

IT SUPPORT FOR LOGISTICS TASKS IN POLISH MACHINE-BUILDING INDUSTRY ENTERPRISES

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Abstract

The paper presents the results of research conducted in the Polish machine-building industry enterprises in the area of IT support implemented in logistics processes. It was presented specific of Polish machine-building industry sector and the characteristics of logistical tasks supported contracts. The results are related to the implementation of research and development project.

Keywords: Machine-building industry enterprises, IT tools, logistics tasks

1. INTRODUCTION

Information technologies over time become more and more an integral part of business organizations and in some cases their essential ingredient. On the market there are more and more organizations that using information technology to improve and create entirely new business models, where competitive advantage is based on IT. Companies are increasingly optimizing their processes, going beyond its own borders. Through the use of information systems they co-ordinate the implementation of its activities spread throughout the world.

Bundling information technology (IT) applications to support logistics activities provides a means for firms to improve their logistics performance [Lai, Kee-hung et al., 2010]. Since the early 1990s there has been a rapid growth in IT investments for enterprise resource planning and supply chain management in manufacturing industries. These information technologies are believed to improve the efficiency of manufacturer shop floor operations, enhance integration across different functional areas, and facilitate inter-firm collaboration [Akkermans et al., 2003, Banker et al., 2006 and Kelley, 1994]. Despite increased adoption and use of advanced IT by manufacturing firms, to date there is still a lack of systematic study of the impact of IT on manufacturing operations [Banker et al., 2006], particularly at the logistics level.

This paper presents the results of studies conducted in selected engineering industry companies, related to the supporting of logistical tasks with IT systems performed in this group of companies.

2. THE SPECIFICITY OF POLISH MACHINE-BUILDING INDUSTRY ENTERPRISES

The subject of empirical research was the sector of medium and large mechanical engineering enterprises from the Silesian (due to the largest concentration of such enterprises in the Upper Silesia). The study has covered 38 companies including company size and sector of activity. Selection of the companies based on:

- company size (sales volume, the amount of employment);
- enterprise sector;
- investment in research and development (R&D) related to the development of new and improved products (product innovation) and processes (process innovation).

The study focused on the scope of logistics processes IT support in selected machine-building industry enterprises. Due to the fact that the conduct of research require a deep knowledge of the respondent's views

and attitudes, it was necessary to conduct focus groups with representatives of senior management of each surveyed enterprises.

The study was conducted in four groups of companies:

- machine-building enterprises producing machinery of general purpose (number of enterprises 8),
- machine-building enterprises producing mining machinery (number of enterprises 15),
- machine-building enterprises producing equipment for the defence industry (6),
- machine-building company for the automotive industry (9).

The undertaken investigations in selected mechanical engineering industry enterprises allow to determine the specificity of analyzed enterprises. It was found that analyzed enterprises of mechanical engineering industry could be characterized as follows [Dohn et al., 2011]:

- lathe and assembly production is discrete and highly complex,
- large share of unitary production, including the production of large machines, primarily as a make to order,
- the activity of analyzed enterprises is particularly sensitive to an economic situation change, vulnerability to recession is stronger and more violent than the reaction to an economic recovery,
- in the medium term production activity is characterized by a relatively large uncertainty and variability in exploited capacity (in terms of size and structure); the results are: the excess of capacity for machinery and the deficit in employment,
- the activity of enterprises requires high technical and organizational competences of personnel, especially in the preparation of production (constructors, technologists, workers of production units),
- in unitary production the profitability is affected by a great deal of different factors of low stability, particularly the order book, the parameters of the contracts with customers (unitary price can be very volatile), the parameters of contracts with suppliers and subcontractors (prices also can be very volatile),
- for the execution of profitable contracts and also not to comprise of unprofitable contracts, extensive knowledge about production costs, production capacity, inventory storage and supply capabilities and knowledge of potential suppliers and receivers (as extensive as possible the list of subcontractors and suppliers, information about their reliability, costs, willingness to cooperate, negotiation potential) is required.

3. RESULTS OF THE RESEARCH

The research in the machine-building industry enterprises showed that most IT support systems in the area of logistics processes are characterized by the enterprises producing mining machinery, while the lowest level of support for enterprises producing equipment for the automotive industry. A characteristic feature of the surveyed companies is a great diversity and lack of coherence in the implemented systems that support different areas of logistics. The greatest support is related to a sphere of supply and production planning. This situation is due to the large market and financial availability of the systems that support these areas. The authors of these systems are often very weak producers who are not able to ensure the integrity of enterprises products with the areas and issues that occur only in the company (such a system would fulfil the role of dedicated systems produced under the specific needs of individual customers). Surveyed enterprises are in a different financial situation and investment in software, and in particular integrated systems are often not possible to implement, therefore only include the necessary areas. Detailed results in the various groups of the surveyed companies are shown in **Figs. 1 to 4**.

