забезпечення сталого розвитку. Для встановлення стратегічних рамок національного розвитку України на період до 2030 р. на засадах принципу «Нікого не залишити осторонь» було започатковано інклюзивний процес адаптації цілей сталого розвитку. Кожну глобальну ціль було розглянуто з урахуванням специфіки національного розвитку. Багато цілей мають такий же вектор спрямованості, що і у Четвертій промисловій революції. Також створено рух «Індустрія 4.0 в Україні». Таким чином, бачимо, що Україна теж рухається в напрямку запровадження ЧПР, а саме сприяння розвитку та використанню інновацій; економічне використання ресурсів (переобладнання виробництва, що потребує меншої кількості ресурсів, їх більш ефективного та повторне використання); нарощування технологічного потенціалу промислових секторів. Серед національної специфіки варто виділити сприяння прискореному розвитку високо- та середньовисокотехнологічних секторів переробної промисловості та високотехнологічному машинобудуванню.

**Висновок.** В Україні, з одного боку, небагато існуючих технологій, які забезпечують високу продуктивність, з другого – є надрозумні та висококваліфіковані людські ресурси, які, поки що, використовують інші країни. Таким чином Україні необхідно скористатись вікном можливостей – застосувати саме «перескакування». Проте навіть якщо одна країна або одна компанія в країні приймає вибір для перестрибування, її слід ретельно керувати, оскільки вона має як можливості, так і ризики. Тобто «перескакування» має бути розумним, смартизованим.

**Keywords:** smartization, industrial enterprise, sustainable development goals of Ukraine, Fourth Industrial Revolution, Industry 4.0

**Ключові слова:** смартизація, промислове підприємство, Цілі сталого розвитку України, Четверта Промислова Революція, Промисловість 4.0

## INTRODUCTION

In his previous works [1, 2] the author noted that the world is significantly changing under the influence of digitization and globalization. The onset of the Fourth Industrial Revolution is already affecting all processes of humanity, in all spheres, at all levels. The industry is the driving force behind sustainable development. Still, with technological advancements in a few years, a whole new era will emerge that will change significant business processes, introduce new business models, utilize scarce resources, and economically adaptable products. Ukrainian enterprises do not stand aside from this process, but there is little research as to how far Ukrainian enterprises are ready for the onset of FIR.

The **PURPOSE** of the paper is a study of achieving industry around the world towards smartization.

## RESEARCH METHODS

Methodological and informational basis of the work is scientific works, materials of periodicals, Internet resources.

## RESULTS

It is expected that the Fourth Industrial Revolution radically transform production on the driving force of global development. Ukraine does not stand aside from this process: in September 2015, at the 70th session of the UN General Assembly in New York, the UN Summit on Sustainable Development and the Adoption of the Post-2015 Development Agenda approved new benchmarks. Ukraine, like other UN member states, has joined the global process of sustainable development. To establish a strategic framework for Ukraine's national development for the period up to 2030, an inclusive process of adapting sustainable development goals has been initiated on the basis of the principle "No one left alone". Each global objective has been considered in light of the specifics of national development [3]. Many goals have the same vector orientation as in the Fourth Industrial Revolution, namely:

Goal 4. Quality education

Goal 9. Industry, innovation, and infrastructure

Goal 11. Sustainable development of cities and communities

Goal 12. Responsible consumption and production

Goal 16. Peace, justice and strong institutions

Goal 17. Partnership for sustainable development

*For a clear vision of Ukraine's readiness for the FIR, let us highlight in detail the specifics of national development of goals related to industry and industrial enterprises (Table. 1).*

Also, with the ongoing movement "Industry 4.0 in Ukraine" [4], great attention to this issue focuses on Apa (Association of Industrial Automation Ukraine). At the Hanover Industrial Exhibition, IT-Enterprise representatives noted that the Manufacturing module and other IT-Enterprise ERP systems already solve Industry 4.0's goals, making it more effective than their competitors' systems [5].

Thus, we see that Ukraine is also moving towards the implementation of the CRDP, namely:

– promoting the development and use of innovation;

– economical use of resources (conversion of production that requires fewer resources, more efficient and reuse);

– increase of the technological potential of industrial sectors;

Promoting the *rapid development of high- and medium-high-tech industries of manufacturing and high-tech engineering* should be noted among national specifics.

The importance of industry, its place and role in the modern world economy have changed significantly in the recent period – structural changes are taking place in the industry aimed at enhancing the part of individual sectors in the contemporary world economy. In the structure of the manufacturing industry, the principal position is occupied by mechanical engineering, to which the latest high-tech industries belong. In economically developed countries, the share of modern engineering industries in the structure of the industry has already reached 40 %.

According to a survey of 800 technology company leaders conducted explicitly for the Davos Forum [6, 7], the key drivers of change will be cloud technology, the development of Big Data collection and analysis methods, crowdsourcing, sharing economics and biotechnology. Other predictions include "smart" internet-connected clothing, drones, and 3D-based medicine, among experts. Besides, 45% believe that in 2025, the boards of directors of large companies can be present and artificial intelligence. By name only, one can guess how far these technologies are located in Ukrainian industrial enterprises. Therefore, the *second assumption* – that we are already so far from world achievements, that we do not have time to catch up with traditional means – by developing our innovations, we need to *radically change the approach to the functioning of the enterprise, focusing on world achievements*.

In terms of analysis by international companies, Ukraine is ranked 46th among the 50 countries surveyed according to the Innovation Index presented by Bloomberg in 2018. At the same time, our country turned out to be the worst in labour productivity (50th place), which testified to the low level of applied technologies and production of goods with little added value and got to three outsiders in technological possibilities (48th place). At the same time, it holds the 21st place in higher education efficiency and 27th in patent activity, i.e. it has the potential for development [7].

