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INDUSTRIAL INFORMATION TECHNOLOGY – A REVOLUTIONARY FACTOR IN LOGISTICS

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Abstract: Within the new strategic industry development (fourth technological revolution) offers maximum use leading role of industrial information technologies, which are currently a major revolutionary factor of technological progress. The purpose of this article is not only to demonstrate the leading role of information technology in industrial activity, but also to propose an approach for the construction of optimization models for intelligent link between technological and logistical processes. This means that through technological and logistical compatibility using smart industries will share real information to better meet the ever increasing customer demands. This flexible technology and business development at a well-established logistics system will lead to greater individualization in the provision and use of intelligent and tailor-made industrial products and services. This qualitatively new step in computerization of technological and business processes is the basis for building a so-called "intelligent production".
Keywords: Intelligent Production, Industrial Logistics, Fourth Technological Revolution

INTRODUCTION : BUSINESS PROCESSES AND IT ENVIRONMENT

Development and linking of technology and business processes with a high degree of automation due to introduction of new information and communication technologies pose new challenges for the industry. These are new industries that are characterized by more efficient use of resources, ergonomic design flexibility of the production chain and integration of customers and partners in both manufacturing and business processes and those with added value in the entire business chain [2,4,5]. Development of the industry is closely linked with the maximum use of industrial information technology as a major revolutionary factor of progress. There are conditions to create intelligent production with technological and logistical compatibility and exchange of real information to better meet the ever increasing customer demands. Flexible build technology and business systems development, which will lead to greater customer satisfaction in the use of smart and tailored to the specific needs products and services [8,11]. Linking technology and business processes with a high degree of automation due to introduction of new information and communication technologies pose new challenges for them. This qualitatively new step in the information environment of technological and business processes is the basis for the construction of so-called intelligent production. These intelligent productions will feature in-effect resource use, ergonomic design, flexibility of the production chain and integration of customers and partners in both manufacturing and business processes and in those value-added along the entire business chain. The circuit integration is shown in Figure 1.

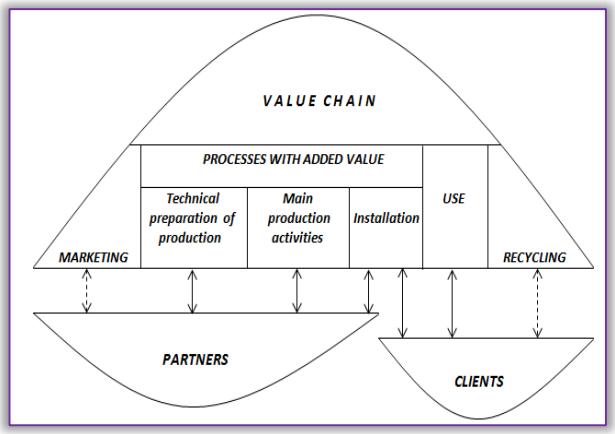

Figure 1. Chain of Integration

Practice has proved that in this whole process have important data standards. Almost all are already used uniform standards for data and Internet. It is used for internal data exchange between employees in companies. The correlation between data standards in operational and administrative areas is of great importance. In case of discrepancy of data standards leading to higher costs.

Intelligent proceedings are not only a technical challenge and technological change which will have lasting consequences organizational and creating opportunities for new production models and corporate concepts, but also a new concept of Network World. In the knowledge society, the Internet is to serve all needs, leading to a change in the definition of the needs of society, such as smart grids (Smart Grids), sustainable mobility concepts (Smart Mobility, Smart Logistics), social welfare (Smart Health) and new technological concepts. In the proceedings leading to increased intelligence products and systems in their network vertical and horizontal integration through the value chain of the product.

