УДК 339.9: 551.568.85
JEL F19, G14, L86
DOI: 10.31471/2409-0948-2020-2(22)-81-86

Kis Halyna Romanivna
Candidate of Economic Sciences, Associate Professor
Associate Professor of the Department of Management and Administration
Ivano-Frankivsk National Technical University of Oil and Gas
76019, Ivano-Frankivsk, st. Carpathian, 15
e-mail: galyakiss@gmail.com
ORCID http://orcid.org/0000-0003-1009-7021

THE USE OF INFORMATION TECHNOLOGY INDUSTRY 4.0 "INTERNET OF THINGS" IN E-COMMERCE

Abstract. The purpose of the study is to analyze the features of the use of information technologies in industry 4.0 "Internet of Things" in e-commerce. The study hypothesizes that the use of Industry 4.0 technologies contributes to the development of modern marketing, data analysis and ensures the security of transactions between consumers on online platforms, which is a driver for the creation of innovative business models, which, in turn, ensure the effective development of business and e-commerce.

The study determined that IoT technologies, big data and analytical capabilities have become an integral part of the development of retail at the present stage. With technological advances in a consumer-centric economic system, market participants can interact with customers through more diverse and effective means. In addition, businesses in the economic system can also optimize their operations and management, allocate and efficiently use resources based on consumer demand and quickly and accurately meet the desired demand by offering optimal goods and services. It is concluded that, as drivers of continuous innovation and transformation of the retail industry, enterprises should consider the technological innovations of Industry 4.0 with an open mind and actively apply them in their strategic transformations. That being said, it is very important to invest in marketing as well as research and innovation in order to achieve faster growth and a more solid position in the e-commerce market.

Modern business models of e-commerce with using Industry 4.0 technologies that contribute to the development of modern marketing, data analysis and secure relationships between consumers on online platforms are identified. Industry 4.0 technologies drive the creation of innovative business models that enable the development of business.

Key words: e-commerce, "Internet of things", information technology, industry 4.0.

Кісь Галина Романівна
кандидат економічних наук, доцент
доцент кафедри менеджменту та адміністрування
Івано-Франківський національний технічний університет нафти і газу
76019, м. Івано-Франківськ, вул. Карпатська, 15
e-mail: galyakiss@gmail.com

ВИКОРИСТАННЯ ІНФОРМАЦІЙНИХ ТЕХНОЛОГІЙ ІНДУСТРІЇ 4.0 "ІНТЕРНЕТ РЕЧЕЙ" В ЕЛЕКТРОННІЙ КОМЕРЦІЇ

Анотація. Метою дослідження обрано аналіз особливостей використання інформаційних технологій індустрії 4.0 "Інтернет речей" в електронній комерції. У дослідженні висунута гіпотеза про те, що застосування технологій Індустрії 4.0 сприяє

розвитку сучасного маркетингу, аналізу даних і забезпечує безпеку транзакцій між споживачами на онлайн-платформах, що є драйвером створення інноваційних бізнес-моделей, які, в свою чергу, забезпечують ефективний розвиток бізнесу і електронної комерції.

У результаті дослідження визначено, що технології "Інтернету речей", великі дані та аналітичні можливості стали невід'ємною частиною розвитку роздрібної торгівлі на сучасному етапі. Завдяки технічному прогресу в економічній системі, орієнтованої на споживача, учасники ринку можуть взаємодіяти з клієнтами за допомогою більш різноманітних і ефективних засобів. Крім того, підприємства в економічній системі також можуть оптимізувати свою діяльність і управління, розподіляти і ефективно використовувати ресурси на основі споживчого попиту і швидко та точно задовольняти визначений попит за рахунок пропозиції оптимальних товарів і послуг. Зроблено висновок про те, що, будучи драйверами безперервних інновацій та трансформації роздрібної індустрії, підприємства повинні розглядати технологічні інновації Індустрії 4.0 неупереджено і активно застосовувати їх в своїх стратегічних перетвореннях. При цьому дуже важливо інвестувати в маркетинг, а також в дослідження та інновації, щоб домогтися більш швидкого зростання і зайняти більш тверду позицію на ринку електронної комерції.