The EU Innovation Scoreboard, which includes data on European Union countries, EU candidate countries and some other countries, has placed Ukraine in the "Innovator emerging" group with Bulgaria, Macedonia and Romania.

An analysis of 100 countries and economies, which account for more than 96% of the global manufacturing value added (MVA) and more than 96 % of the world gross domestic product (GDP), conducted in 2018 at the World Economic Forum, showed that based on a weighted estimate of the Manufacturing Structure and D production ravers, Ukraine is in the category of Beginner countries, together with Armenia, Bulgaria, Egypt, Latvia and Moldova [7].

Table 1

**Sustainable Development Goals of Ukraine for the period 2015-2030, which are identical to the goals of the countries within the framework of the CRDP [prepared by the author based on [3]]**

Task (global definition)	Task (national definition)	Explanation
Goal 9. Creating sustainable infrastructure, promoting inclusive and sustainable industrialization and innovation (global definition) Objective 9. Building sustainable infrastructure, expanding inclusive and sustainable industrialization and innovation (national definition) <i>Goal 9. Industry, innovation and infrastructure</i> (abbreviated national explanation)		
9.2. Promote inclusive and sustainable industrialization, significantly increase industrial employment and industrial production share in a gross domestic product by 2030 by national conditions and double relevant figures in the least developed countries	9.4. <u>To promote the accelerated development of high- and medium-high-tech sectors of the manufacturing industry</u> , which are formed based on the use of chains "education - science - production" and cluster approach in the areas of <u>development of innovative ecosystem</u> ; development of information and telecommunication technologies (ICT); application of ICT in agro-industrial complex, energy, transport and industry; <u>high-tech mechanical engineering</u> ; creation of new materials; development of pharmaceutical and bioengineering industries.	Specified according to national specifics
9.4. By 2030, <u>modernize infrastructures and retrofit industrial enterprises</u> , making them sustainable by <i>increasing resource efficiency, increasing the use of clean and environmentally friendly technologies and industrial processes</i> , with the participation of all countries by their capabilities.	The task is taken into account	The global task is taken into account in the national functions of PP. 9.1, 9.2 and 9.3
9.5. Increase scientific research, increase the technological potential of <i>industrial sectors in all countries</i> , especially developing countries, including by stimulating innovation activity by 2030 and significantly increasing the number of R&D workers per 1 million people, as well as public and the private cost of DIs	9.5. Establish financial and institutional systems ( <i>innovative infrastructure</i> ) that will support the development of research and scientific and technical (experimental) development	The task is specified according to national specificity
Goal 12. Ensuring a transition to sustainable consumption and production models (global definition) Objective 12. Ensure the transition to rational consumption and production models (national definition) <i>Goal 12. Responsible Consumption and Production</i> (shortened national definition)		
12.2. By 2030 achieve the sensible development and efficient use of natural resources	12.1. <i>To reduce the resource intensity of the economy</i>	The task is formulated in consultation with the public and stakeholders
12.4. By 2020, achieve the environmentally sound management of chemicals and all waste throughout their life cycle following agreed international principles, substantially reducing their release into the air, water and soil to minimize their harmful effects on human health and the environment	12.3. Ensure the sustainable use of chemicals <i>based on innovative technologies and industries</i>	The task is formulated in consultation with the public and stakeholders
12.5. By 2030, significantly reduce the amount of waste by taking measures to prevent their generation, reduction, recycling and reuse	12.4. Reduce waste generation and increase its <i>recycling and reuse through innovative technologies and industries</i>	The task is formulated taking into account national peculiarities
12.6. Encourage companies, exceptionally large and transnational companies, to apply <i>sustainable production practices</i> and to display <i>resource management</i> information in their reports	The task is taken into account	A separate task has not been set because the responsibility has been taken into account in the relevant programming documents
12.a. Assist developing countries in <i>enhancing their scientific and technological capacity to move to more rational consumption and production models</i>	-	Since Ukraine belongs to such countries, it will receive assistance in this direction

However, Ukraine has taken first place in Europe in the field of IT outsourcing [8]. It is noted that today there are about 100 thousand IT specialists in Ukraine, the number of which may double in the next four years. "Ukraine has the largest and fastest-growing number of IT professionals in Europe; it is expected that its IT-engineering workforce by 2020 will increase by almost half – to 200 thousand", – informs IT Outsourcing News.

This means that Ukraine *has the potential to develop innovation*, but they do not have an implementation in the domestic market.

Some positive changes are observed in the field of information and communication technology development: according to the report "Global Information Technology Development Report 2015" compiled by the World Economic Forum, Ukraine ranked 71st in the world in terms of TIC, *having risen for the year ten positions* compared to last year's indicator (in 2014, Ukraine ranked 81st in this rating). While forming the score, the organization calculated the Network Readiness Index, which characterizes the level of ICT development in 143 countries [8].

Therefore, it is the *industry can become agents of change and bring Ukraine to the path of sustainable economic development, but only demands a substantial upgrade, including the replacement of worn more than 80 % of assets, innovation and focus on producing competitive products with high added cost.*

### CONCLUSIONS

In Ukraine, on the one hand, few existing technologies that provide high productivity, on the other hand, are above reasonable and highly skilled human resources that are currently being used by other countries. Thus, *Ukraine needs to take advantage of the window of oppor-*

*tunity – to apply "jumping".* However, even if one country or one company in the country accepts the choice to jump, it should be carefully managed as it has both potential and risks. *That is, "jumping" must be reasonable, smart.*

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