Or as a result of the rapid development of new networked world in the industry expect intelligent industries to develop in the direction of (in Figure 2):

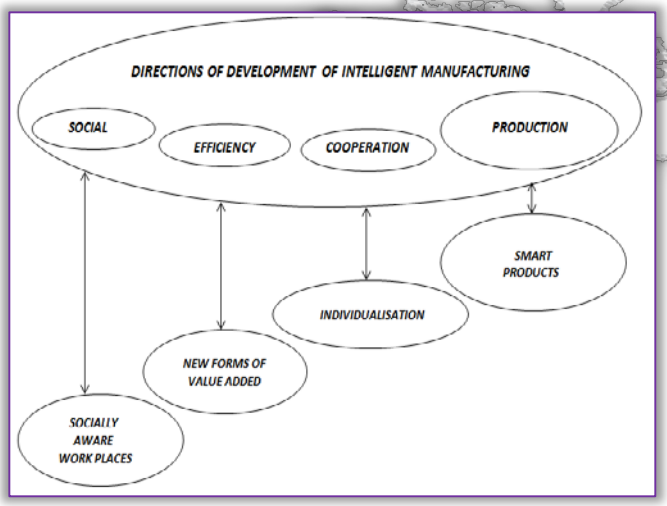

Figure 2. Directions of Development

First direction – Production:

» Production of intelligent products.
» Intelligent industrial methods.
» Intelligent processes (technology and logistics).
» The production and engineering processes can dynamically be designed so that the industry can change quickly and flexibly and to respond to disturbances.
» The production processes are fully transparent and provide optimal solutions.

Second direction – Cooperation:

» Satisfying individual customer requirements and even profitable to produce single items.
» 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.
» More intensive cooperation between business partners (suppliers and customers) as well as between employees, resulting in new opportunities and benefits.

Third direction – Efficiency:

» In the process of work can be created new forms of added value and new technology and business models.
» An opportunity to increase the efficiency of start-up small businesses, and to develop new services;
» It can respond to challenges such as resource saving and energy efficiency, urban production and demographic change;
» Resource productivity and efficiency can be improved along the whole chain of value creation.

Fourth direction – Social:

» Workplaces can meet the demographic factor and be socially involved.
» On the basis of intelligent systems support staff can focus on creative value-added activities and be exempt from routine tasks. Given the upcoming shortage of skilled workers as possible, thus the productivity of older workers to keep for a longer working life.
» Flexible work organization allows employees to better combine work and family life, and to combine it with better training and improve Work-Life-Balance (balance of life).

LOGISTIC MANUFACTURING SYSTEM AND BUSINESS ENVIRONMENT

Modern information system for automation of industrial activities in the companies was constructed in the following pyramidal form:

≡ at the base are automated process control (SCADA),
≡ in the middle are MES (Manufacturing Execution System),
≡ a tip of the pyramid ERP systems.

The boundaries of this pyramid of automation emerge primarily in the range of processing and data transmission. But with the development of industrial network components in the Internet of Things and Services (IoTS), processing will influence the amount of data. Growing volumes of data (Big Data) in the future will begin to create problems of business and corporate level because the higher level in the pyramid, the more reduced the rate of transmission.

ERP (Enterprise Resources Planning) systems are designed primarily for resource planning. Logistics is an integral part of this system, it is a module of this system. In the first years of this century appeared ERP

postmodern. It is a web-based software that provides employees and partners real-time access to ERP system itself [6,10]. These systems are synchronized with the dynamic technology and business processes that are part of lean manufacturing. Their Internet of Things enables direct communication of the ERP system with cyber-physical systems (CPS) and intelligent products at the manufacturing. This means that domestic production logistics system reacts as a module of the ERP system or technology and business processes have been adapted into a single market service. Connections of the ERP system with cyber-physical systems is illustrated in Figure 3.

