

Thus, modern universities, in order to meet the requirements of the time, must perform not only the classical functions (education, research, education), but also acquire new features such as innovation and entrepreneurship. A prerequisite for the competitiveness of the university is its ability to innovate and independently produce innovations.

#### *Sources and literature*

1. Будущее высшей школы в России: экспертный взгляд. Форсайт-исследование – 2030: аналитический доклад/под ред. В. С. Ефимова. Красноярск: Сиб. фед. ун-т, 2012. 182 с. URL: [http://foresight.sfu-kras.ru/sites/foresight.sfu-kras.ru/files/\\_Doklad\\_Vysshaya\\_shkola\\_-\\_2030\\_ekspertnyy\\_vzglyad\\_2012\\_0.pdf](http://foresight.sfu-kras.ru/sites/foresight.sfu-kras.ru/files/_Doklad_Vysshaya_shkola_-_2030_ekspertnyy_vzglyad_2012_0.pdf)
2. Будущее образования: глобальная повестка. URL: [http://https://edu2035.org/pdf/GEF.Agenda\\_ru.pdf](http://https://edu2035.org/pdf/GEF.Agenda_ru.pdf)
3. University of the future a thousand-year-old industry on the cusp of profound change. URL: [http://www.eu.com/Publication/vwLUAssets/University\\_of\\_the\\_future/%24FILE/University\\_of\\_the\\_future\\_2012.pdf](http://www.eu.com/Publication/vwLUAssets/University_of_the_future/%24FILE/University_of_the_future_2012.pdf)
4. Барбер М. Накануне схода лавины. Высшее образование и грядущая революция. *Вопросы образования*. 2013. № 3. С. 152–229.
5. Інноваційний університет: концепція становлення і розвитку: монографія/за заг. ред. І. В. Артьомова. Ужгород: ДВНЗ «УжНУ», 2016. 524 с.
6. Бурняк Н. М. Предпринимательский университет: сущность и особенности формирования. *Экономика и управление*. 2006. № 2. URL: <https://cyberleninka.ru/article/n/predprinimatelskiy-universitet-suschnost-i-osobennosti-formirovaniya/viewer>
7. Кларк Б. Р. Создание предпринимательских университетов: организационные направления трансформации/пер. с англ. А. Смирнова. Москва: Изд. дом Гос. ун-та “Высшая школа экономики”, 2011. 240 с.
8. Ицковиц Г. Тройная спираль. Университеты – предприятия – государство. Инновации в действии/пер. с англ. под ред. А. Ф. Уварова. Томск: ТУСУР, 2010. 344 с.
9. Сидорова А. А. Предпринимательские университеты в образовательной стратегии государства. *Проблемный анализ и государственно-управленческое проектирование*. 2014. № 6. С. 81–91.
10. Закон України «Про інноваційну діяльність» (№ 40-IV від 04.07.2002 року). URL: <https://zakon.rada.gov.ua/laws/show/40-15#Text>
11. Стратегія інноваційного розвитку України на 2010–2020 роки в умовах глобалізаційних викликів. URL: [http://kno.rada.gov.ua/komosviti/control/uk/publish/article?art\\_id=47920&cat\\_id=460](http://kno.rada.gov.ua/komosviti/control/uk/publish/article?art_id=47920&cat_id=460)
12. Національна доктрина розвитку освіти у XXI столітті. *Освіта України*. 2001. № 1. С. 22–25.

**Alghadhywi Mohammed Younus Hasan** – ph. d. student Lesya Ukrainka Volyn National University

Supervisor: ph. d. in economics,  
Associate Professor Department of  
Entrepreneurship and Marketing  
Lesya Ukrainka Volyn National  
University I. Tsymbaliuk

### **Innovative Fundamentals of Industry Development**

The current pace of technological development in the fourth industrial revolution is blurring the boundaries between the physical, digital and biological spheres of production systems and making significant changes in the way people live and work. This makes it especially important to understand these technologies and the possibilities of their use in the development of industry, in order to focus on the relevant areas and properly direct investment.

To reveal the impact of technology and innovation on industrial development, the World Economic Forum presented the System Initiative for the formation of future production [1]. Based on generalized information received from the leaders of companies implementing large-scale techno-

logies in various industries, five major innovative technologies that form the basis of future industrial development in the world were identified. At the same time, government, business, and academia play an important role in the development of technology and innovation in the industry.

Today, the advanced technologies that are transforming global production systems and deploying a new wave of competition between manufacturers and countries are 1) the Internet of Things, 2) artificial intelligence, 3) advanced robotics, 4) wearables; 5) 3D printing. They influence the further innovative development of the industry, changing all through stages of production processes, and also the management of global supply chains.

The global media market (Wearables Market) for businesses in 2016 amounted to 3232 million dollars and is projected to reach 32 418 million dollars by 2023. Enterprise wearables device is the technology that enables industries to provide advanced high-end user experience to their employees while performing the tasks. Wearable devices are used to access information through connected devices, automatically store and track activity, which increases employee productivity and improves productivity [2].

3D printing is a manufacturing process in which material is stacked to form a three-dimensional object. Although 3D printers use a variety of materials (such as plastic or metal) and technology, they all allow you to convert digital files that contain three-dimensional data – created by computer-aided design (CAD) or automated manufacturing (CAM), or from a 3D scanner – on physical objects [3].