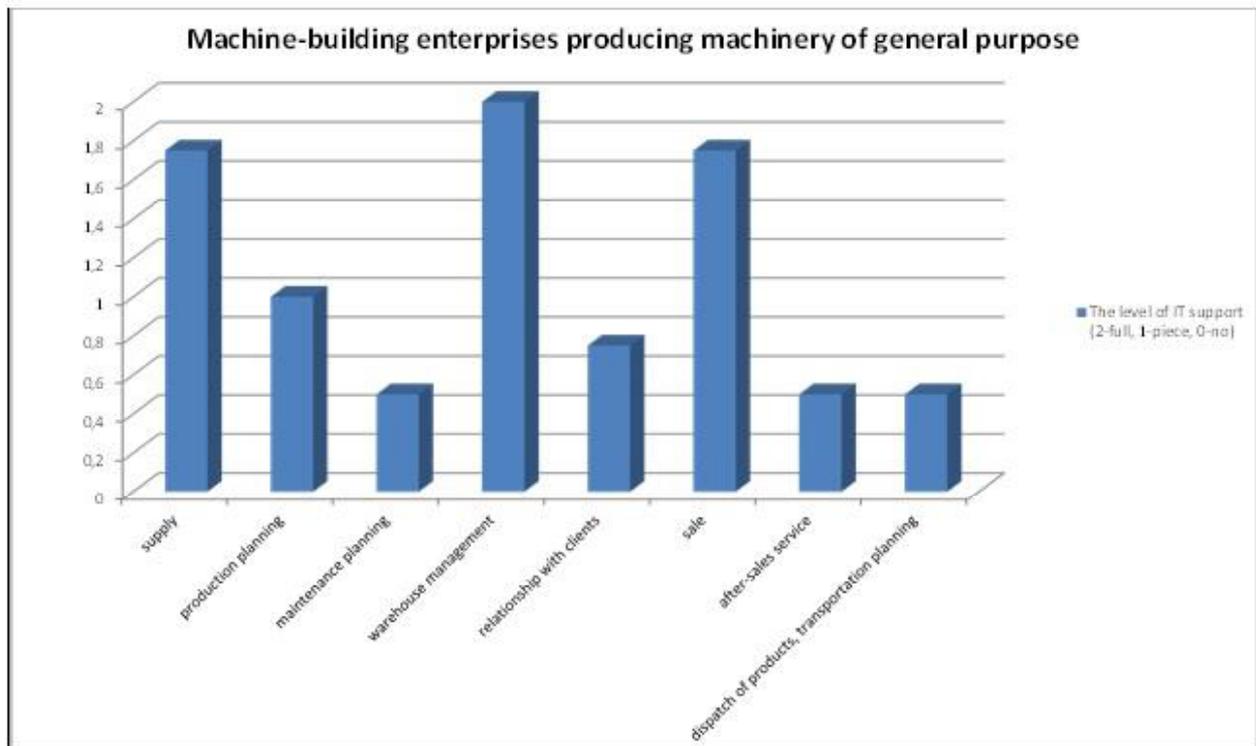


Fig. 1 The scope of IT systems supported different areas of logistics in enterprises producing machinery of general-purpose

Source: own preparation

The research in enterprises build producing machinery of general-purpose showed that the full support of IT systems includes the areas of inventory management, and the small percentage of support applies to the areas of planning and accounting for repair, after-sales service, and the expedition of transport planning and accounting.

An interesting finding of the study in this group of companies is a substantial deviation from the general, preferred principle of minimizing the states of stocks, carried out by the MRP systems. Here there is a need to create and maintain stocks of certain materials, parts and sales teams, due to the large (several months, semi-annual or longer) delay in the execution of orders. The availability of these parts in many cases determines the possibility of undertaking the production of their products.

The group of machine-building enterprises producing mining machinery has a broad IT support in area of logistic tasks. This situation is undoubtedly due to the increasing importance of domestic mining machinery industry

According to forecasts of experts and analysts of international oil and energy market, it will increase demand for energy products and other raw materials and the dynamic development of the metallurgical industry, which will result in a threefold increase in 2020 production of coal and lignite, which reaches about 13 million tons per year. High production growth is observed recently in China, the USA and Russia and in other countries with deposits of this material, including India, Vietnam, South Africa, Indonesia, Canada, Ukraine, Kazakhstan and the countries of South America. In connection with this and the necessity to improve work safety in mines, mining world needs and will need more and more modern and efficient machinery and equipment and new, finer and more efficient technologies. Thanks to this, mining machinery manufacturers have opened up a long-term perspective for the disposal of its machines and equipment, thus guaranteeing jobs and generate high returns. [Jaworski B., 2007].

