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1. Digital Technology. URL: <http://technologyin.org/digital-technology> ( : 23.07.2018).
2. Geissbauer R., Vedso J., Schrauf S. Industry 4.0: Building the digital enterprise. URL: <https://www.pwc.com/gx/en/industries/industries-4.0/landing-page/industry-4.0-building-your-digital-enterprise-april-2016.pdf> ( : 23.07.2018).
3. «  
2018-2020  
» 17 2018 . 67- . URL: <http://zakon3.rada.gov.ua/laws/show/67-2018-> . ( : 23.07.2018).
4. Mahajan S., Sandip Saha S., Macias A. Analytics: Laying the Foundation for Supply Chain Digital Transformation. November, 2017 URL: <https://www.thehackettgroup.com/wp-content/uploads/2017/12/hackett-analytics-supply-chain-digital-1711.pdf> ( : 23.07.2018).
5. Lehmacher W., Betti F., Beecher P., Grotemeier C., Lorenzen M. Impact of the Fourth Industrial Revolution on Supply Chains. October 2017. URL: [http://www3.weforum.org/docs/WEF\\_Impact\\_of\\_the\\_Fourth\\_Industrial\\_Revolution\\_on\\_Supply\\_Chains\\_.pdf](http://www3.weforum.org/docs/WEF_Impact_of_the_Fourth_Industrial_Revolution_on_Supply_Chains_.pdf). ( : 23.07.2018).
6. Alcantara P., Riglietti G., Aguada L. BCI Supply Chain Resilience Report 2017. Business Continuity Institute. Nov 2017.