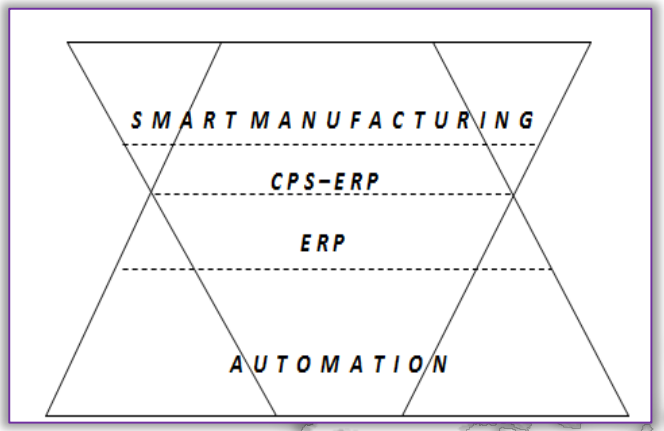

Figure 3.Links of ERP-system with CPS-system

Solutions for ERP-systems in businesses can use these new generation that are suitable for use in environmental conditions. This is an intelligent ERP-system using a service-oriented architecture (SOA), a service-oriented architecture (SOA). It allows to enjoy the facilities and services and other software vendors through standardized interfaces. Systems of this type are suitable for use in the rapidly changing technological processes applicable to flexible manufacturing. These might online connection with CPS (cyber physical systems) and intelligent products of stage production level [9,12,13].

With the use of in-memory databases, or large databases, sensors CPS can process all production information in real time. Or occurring any changes in the production is performed simulation and optimization using in-memory information technology, but in real time. When changing production processes, they can now be optimized much faster, more qualitative and better. Direct access to production data from the ERP-system provides greater transparency of technological and business processes of all individual orders [3]. These decisions are easier to perform as simulations and optimizations forecasts, which creates ERP-system are presented in a user-friendly way of easily accessible mobile devices. In addition, the new ERP-system leverages Cloud Computing for Internet access services (IOS). This part of the website includes services and functions that are implemented as web-based software components.

Characteristic about them is that sensors CPS can process all production information if changes occur in the production, respectively, and logistics, as soon optimization is performed in real time. Thus it is done quickly and flexibly optimize all processes on the scale of government [1,7,14].

Direct access to production data from the ERP-system ensures transparency of technological and business processes at all levels. So decisions become easier to implement, since the simulation and expected outcomes are easier and more accessible for use by mobile devices such as tablets or smartphones.

Now ERP-systems can react very quickly and provide integration modules. Figure 4 shows the connection of the module Logistics (Supply Chain Executions) with other modules of ERP-systems.

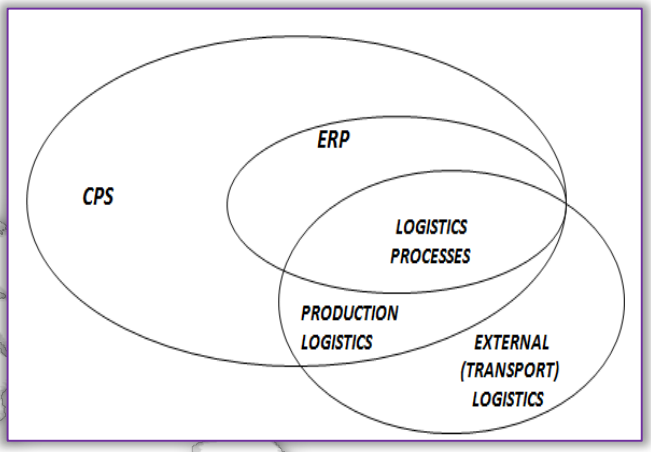

Figure 4. The Connection of Logistics Module with other Modules of ERP-Systems

CONCLUSIONS

Now can be drawn the following conclusions:

- Clarified is the leading role of industrial information technology in the creation of intelligent industries, which are currently a major revolutionary factor of technological progress.
- Clarified is the place of logistics and business processes in IT.
- Analyzed is the dependence and commitment to technological and business processes with a high degree of automation due to introduction of new information and communication technologies in industrial activities.
- ERP-systems are designed primarily for resource planning. Logistics is an integral part of this system, it is a module of this system.

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