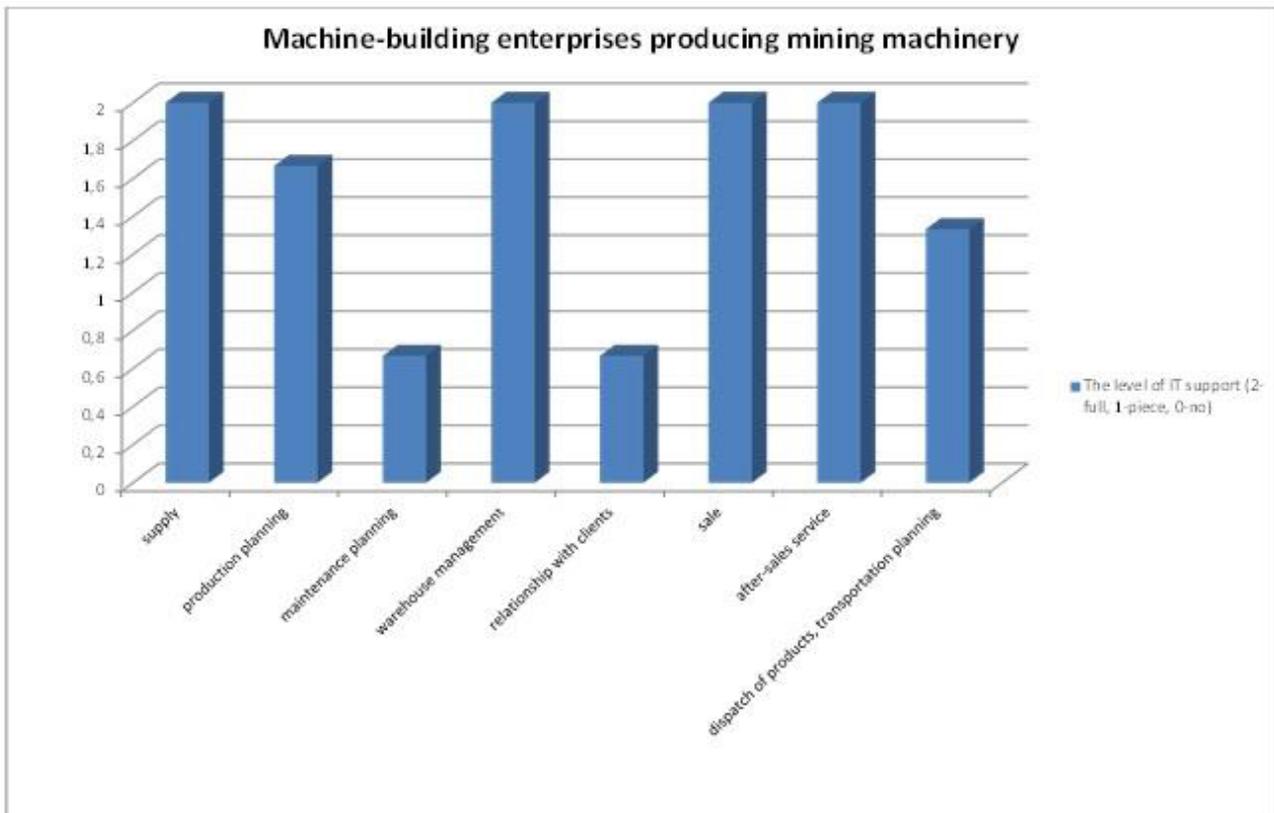


Fig. 2 The scope of IT systems supported different areas of logistics in enterprises producing mining machinery