7. Kersten W., Seiter M., von See B., Hackius N., Maurer, T. Trends and Strategies in Logistics and Supply Chain Management. Digital Transformation Opportunities. DVV Media Group GmbH, Bremen. 2017. 71p. URL: <https://logistiktrends.bvl.de/en/> ( : 23.07.2018).
8. Schrauf S., Bertram P. Industry 4.0: How digitization makes the supply chain more efficient, agile, and customer-focused. PwC Strategy&. September 7, 2016. URL: <https://www.strategyand.pwc.com/reports/industry4.0/> ( : 23.07.2018).
9. Mussomeli A., Gish D., Laaper S. The rise of the digital supply network. December 01, 2016. URL: <https://www2.deloitte.com/insights/us/en/focus/industry-4-0/digital-transformation-in-supply-chain.html>. ( : 23.07.2018).
10. Aliche K., Rexhausen D., Seyfert A. Supply Chain 4.0 in consumer goods. Operations as a competitive advantage in a disruptive environment. McKinsey & Company. 2017. P.41-51. URL: <https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/supply-chain-4-0-in-consumer-goods/> ( : 23.07.2018).
11. Macaulay J., Buckalew L., Chung G., Kückelhaus M. Internet of Things in Logistics: A collaborative report by DHL and Cisco on implications and use cases for the logistics. DHL Trend Research, Cisco Consulting Services. 2015. URL: [http://www.dhl.com/content/dam/Local\\_Images/g0/New\\_aboutus/innovation/DHLTrendReport\\_Internet\\_of\\_things.pdf](http://www.dhl.com/content/dam/Local_Images/g0/New_aboutus/innovation/DHLTrendReport_Internet_of_things.pdf) ( : 23.07.2018).
12. Hülsmann T. Logistics 4.0 and The Internet of Things // Workshop «Platforms for connected Factories of the Future». Brussels, 5-6 October, 2015. URL: [http://ec.europa.eu/information\\_society/newsroom/image/document/2015-44/8\\_huelsmann\\_11945.pdf](http://ec.europa.eu/information_society/newsroom/image/document/2015-44/8_huelsmann_11945.pdf) ( : 23.07.2018).
13. Maersk and IBM to form joint venture applying blockchain to improve global trade and digitise supply chains. January 16, 2018. URL: <https://maersk.com/press/press-release-archive/maersk-and-ibm-to-form-joint-venture> ( : 23.07.2018).
14. 2.0: .
- 19.01.2018. URL: <http://www.bakertilly.ua/news/id1383> ( : 23.07.2018).
15. Blockchain . 07.07.2017. URL: <http://logist.fm/publications/tehnologiya-blockchain-v-logistike> ( : 23.07.2018).
16. Schlaepfer R.C., Koch M., Merkofer P. Industry 4.0. Challenges and solutions for the digital transformation and use of exponential technologies. Deloitte. URL: <http://www2.deloitte.com/content/dam/Deloitte/ch/Documents/manufacturing/ch-en-manufacturing-industry-4-0-24102014.pdf> ( : 23.07.2018).
17. Rößmann M., Lorenz M., Gerbert P., Waldner M., Justus J., Engel P., Harnisch M. Industry 4.0: The Future of Productivity and Growth in Manufacturing Industries. 2015. URL: [https://www.bcgperspectives.com/content/articles/engineered\\_products\\_project\\_business\\_industry\\_40\\_future\\_productivity\\_growth\\_manufacturing\\_industries](https://www.bcgperspectives.com/content/articles/engineered_products_project_business_industry_40_future_productivity_growth_manufacturing_industries) ( : 23.07.2018).
18. „ . . 16.01.2018. URL: <https://www.epravda.com.ua/columns/2018/01/16/633057> ( : 23.07.2018).
19. Schröder M. Indorf M., Kersten W. Industry 4.0 And Its Impact On Supply Chain Risk Management // 14th International Conference «Reliability and Statistics in Transportation and Communication (RelStat)». Riga, 15–18 October 2014. URL: [http://www.tsi.lv/sites/default/files/editor/science/Conferences/RelStat14/schroeder\\_indorf\\_kersten.pdf](http://www.tsi.lv/sites/default/files/editor/science/Conferences/RelStat14/schroeder_indorf_kersten.pdf) ( : 23.07.2018).
20. Ozkoca Y. The Internet Of Things (IOT) and how it will help Logistics. 26.05.2017. URL: <https://www.morethanshipping.com/internet-things-iot-will-help-logistics> ( : 23.07.2018).
21. Nordrum A. Popular Internet of Things Forecast of 50 Billion Devices by 2020 is Outdated. 18.08.2016. URL: <https://spectrum.ieee.org/tech-talk/telecom/internet/popular-internet-of-things-forecast-of-50-billion-devices-by-2020-is-outdated> ( : 23.07.2018).
22. Broadband Connectivity. Digital Economy and Society Index Report 2018 – Connectivity. URL: <https://ec.europa.eu/digital-single-market/en/connectivity> ( : 23.07.2018).
23. Speedtest Global Index. June 2018. URL: <http://www.speedtest.net/global-index> ( : 23.07.2018).
24. «Internet of things» // . URL: [https://en.wikipedia.org/wiki/Internet\\_of\\_things](https://en.wikipedia.org/wiki/Internet_of_things) ( : 23.07.2018).

25. . . . : //
26. Big Data? . URL: <http://thefuture.news/bigdata> ( : 23.07.2018).
27. «Big data» // . URL: [https://en.wikipedia.org/wiki/Big\\_data](https://en.wikipedia.org/wiki/Big_data) ( : 23.07.2018).
28. . . . : . . . : «2006», 2013. 368 .
29. . . . 1. . 10.09.2017. URL: <http://academicfox.com/lektsiya-1-osnovni-ponyattya-hmarnyh-tehnolohij> ( : 23.07.2018).
30. « » // . URL: <https://uk.wikipedia.org/wiki/> ( : 23.07.2018).
31. « » // . URL: <https://uk.wikipedia.org/wiki/> ( : 23.07.2018).
32. – – « » // . URL: <https://uk.wikipedia.org/wiki/> ( : 23.07.2018).
33. Glockner, H., Jannek, K., Mahn, J., Theis, B. Augmented reality in logistics: Changing the way we see logistics – a DHL perspective. 2014. URL: [http://www.dhl.com/content/dam/downloads/g0/about\\_us/logistics\\_insights/csi\\_augmented\\_reality\\_report\\_290414.pdf](http://www.dhl.com/content/dam/downloads/g0/about_us/logistics_insights/csi_augmented_reality_report_290414.pdf) ( : 23.07.2018).
34. Logistics Trend Radar. URL: [http://www.dhl.com/content/dam/downloads/g0/about\\_us/logistics\\_insights/dhl\\_logistics\\_trend\\_radar\\_2016.pdf](http://www.dhl.com/content/dam/downloads/g0/about_us/logistics_insights/dhl_logistics_trend_radar_2016.pdf) ( : 23.07.2018).
35. . . . . 2008. . 78. . 58–69. //