Виявлено сучасні бізнес-моделі електронної комерції із застосуванням технологій Індустрії 4.0, що сприяють розвитку сучасного маркетингу, аналізу даних і безпечних відносин між споживачами на онлайн-платформах. Технології Індустрії 4.0 є драйвером створення інноваційних бізнес-моделей, які дають можливість розвитку бізнесу.

Ключові слова: електронна комерція, "Інтернет речей", інформаційні технології, індустрія 4.0.

Introduction. With the development of wireless communications, devices and sensors, Internet of Things (IoT) and other Industry 4.0 technologies are gaining popularity in logistics, various industries, but primarily in e-commerce. As a result, all Industry 4.0 technologies have a significant impact on the development of new information and communication technologies and determine the vision and fundamental principles of the "smart enterprise". Through the Internet of Things, cyber-physical systems control physical processes, creating a kind of virtual copy of the real world, and make decentralized decisions, interact with each other and people in real time [1-5]. The Internet and digital technologies enable firms of all sizes to create innovative business models and expand into new markets by expanding their scale. Innovative business models streamline global value chains and supply chains, playing a key role in driving e-commerce trends [6-8]. Leveraging Industry 4.0 advanced technologies such as the Internet of Things, big data analytics and autonomous robotics transforms the supply chain management model from a linear one, in which instructions are passed from supplier to manufacturer, distributor, consumer and back, to a more integrated model in which information flows to all parts of the supply chain. Information technology, human resources and data analytics play a key role in the strategy of self-management of a company in the domestic and foreign markets, including security tools, business processes and the professionalism of employees. As digitalization becomes more widespread, its impact on the development of e-commerce is growing [9-11]. Automation has dramatically improved the ability to track costs that determine product costs, customer margins, and product profitability. Using IoT technologies, it is possible to create an application or an online platform, which includes an Omni-channel marketing data analysis solution that tracks the demand for a product through understanding customer needs and ultimately helps to conduct relevant promotions and adopt strategies aimed at increasing customer base.

Literary sources analysis and problem statement. Methodological and informational basis of the work are scientific works, periodic publications materials, legal acts, the resources of Internet. The results of the study of various aspects of the development of the concept of the "Internet of things" and the problems of its implementation in real manufacturing are reflected in a significant number of analytical reports of international organizations and in the work of

2020 ISSN 2409–0948 print
№ 2(22) ISSN 2415–3311 online

groups of scientists [3; 8; 12-15]. At the same time, a few works of Ukrainian scientists were implemented in the direction of research Industry 4.0 "Internet of Things" information technology in e-commerce using [4; 5; 9; 16].

Formulation of the problem and the purposes. In the study, we will proceed from the fact that the use of Industry 4.0 technologies contributes to the development of modern marketing, data analysis and ensures the security of transactions between consumers on online platforms, which is a driver for creating innovative business models, which, in turn, ensure the effective development of international business and international e-commerce.

The purpose of the study is to analyze the features of the use of information technologies in industry 4.0 "Internet of Things" in e-commerce.

Presentation of the main research material. As noted in the study [17, p. 129], the volume of e-commerce in Ukraine is growing every year by 10-15% since 2014, which confirms the rapid development of this area of trade in our country. Visually, the dynamics of growth of e-commerce in our country for years 2014-2019 in value indexes (in comparable prices on 01.01.2014) is shown in Fig. 1. It should be noted that these figures generally correspond to the global growth rate of e-commerce, and in some periods the growth rate in Ukraine is even ahead of the world [6; 10].