The Internet of Things is the concept of connecting any device to the Internet and/or to each other. It's a giant network of connected "things" that also includes people. On a larger scale, IoT can be applied to things like transport networks: "smart cities", which can help us reduce waste and increase the efficiency of things like energy use. At the same time, the introduction of such technology in the industry poses a threat to the security of companies around the world. With many billions of devices connected to the Internet, the issue of privacy and data exchange becomes relevant. Another problem that many companies will face is the huge amount of data that all these devices are going to produce. Companies need to find a way to store, track, analyse, and comprehend the vast amounts of data that will be generated [4].

Artificial intelligence (AI) is a broad branch of computer science that builds intelligent machines capable of performing tasks that typically require human intelligence. It is an interdisciplinary science that creates a paradigm shift in virtually every technical sector of the industry. AI is a computer system capable of performing tasks that typically require human intelligence [5]. Today, artificial intelligence is aptly referred to as narrow AI (or weak AI) because it is designed to perform certain tasks (for example, only face recognition or only searching the Internet or only driving a car). However, the long-term goal of many researchers is to create a common AI (or strong AI). Although narrow AI can outperform people in any particular task, such as playing chess or solving equations, strong AI outperforms people in almost every cognitive task [6].

**Advanced robotics** systems are ready to transform industrial operations. Compared to conventional robots, advanced robots have excellent perception, integration, adaptability, and mobility. Taken together, these improvements mean that improved work can perform many tasks more economically than the previous generation of automated systems. Improving factory structures and processes with digital technology can increase productivity and flexibility both in the factory and in the supply chain, allowing manufacturers to adapt quickly to the changing needs of consumers [7].

Today, these five innovative technologies are at different stages of technical readiness and implementation. Some of them, such as advanced robotics (\$ 35 billion markets) and 3D printing (\$ 5 billion markets), have a long industrial history and are on the verge of implementation in certain industries. Others, such as artificial intelligence and enterprise wear (a market of \$ 700 million), are in their infancy but have significant potential for use.

The existence of these advanced technologies obliges companies to rethink their vision of further development, and governments to re-evaluate their national competitive advantages and development strategies. The introduction of innovations and the use of these technologies by enterprises will allow them to embark on the path of success in the future. And governments capable of setting the right policies, developing and disseminating these technologies, and preparing their

workforce, infrastructure, and supply chains for use, will position their economies for growth and create a positive innovative image of the country. Innovative image is a certain image of the country, its characteristics, which reflects the favourable conditions for innovation and, ultimately, influences the decisions of economic entities to invest in innovation [8].

Currently, North America, Europe, and Asian countries (China, Japan, and South Korea) are leading in the introduction of innovative technologies in the industry, and the rest of the world is lagging behind. In 2015, North America and Europe together accounted for 80 % of the Wearables Market and almost 70 % of industrial 3D printing units [1]. The introduction of innovative technologies in different industries is uneven. With the exception of Wearables devices, modern technology is largely concentrated in certain industries, including the automotive, electronics, and aerospace industries.

However, many of these technologies have not yet realized their full potential and contribution to comprehensive global productivity. Their active introduction in the industry will largely depend on the ability of enterprises to improve technical readiness and train the necessary skilled labour. At the same time, an important task of the government is to promote inclusive dissemination and implementation of innovations, provide a developed basic infrastructure, and address cybersecurity. The obvious advantages of new technologies will lead to their greater introduction, and limiting investment in their introduction will be fatal for the long-term prospects of industrial development.

### *Sources and literature*

1. World Economic Forum In collaboration with A. T. Kearney (2017). Technology and Innovation for the Future of Production: Accelerating Value Creation. White Paper. URL: [http://www3.weforum.org/docs/WEF\\_White\\_Paper\\_Technology\\_Innovation\\_Future\\_of\\_Production\\_2017.pdf](http://www3.weforum.org/docs/WEF_White_Paper_Technology_Innovation_Future_of_Production_2017.pdf)
2. Chandani Poddar & Supradip Baul. SE: Emerging and Next Generation Technologies. 2017. P. 185. URL: <https://www.alliedmarketresearch.com/enterprise-wearables-market>
3. Hoffman T. 3D Printing: What You Need to Know. 2020. URL: <https://www.pcmag.com/news/3d-printing-what-you-need-to-know>
4. Morgan J. A Simple Explanation Of 'The Internet Of Things'. 2014. URL: <https://www.forbes.com/sites/jacobmorgan/2014/05/13/simple-explanation-internet-things-that-anyone-can-understand/#79542adf1d09>
5. Artificial Intelligence. What is Artificial Intelligence? How Does AI Work? URL: <https://builtin.com/artificial-intelligence>
6. Benefits & Risks of artificial intelligence. URL: <https://futureoflife.org/background/benefits-risks-of-artificial-intelligence/?cn-reloaded=1>
7. Advanced Robotics in the Factory of the Future/D. Küpper, M. Lorenz, C. Knizek et al. 2019. URL: <https://www.bcg.com/ru-ru/publications/2019/advanced-robotics-factory-future>
8. Цимбалюк І. О., Шматковська Т. О. Інноваційний імідж країни та можливість податкового впливу на його формування. *Последните постижения на европейската наука – 2016: материали за 12-а Международ. науч.-практ. конф. (София, 17–22 юни, 2016)*. Т. 1. Икономики. София: «Бял ГРАД-БГ» ООД, 2016. С. 49–52.

**Андросова Т.** – к. е. н., проф.;  
**Лабунець А.** – магістрант  
Харківський державний університет  
харчування та торгівлі  
м. Харків, Україна

### **Економічні закони та управління інноваційним розвитком**

Результатом ефективного управління розвитком інноваційної діяльності промисловості виступає ефективна національна економічна модель, побудована на основі використання нових технологій (інноваційно-технологічна модель розвитку економіки). Її формування та реалізація