1. Digital Technology. technologyin.org. Retrieved from <http://technologyin.org/digital-technology>.
2. Geissbauer, R., Vedso, J., & Schrauf, S. (2016). Industry 4.0: Building the digital enterprise. pwc.com. Retrieved from <https://www.pwc.com/gx/en/industries/industries-4.0/landing-page/industry-4.0-building-your-digital-enterprise-april-2016.pdf>.
3. Rozporiadzhennia Kabinetu ministriv Ukrainy «Pro skhvalennia Kontseptsii rozvytku tsyfrovoy ekonomiky ta suspilstva Ukrainy na 2018–2020 roky ta zatverdzhennia planu zakhodiv shchodo yii realizatsii» vid 17 sichnia 2018 r. 67-r [Order of the Cabinet of Ministers of Ukraine «About Approval of the Concept for the Development of the Digital Economy and Society of Ukraine for 2018–2020 and approval of the Plan of Measures for its Implementation» dated January 17, 2018 . 67-p.]. (n.d.). zakon3.rada.gov.ua. Retrieved from <http://zakon3.rada.gov.ua/laws/show/67-2018-> [in Ukrainian].
4. Mahajan, S., Sandip S., & Macias, A. (2017). Analytics: Laying the Foundation for Supply Chain Digital Transformation. thehackettgroup.com. Retrieved from <https://www.thehackettgroup.com/wp-content/uploads/2017/12/hackett-analytics-supply-chain-digital-1711.pdf>.
5. Lehmacher, W., Betti, F., Beecher, P., Grotemeier, C., & Lorenzen, M. (2017). Impact of the Fourth Industrial Revolution on Supply Chains. weforum.org. Retrieved from [http://www3.weforum.org/docs/WEF\\_Impact\\_of\\_the\\_Fourth\\_Industrial\\_Revolution\\_on\\_Supply\\_Chains\\_pdf](http://www3.weforum.org/docs/WEF_Impact_of_the_Fourth_Industrial_Revolution_on_Supply_Chains_pdf).
6. Alcantara, P., Riglietti, G., & Aguada, L. (2017). BCI Supply Chain Resilience Report 2017. Business Continuity Institute.
7. Kersten, W., Seiter, M., von See, B., Hackius, N., & Maurer, T. (2017). Trends and Strategies in Logistics and Supply Chain Management. Digital Transformation Opportunities. DVV Media Group GmbH, Bremen, 71p. logistiktrends.bvl.de. Retrieved from <https://logistiktrends.bvl.de/en>.
8. Schrauf, S., & Bertram, P. (2016). Industry 4.0: How digitization makes the supply chain more efficient, agile, and customer-focused. PwC Strategy&. strategyand.pwc.com. Retrieved from <https://www.strategyand.pwc.com/reports/industry4.0>.
9. Mussomeli, A., Gish, D., & Laaper, S. (2016). The rise of the digital supply network. deloitte.com. Retrieved from <https://www2.deloitte.com/insights/us/en/focus/industry-4-0/digital-transformation-in-supply-chain.html>.

