# THE TECHNICAL DEVELOPMENT AND INDUSTRIAL LOGISTICS

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**Abstract:** *The rapid development of innovative industry started to impose so-called service-oriented platform of product development, which means intelligent monitoring, or that the product will be monitored throughout its life cycle - from concept to recycling it. These intelligent products (Smart Products) have informational knowledge of their production processes, logistics and future applications. They actively support the production processes (when they will be produced, with what parameters, what materials should be produced, where it should be delivered, when, what modifications, etc.). In this environment and these conditions the logistical component has a qualitatively new dimension adapted to meet these new requirements imposed by the innovative development - namely, to be in constant optimal contact with the production cyber system.*
*KEYWORDS: INNOVATION, INTELLIGENT PRODUCTS, INDUSTRIAL LOGISTICS, CYBER-SYSTEM*

## *1.Innovative Development of Industry and Logistics*

The innovations in the development of the industry are the main engine for its development. They are characterized by their stages of development or the so-called industrial revolutions. The First industrial revolution is related to mechanization, which is operated by water and steam. The Second industrial revolution characterized by mass production, built the division of labor (Ford, Taylor and others) using assembly lines and use of electricity. The Third industrial revolution is called digital revolution, characterized by the use of electronics and information technology to further automate of the manufacturing activities.

With the increasing complexity of products placed new demands on production. Factors that impose these changes are: increasing requirements in terms of flexibility, efficient use of resources and individualized products; Integration of customers and suppliers in the design and manufacture; the reorganization of the value chain and logistics and production processes in a globalized market. Begin to form new integration concepts that aim to qualitatively change the future production and logistics processes. In this context of development take shape and purpose of the Fourth industrial revolution. This suggests a new level of organization and management of the entire value chain, which is oriented towards individualized user desires. The value chain in the entire life cycle of products is expanding - the idea, the contract for the development, production, supply of a product, recycling, including related logistics services. Companies are starting to use their equipment and systems such as cyber-systems in the network world. In this way connect embedded system manufacturing technologies and intelligent manufacturing processes on the way to a new technological level. Intelligent industry refers to the technological evolution of embedded systems to cyber-physical systems or she represents the path to the "Internet of things (components) and services" (Fig.1.)

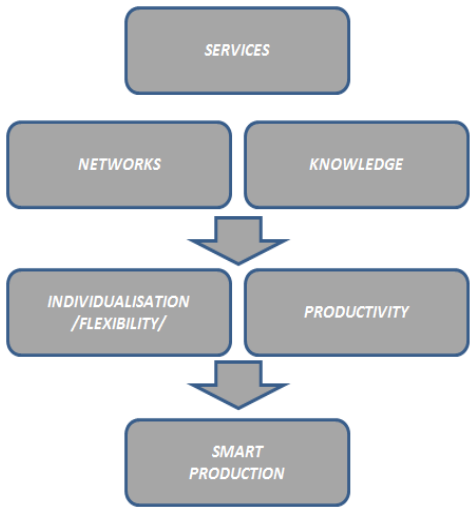


*Fig.1.Characteristics of the Fourth Technological Revolution*

This radically changed the manufacturing and business models by creating conditions for greater flexibility and resource efficiency. For the first time there is an industrial revolution, which predicted a priori, not to monitor its consequences. This provides various opportunities for companies and research institutes to active participation and impact on production. Of the other part, creates an opportunity to develop completely new technological models, services and products. The Fourth technical revolution is not only a technical challenge - the technological change, which will have lasting organizational consequences and creating opportunities for new production models and corporate concepts, but also a new concept of the network world, including all components including and logistics. In "one intelligent world" Internet is to serve all needs which leads to changes in electricity of smart grids (Smart Grids), to sustainable mobility concepts (Smart Mobility, Smart Logistics), social welfare (Smart Health) and new technological solutions.[2,4] In the production this leads to increased intelligence products and systems, their vertical network connected to engineering and horizontal integration through the value chain of the product. The work focuses on the manufacture of intelligent products, processes, methods, individual customer requirements and even profitable to produce single items; manufacturing, logistics and engineering processes can dynamically be designed so that the industry can change quickly and flexibly and respond to interference; It creates an opportunity to increase the efficiency of start (star-up) small businesses as well as to develop new services; the digital network allows direct involvement of customer requirements and inexpensive customization of products and services; There is huge potential for new products, services and solutions; global competition in the technology of production increases. The Logistics connection or logistics acquires a qualitatively new dimension. The Logistics chain will be under constant optimum connection with the manufacture of the product so that the material, information and financial flows will be a cyber-system built by both physically real objects and the virtual ones operating at optimum levels in the production network system.

