

TOWARDS A CONCEPTUAL FRAMEWORK OF LOGISTICS 4.0

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OBJECTIVE

The application of modern technologies of Industry 4.0 increases the efficiency of manufacturing and service enterprises, as well as logistics processes and activities. It affects the development of Logistics 4.0 as an emerging concept of Industry 4.0 that is using different digital solutions to transform logistic processes digitally. The aim of this paper is to define the concept, role and structure of the digital logistics system within the concept of Industry 4.0, as well as to assess the impact of its implementation. This paper defines the criteria to compare traditional logistics and Logistics 4.0 and presents the structure of Logistics 4.0 technologies connection divided by integrated logistics system processes, as well as an influence of the application of certain Logistics 4.0 technologies on the observed criteria. The purpose of this paper is to outline the advantages of a Logistics 4.0 concept and the application of modern technologies in the digital logistics system, which improves logistics processes and activities. This paper has significant value for all who work in logistics and strive to apply the concept of Logistics 4.0.

METHODOLOGY

The applied research and methodological approach is a hybrid type. It implies consideration of the role, functioning and requirements that are placed before logistics systems in a digital environment. Also, it implies analysis of current scientific and expert literature dealing with information technologies and software support of logistics processes.

RESULTS

The main result of this paper is a contribution in the form of the Logistics 4.0 model (Figure 1) that presents the structure of Logistics 4.0 technologies connectivity divided by integrated logistics system processes: procurement, production and distribution.

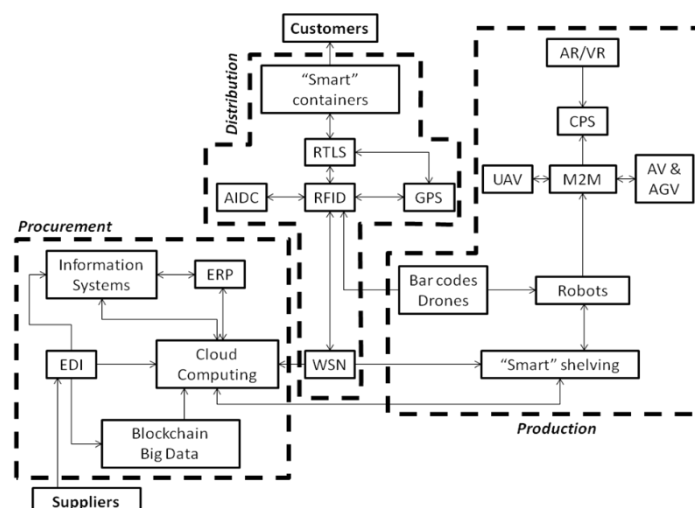


Figure 1: The structure of Logistics 4.0 technologies connection divided by integrated logistics system processes

Also, this paper presents the comparative analysis of traditional logistics and Logistics 4.0 by main criteria: information flow and data exchange, control, business and process costs, warehouse, distribution/transport, employees and the impact of individual Logistics 4.0 technologies on the defined criteria (Figure 2). In Figure 2, the blue arrows indicate the improvement of some of the observed criteria of logistics processes using Logistics 4.0 technologies, while the red arrows show the reduction in costs and obligations in performing activities arising from the application of these technologies.

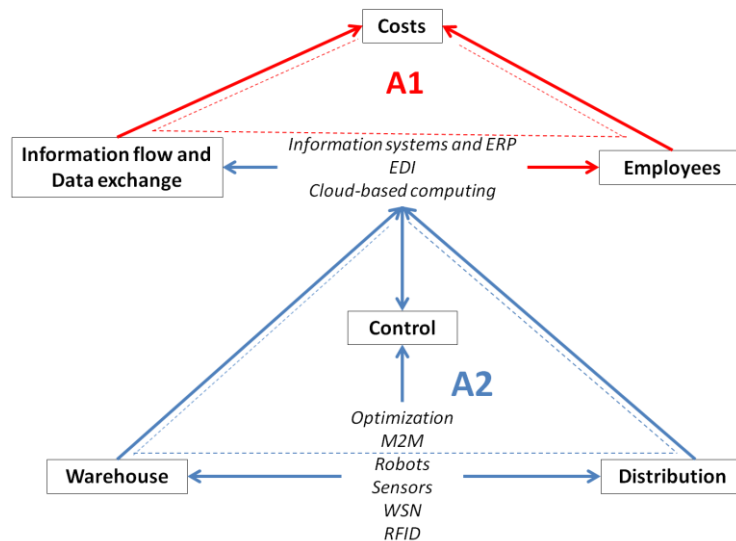


Figure 2: Impact of certain Logistics 4.0 technologies on the observed criteria

CONCLUSION

This paper concludes that the conceptual framework and structure of Logistics 4.0 can be defined. Also, the concept of Logistics 4.0 has significant advantages over the concept of traditional logistics, such as: Logistics 4.0 implies the application of modern information and communication technologies, software, and new business models that enable complete digitalization and automation of logistics processes; improve operations and activities, information flow, delivery and transport, production, and warehouse management; decreases operational costs and replace (even partially) manpower in some processes in logistics. Besides all previously mentioned, the high initial costs, i.e. implementation costs of Logistics 4.0 are the current limit for its implementation and present the lack of the concept.

Keywords: Logistics 4.0, digitalization, Industry 4.0, improvement, comparison criteria

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