- 
10. Alicke, K., Rexhausen, D., & Seyfert, A. (2017) Supply Chain 4.0 in consumer goods. Operations as a competitive advantage in a disruptive environment. McKinsey & Company, P. 41–51. mckinsey.com. Retrieved from <https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/supply-chain-4-0-in-consumer-goods>.
  11. Macaulay, J., Buckalew, L., Chung, G., & Kückelhaus, M. (2015) Internet of Things in Logistics: A collaborative report by DHL and Cisco on implications and use cases for the logistics. DHL Trend Research, Cisco Consulting Services. dhl.com. Retrieved from [http://www.dhl.com/content/dam/Local/Images/g0/New\\_aboutus/innovation/DHLTrendReport\\_Internet\\_of\\_things.pdf](http://www.dhl.com/content/dam/Local/Images/g0/New_aboutus/innovation/DHLTrendReport_Internet_of_things.pdf).
  12. Hülsmann, T. (2015) Logistics 4.0 and The Internet of Things // Workshop «Platforms for connected Factories of the Future». Brussels, 5-6 October, 2015. ec.europa.eu. Retrieved from [http://ec.europa.eu/information\\_society/newsroom/image/document/2015-44/8\\_huelsmann\\_11945.pdf](http://ec.europa.eu/information_society/newsroom/image/document/2015-44/8_huelsmann_11945.pdf).
  13. Maersk and IBM to form joint venture applying blockchain to improve global trade and digitise supply chains. (2018). maersk.com. Retrieved from <https://maersk.com/press/press-release-archive/maersk-and-ibm-to-form-joint-venture>.
  14. Lohistyka 2.0: blokchein zrobyt postachannia prozorym i kardynalno zminyt usiu haluz [Logistics 2.0: blockchain make deliveries transparent and radically change the entire industry]. (2018). bakertilly.ua. Retrieved from <http://www.bakertilly.ua/news/id1383> [in Ukrainian].
  15. Tekhnolohyia Blockchain v lohystyke [Blockchain technology in logistics]. (2017). logist.fm. Retrieved from <http://logist.fm/publications/tehnologiya-blockchain-v-logistike> [in Russian].
  16. Schlaepfer, R.C., Koch, M., & Merkofer, P. Industry 4.0. Challenges and solutions for the digital transformation and use of exponential technologies. Deloitte. deloitte.com. Retrieved from <http://www2.deloitte.com/content/dam/Deloitte/ch/Documents/manufacturing/ch-en-manufacturing-industry-4-0-24102014.pdf>.
  17. Rüßmann, M., Lorenz, M., Gerbert, P., Waldner, M., Justus, J., Engel, P., & Harnisch, M. (2015). Industry 4.0: The Future of Productivity and Growth in Manufacturing Industries. Retrieved from [https://www.bcgperspectives.com/content/articles/engineered\\_products\\_project\\_business\\_industry\\_40\\_future\\_productivity\\_growth\\_manufacturing\\_industries](https://www.bcgperspectives.com/content/articles/engineered_products_project_business_industry_40_future_productivity_growth_manufacturing_industries).
  18. Ryzhenko, O., & Fishchuk V. (2018). Yak tsyfrova ekonomika zminyt Ukrainu [As the digital economy changes the Ukraine.]. Ekonomichna Pravda – Economic Truth. epravda.com.ua. URL: Retrieved from <https://www.epravda.com.ua/columns/2018/01/16/633057/> [in Ukrainian].
  19. Schröder, M., Indorf, M., & Kersten, W. (2014). Industry 4.0 And Its Impact On Supply Chain Risk Management // 14th International Conference «Reliability and Statistics in Transportation and Communication (RelStat)». Riga, 15–18 October 2014. tsi.lv. Retrieved from [http://www.tsi.lv/sites/default/files/editor/science/Conferences/RelStat14/schroeder\\_indorf\\_kersten.pdf](http://www.tsi.lv/sites/default/files/editor/science/Conferences/RelStat14/schroeder_indorf_kersten.pdf).
  20. Ozkoca, Y. (2017). The Internet Of Things (IOT) and how it will help Logistics. morethanshipping.com. Retrieved from <https://www.morethanshipping.com/internet-things-iot-will-help-logistics>.
  21. Nordrum, A. (2016). Popular Internet of Things Forecast of 50 Billion Devices by 2020 is Outdated. spectrum.ieee.org. Retrieved from <https://spectrum.ieee.org/tech-talk/telecom/internet/popular-internet-of-things-forecast-of-50-billion-devices-by-2020-is-outdated>.
  22. Broadband Connectivity. Digital Economy and Society Index Report 2018 – Connectivity. ec.europa.eu. Retrieved from <https://ec.europa.eu/digital-single-market/en/connectivity>.
  23. Speedtest Global Index. (2018). speedtest.net. Retrieved from <http://www.speedtest.net/global-index>.
  24. Storinka «Internet of things» [Page «Internet of things»]. Vilna entsyklopediia «Wikipediia» – Free Encyclopedia «Wikipedia». en.wikipedia.org. Retrieved from [https://en.wikipedia.org/wiki/Internet\\_of\\_things](https://en.wikipedia.org/wiki/Internet_of_things).
  25. Neurov I.V. (2014). Marketynhova lohistyka: istorychni aspekty ta perspektyvy rozvytku [Marketing Logistics: historical aspects and prospects of development]. Visnyk Natsionalnoho universytetu «Lvivska politekhnik». – Bulletin of the National University «Lviv Polytechnic». 811. 253–258. [in Ukrainian].
-