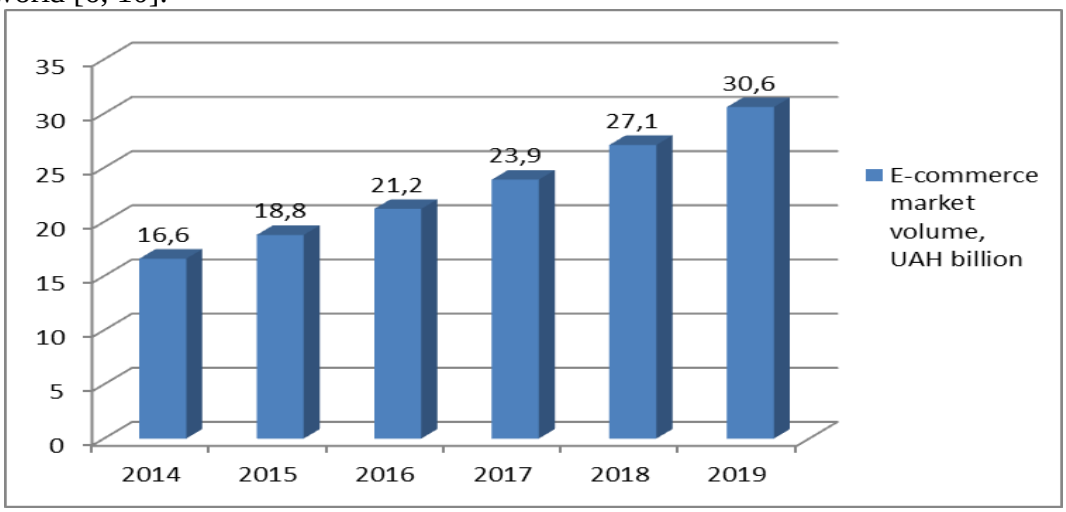

Fig. 1. Ukrainian e-commerce market volume in 2014-2019, UAH billion
Source: author's own development based on [10; 11; 17]

The World Trade Organization (WTO) Work Program on Electronic Commerce defines electronic commerce as the production, distribution, marketing, sale or delivery of goods and services by electronic means. In the context of trade in services, the WTO defines e-commerce as: 1) providing of Internet access services; 2) electronic delivery of services; 3) the use of the Internet as a channel for distribution services, through which goods and services are purchased over the Internet, but then delivered to consumers in a non-electronic form [17]. Of these, only 3) falls within the current definition of the OECD, but 1) and 2) will only count to the extent that these services were provided via a computer network.As digital transformation accelerates, the e-commerce landscape is becoming more dynamic. New business models have reshaped the buyer-seller relationship and expanded the boundaries of online buying and selling. More and more businesses buy and sell online around the world and the absolute value of the e-commerce market is steadily increasing.

Removing uncertainty in the law and the creation of favorable business-environment will help small firms to trade on the international e-commerce market. However, analysts identify four specific areas in which government policies were considered to potentially restrict e-commerce to intangibles. Each component is limited by country policies and may change the final price of the product due to fees, fines or transit fees. In e-commerce, it is imperative that these costs are continuously recorded and accumulated using a costing application that tracks

transaction points in international logistics. Automation has vastly improved the ability to track and analyze the costs that drive the global value chain and product profitability.

The colossal success of e-commerce sales is the catalyst for major changes in the way global businesses manufacture, sell and promote products to increase consumer demand. To ensure the successful operation of transnational corporations (TNCs), automated technological changes are required to provide the necessary functions for electronic commerce [15]. Technological change and innovation in business models are constantly changing the e-commerce landscape.

To track the development trends of an e-commerce company, it seems appropriate to pay attention to the following: 1) firms participation refers to the percentage of e-commerce firms; 2) turnover reflects the percentage of total turnover that e-commerce firms bring to the market; 3) directly the global e-commerce market in dynamics [18].

The share of e-commerce in total trade turnover can be large if: 1) there are a large number of e-commerce companies on the market; 2) a small number of e-commerce firms account for a large share of the total market.

E-commerce trends, including through innovative business models, play a key role in driving innovation in e-commerce. The Internet and digital technologies enable firms of all sizes to enter and expand new markets, enabling them to grow, scale and benefit from knowledge diffusion as it becomes easier for them to participate in global value chains.

E-commerce facilitates cross-border trade, enhances consumer convenience and allows firms to enter new markets. Progressing in the e-commerce market requires constant improvement in the diversification of the company's goods and services based on innovative technologies, since continuous progress and adaptability are one of the reasons for the competitive efficiency and complexity of e-business [6-10].

New and emerging Industry 4.0 digital technologies in business models are pushing the boundaries of e-commerce in effective ways. For example, online payment innovations are unlocking the potential of e-commerce by promoting secure online transactions between unknown parties. Such innovations make e-commerce more convenient and easier to trade online. Likewise, innovations that enable new businesses to engage in e-commerce can contribute to the global expansion of online commerce.