## *2. Intelligent Factory (Smart Factory) and the role of Logistics*

*Structure of Smart Factory.* An important element of this technical development is the intelligent factory (Smart Factory). There Smart Logistics is an important component of future intelligent infrastructure.[1] Smart Factory is defined as one factory in which are context-oriented (context-aware assists) and communicate people, machines and resources independently in the integration network for implementation of production tasks. These systems perform their tasks based on information coming from the physical and virtual world via the Internet of Things (components) and Internet of the services.[5] The information about the physical world is real position or state as opposed to information in the virtual world as electronic documents, drawings, simulations and more. In the intelligent factory physical objects such as manufacturing facilities, logistical components, information systems and staff must interact in real time. In Figure 2 it shows the structure of the smart factory.

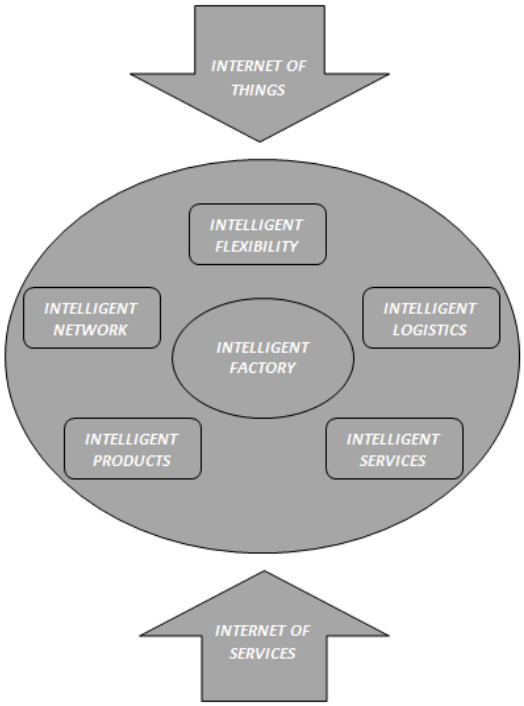


*Fig.2. Intelligent Factory*

*Horizontal and vertical integration in Smart Factory.* The horizontal integration defines continuous integration of various information technology systems in different stages of the production process and planning. This is integration process between material, energy and information flows both inside the company (input logistics, manufacturing, logistics output) and with other companies to find a continuously optimal solution. The vertical integration defines continuous integration of information technology at different hierarchical levels in the production system. Such as levels are: level actuator, level sensors, level management technique level production management, level management firm to find a continuous the best solutions at Smart Factory.

The vertical and horizontal interaction between machine - Internet machine - man and machine - a machine along the value chain in real time, forms the basis of the production cyber-physical system. They will be linked together in the integration network.

*Logistics system of Smart Factory.* It can be seen as separate from cyber-physical system (CPS), but must be connected to it by connecting models that perform the functions of coordination and management processes.[3] These models should be able to use integration data and real-time services. However, only material flow will have physical nature of dimension and its copy will be virtually or it is a virtual component. This system will regulate itself and participates in the optimization of the materials making up the product details. The physical component of the material flow includes smart flow of materials, vehicles and equipment and other logistics operations. Moreover, the logistics system is radically amended and qualitatively different from existing now as IT components (flow) will be entirely virtual to cloud borders capitalizing only logistical information allowing free communication in real time with cyber-systems of Smart production. It will use logistics data and services. The second component (flow) is the financial, which is also entirely virtual, using data integration and services, and is directed only to the financial changes as a result of logistical changes. Both components will operate in real-time cloud limits imposed by the intelligence of the Smart logistics system. This service-oriented platform, including features of Smart Mobility, Smart Logistics and Smart Grid, formed the requirements for intelligent factory producing intelligent products and representing an important component of future smart production infrastructures.

## Conclusion

Based on the above, it can draw the following conclusions:

1. The logistical components acquired a qualitatively new dimension adapted to meet new requirements imposed by the innovative development.

2. The logistical components must be in constant optimum connection with production cyber-physical system.

3. Logistics chains will be under constant optimum connection with the manufacture of the product so that the material, information and financial flows will be one cyber system built by both physically real objects and the virtual ones operating at optimum levels in the production network system.

4. logistics system is radically amended and qualitatively different from existing now, as IT components (flow) will be entirely virtual in cloud borders capitalizing only logistical information allowing free communication in real time with cyber-systems of Smart production.

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