26. Shcho take Big Data? Shcho tse za tekhnolohiia, yak vona pratsiue ta komu tse potribno [What is Big Data? What is the technology, how it works and who needs it]. thefuture.news Retrieved from <http://thefuture.news/bigdata>.
27. Storinka «Big data» [Page «Big data»]. Vilna entsyklopediia «Vikipediia» – Free Encyclopedia «Wikipedia». [en.wikipedia.org](https://en.wikipedia.org/wiki/Big_data). Retrieved from [https://en.wikipedia.org/wiki/Big\\_data](https://en.wikipedia.org/wiki/Big_data).
28. Balabanova, L.V., & Hermanchuk, A. M. (2013). Lohistyka: pidruchnyk [Logistics: textbook]. Lviv: Vydavnytstvo PP «Mahnoliia 2006» [in Ukrainian].
29. Boreiko, O. (2017). Lektsiia 1. Osnovni poniattia khmarnykh tekhnolohii [Lecture 1. Basic concepts of cloud technologies]. academicfox.com. Retrieved from <http://academicfox.com/lektsiya-1-osnovni-ponyattia-hmarnyh-tehnolohij/> [in Ukrainian].
30. Storinka «Blockchain» [Page «Blockchain»]. Vilna entsyklopediia «Vikipediia» – Free Encyclopedia «Wikipedia». [uk.wikipedia.org](https://uk.wikipedia.org/wiki/). Retrieved from <https://uk.wikipedia.org/wiki/> [in Ukrainian].
31. Storinka «Rozpodilena baza danyh» [Page «Distributed Database»]. Vilna entsyklopediia «Vikipediia» – Free Encyclopedia «Wikipedia». [uk.wikipedia.org](https://uk.wikipedia.org/wiki/). Retrieved from <https://uk.wikipedia.org/wiki/> [in Ukrainian].
32. Storinka «Avtonomnyi robot» [Page «Autonomous robot»]. Vilna entsyklopediia «Vikipediia» – Free Encyclopedia «Wikipedia». [uk.wikipedia.org](https://uk.wikipedia.org/wiki/). Retrieved from <https://uk.wikipedia.org/wiki/> [in Ukrainian].
33. Glockner, H., Jannek, K., Mahn, J., & Theis, B. (2014). Augmented reality in logistics: Changing the way we see logistics – a DHL perspective. [dhl.com](http://www.dhl.com/content/dam/downloads/g0/about_us/logistics_insights/csi_augmented_reality_report_290414.pdf). Retrieved from [http://www.dhl.com/content/dam/downloads/g0/about\\_us/logistics\\_insights/csi\\_augmented\\_reality\\_report\\_290414.pdf](http://www.dhl.com/content/dam/downloads/g0/about_us/logistics_insights/csi_augmented_reality_report_290414.pdf).
34. Logistics Trend Radar. [dhl.com](http://www.dhl.com/content/dam/downloads/g0/about_us/logistics_insights/dhl_logistics_trend_radar_2016.pdf). Retrieved from [http://www.dhl.com/content/dam/downloads/g0/about\\_us/logistics\\_insights/dhl\\_logistics\\_trend\\_radar\\_2016.pdf](http://www.dhl.com/content/dam/downloads/g0/about_us/logistics_insights/dhl_logistics_trend_radar_2016.pdf).
35. Vitlinskyi, V.V., & Sharapov, O.D. (2008). Teoriia intelektualnykh system pryiniattia rishen [Theory of Intelligent Decision Making Systems]. Modeliuvannia ta informatsiini systemy v ekonomitsi – Modeling and Information Systems in Economics. 78, 58–69. [in Ukrainian].