"Industry 4.0", or the fourth industrial revolution, is the integration of links in the industrial production chain using "the latest information and communication technologies." It can be defined as a set of technologies and concepts to form a global value chain that connects cyber-physical systems, the Internet of Things and the Internet of Services. Each of the "industrial revolutions" is usually characterized by a set of typical technologies [3-5; 16].

At the moment, the "Internet of Things" is gaining popularity in logistics, various industries, retail and pharmaceuticals, agriculture. The role of IoT data as a central component in today's digital world revolves around the way data is collected and analyzed, how quickly information is collected, feedback, and reuse [1; 2; 15].

To achieve the effect of the application of the "Internet of Things" technology, the enterprise must not only collect data from existing devices, but also carry out subsequent analysis to ensure their integration with systems and processes, which will allow searching and implementing new methods of creating value.

Sensors and mechanisms embedded in objects or devices are linked through wired and wireless networks and use the same Internet Protocol (IP). These networks produce huge amounts of data that are transmitted to computers via a virtual cloud (cloud) for analysis, automatically interacting with each other and simultaneously managed by the IoT platform. Thus, production processes are monitored, which increases efficiency.

Results and Discussion. Industry 4.0 e-commerce business models are driving global commerce by creating convenience for consumers and enabling companies to enter new international markets. The development of the e-commerce market requires constant improvement in the diversification of the company's goods and services based on innovative

2020 ISSN 2409–0948 print
№ 2(22) ISSN 2415–3311 online

technologies, since continuous progress and the ability to adapt are one of the prerequisites for increasing the competitiveness of e-business.

Online platforms operate both as a stand-alone retail marketplace and as a provider of digital marketplaces that bring online consumers together and create a diversified marketplace. As multi-sided markets, online platforms are more profitable on both sides of the market, and the economic benefits come from the scale of e-commerce thanks to the established communication mechanisms between consumers.

Many companies are actively innovating in e-commerce business models and are using a range of Industry 4.0 digital technologies, including artificial intelligence, blockchain, the Internet of Things, and autonomous delivery devices such as drones and robots. On the basis of these technologies, developed mechanisms to create a business model – new payment mechanisms (mobile money and digital wallets), security and trust mechanisms (digital identification, minimum quality standards, insurance, systems for analyzing and maintaining reputation: smart contracts, etc.), mechanisms of interaction in the international market (trust mechanisms, marketing and advertising, logistics, packaging and storage, customer service in foreign languages, customs clearance) are the drivers of the growth of e-commerce in world trade. The e-commerce business model, based on Industry 4.0 technologies, is an important concept that helps to structure and translate the company's strategy to the operational level, and therefore increase the likelihood of achieving the company's strategic goals. The OECD e-commerce guidelines state that firms must disclose to consumers "general terms, conditions and payment methods, including recurring payments such as automatic re-purchases and renewals, and how to opt out of such agreements" [19]. The Industry 4.0 value creation model creates the foundation of the digital economy that allows consumers, merchants, retail vendors, other businesses, third-party service providers, and strategic partners to interact with each other [20].

Conclusions. IoT technologies, big data and analytic capabilities have become an integral part of retail development today. With technological advances in a consumer-centric ecosystem, market participants can interact with customers through more diverse and effective means. In addition, businesses in the ecosystem can also optimize their operations and management, allocate and efficiently use resources based on customer demand, and meet the desired demand quickly and accurately by offering optimal goods and services. The future development of retail technology will become even more focused after significant investment and trial and error strategies. More integrated solutions will emerge in the early stages, and the digital expansion of retail opportunities will accelerate. As drivers of continuous innovation and transformation in the retail industry, businesses must view the technological innovations of Industry 4.0 with an open mind and actively apply them in their strategic transformation.

In addition to trying to diversify goods and services, companies need to focus on reducing their dependence on the Chinese market in order to achieve faster and more dynamic growth in the long term. For this, it is important to invest in marketing as well as research and innovation in order to achieve faster growth and take a more solid position in the international e-commerce market. The scientific hypothesis has been confirmed. Modern business models of e-commerce with using Industry 4.0 technologies that contribute to the development of modern marketing, data analysis and secure relationships between consumers on online platforms are identified. Industry 4.0 technologies drive the creation of innovative business models that enable the development of international business and international e-commerce.