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***Digital technologies in the modern logistics and supply chain management.***

***The aim of the article.*** The purpose of this paper is to analyze and specify the existing aspects of using different kinds of digital technologies in logistics and supply chain management in the current state of economic development and in the near future (in the digital economy) and to formulate our own view towards this problem, in particular, researching the use of digital technologies in different types of logistics. In addition, the majority of papers on this topic are foreign, thus this article is written to compensate for the lack of research on this topic in the domestic academia.

***The results of the analysis.*** The analysis done with the use of different sources towards spread of using digital technologies in logistics and supply chain management currently and in the near future has shown that the first place is taken by the Internet of Things that represents some kind of circulatory system of supply chains in digital economy, in which there is a circulation of data that can be effectively processed and stored by using the Big Data technology (placed second) and Cloud Computing (placed third). The fourth place in the rating of using digital technologies in logistics and supply chain management is taken by the Blockchain technology which can improve the correctness and reliability of storage the huge arrays of data. The sixth place is taken by the Robots, and the seventh is given to Artificial Intelligence, which can replace a person in such logistic activities with the significant amount of operations as manufacturing, transportation and warehouse logistics and become a base for the cyber-physical systems and the systems that are able to learn and teach other machines. The eighth place is taken by the Augmented and Virtual Reality technologies that can combine the real and the virtual worlds which can be helpful in order to increase the effectiveness of supply chain functionality. Despite the fact that the Sensors have taken the last place in the rating, they have a significant



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connection with others technologies and it can be assumed that they are not discussed, but they are meant to be.

**Conclusions and direction for further research.** The research done has shown that technologies that are already associated with logistics information flows are the digital technologies which are currently being widely used either have the logistics companies interested in them or will become this way in the near future. This is caused by the fact that information in the digital economy is taken the special status, thus by using the information correctly a company can get the competitive advantage over other companies. The list of those technologies contains the following items: the Internet of Things, Big Data, Blockchain, and Artificial Intelligence, which can be used in all the types of functional spheres of logistics. Manufacturing, transportation, and warehouse logistics are the functional spheres of logistics where there are much more opportunities for the digital technologies to be used than in any other sphere. It can be assumed that the gotten results are not final and have debating nature. It is caused by the constant changes in the sphere of digital technologies as well as its rapid development and the elaborateness to adopt business processes to those rapid changes, among which it can be hard to identify the technologies which are indeed essential in a way that they are able to make changes in the functionality of logistic processes, and those which are not able to give a company that much value.

In further research it is worthwhile to discover the use of digital technologies deeper for each kind of logistics and for elements of supply chain separately and to lead the extensive domestic researches towards using digital technologies in logistics and supply chain management etc.

Keywords: logistics, supply chain, digital economy, digital transformation, digital technologies, the Internet of Things.