References

1. Industry 4.0. Challenges and Solutions for the Digital Transformation and Use of Exponential Technologies. (2020). Deloitte. Available at: https://www2.deloitte.com/ch/en/pages/manufacturing/articles/manufacturing-study-industry-4.html#

2. Industrie 4.0. Smart Manufacturing for the Future (2013). Berlin: Germany Trade and Invest Gesellschaft für Außenwirtschaft und Standortmarketing mbH, 39 p.

3. Internet of Things: Next major disruptor for retail (2013). Available at: http://www.the–future–of–commerce.com

4. Duginecz G. V. (2018). Koncepciya "Internet rechej" v globalnomu vyrobnycztvi: dosvid dlya Ukrayiny [The concept of "Internet of Things" in global production: experience for Ukraine]. Ekonomika i region [Economy and region]. № 1(68). P. 127–133. Available at: http://journals.pntu.edu.ua/eir/article/view/1024.

5. Opanasyuk V. (2017). Industriya 4.0: mistse Ukraini v mizhderzhavniy kooperatsii i spetsializatsiya [Industry 4.0: Ukraine's place in interstate cooperation and specialization]. Naukovi zapiski Natsionalnogo universitetu "Ostrozka akademiya". Seriya "Ekonomika" [Scientific notes of the National University "Ostroh Academy". "Economy" Series]. № 4(32). P. 67-71.

6. E-Commerce Impacts Global Trade (2018). Available at: https://globalshippersalliance.org/wp-content/uploads/2018/03/2017_AAEI_e-Commerce-BenchmarkReport.pdf

7. Orendorff A. (2019). The plague of e-commerce return rates and how to maintain profitability. Available at: https://www.shopify.com/enterprise/ecommercereturns.

8. Unpacking E-Commerce: Business Models, Trends and Policies (2019). Paris: OECD Publishing.

9. Mazaraki A., Duginets A. (2016). Essence of international production networks: institutional analysis. Contemporary issues in economics, business and management. Conference Proceedings. PRESSIA ltd. Belgrade, P. 265-270.

10. Global e-commerce 2019. (2020). Available at: https://www.emarketer.com/content/global-ecommerce-2019

11. Global manufacturing competitiveness index – 2016 (2017). Available at: https://www2.deloitte.com/global/en/pages/manufacturing/ articles/global-manufacturing-competitivenessindex.html

12. Communication technologies for the Internet of things in agriculture (Agro IoT) and the role of telecom operators (2018). Report 2017. J'son & Partners Consulting. Available at: http://json.tv/en/ict_telecom _analytics_view/communication-technologies-for-the-internet-of-things-inagriculture-agro-iot-and-the-role-of-telecom-operators

13. Shipp S., Scott J., Weber C., Finnin M. (2012). Emerging Global Trends in Advanced Manufacturing. Alexandria, VA: Institute for Defense Analyses. Available at: http://www.wilsoncenter.org/sites/default/les/Emerging_Global_Trends_in_Advanced_Manufacturing.pdf

14. Voigt K. (2012). China looks to lead the Internet of Things. Available at: http://edition.cnn.com/2012/11/28/business/china-internet-of- things/

15. Manyika J., Chui M., Bisson P. Woetzel J., Dobbs R., Bughin J., Aharon D. (2015). Unlocking the potential of the Internet of Things. Available at: http://www.mckinsey.com/insights/business_technology

16. Skitsko V. I. (2016). Industriya 4.0 yak promislove virobnitstvo maybutnogo [Industry 4.0 as an industrial production of the future]. Investitsiї: praktika ta dosvid [Investments: practice and experience]. № 5. S. 33-39.

17. Jaruzelski B., Schwartz K., Volker S. (2015).Innovation's New World Order.. Available at: http://www.strategybusiness.com/interactive/Where-Companies-Spend-Their-RD-Money.

18. WTO. Un.org. Available at: https://www.un.org/ru/sections/general/documents

19. Dijkman R. M., Sprenkels B., Peeters T., Janssen A. (2015). Business models for the Internet of Things. International Journal of Information Management. Vol. 35, P. 672-678.

20. Osterwalder A., Pigneur Y. (2010). Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers. 1st ed. John Wiley and sons, 288 p.