Source: own preparation

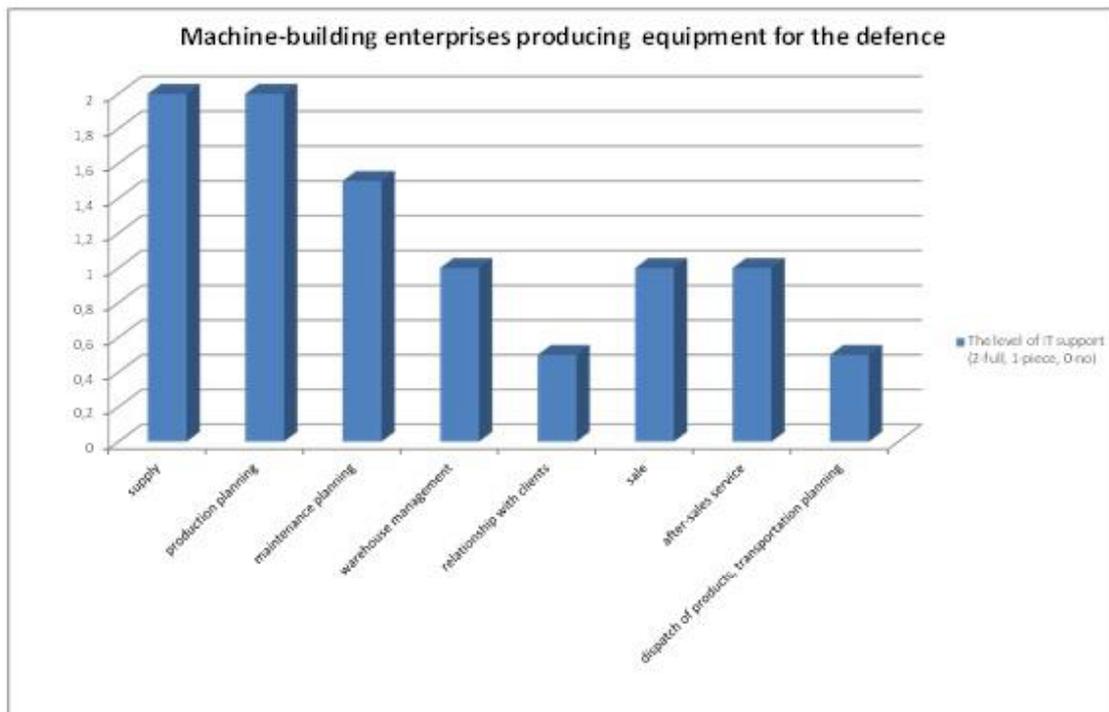


Fig. 3 The scope of IT systems supported different areas of logistics in enterprises producing equipment for the defence

Source: own preparation

Conducted research in the group of enterprises producing equipment for the defence shows that the greatest support of IT systems includes areas: purchasing and procurement, production planning, and maintenance planning. The smallest IT support is characterized by areas: relationship with clients and dispatch of products, transportation planning accounting.

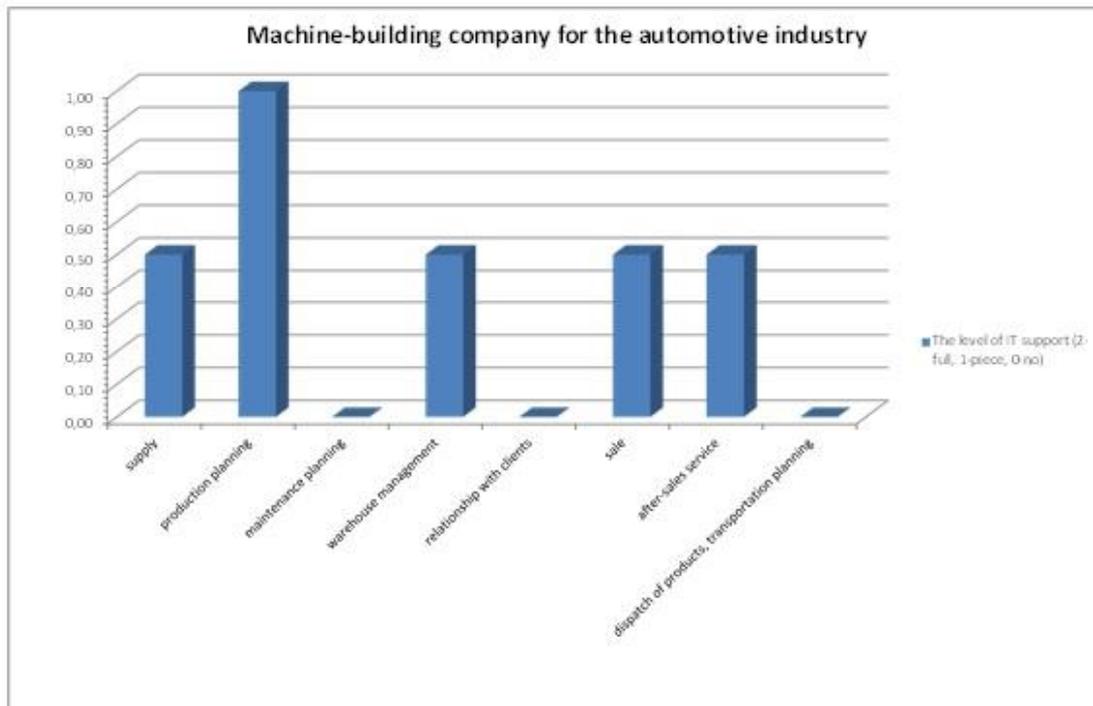


Fig. 4 The scope of IT systems supported different areas of logistics in enterprises producing machinery for automotive industry

Source: own preparation

The study shows that the weakest support of IT systems are characterized by enterprises producing machinery for automotive industry. In fact, this is the only group of enterprises which are none of computer support in the areas of maintenance planning, relationships with contractors and expedition products. Interestingly, the surveyed companies as a key success factor recognize the characteristics and composition of the teams creating the company. The more important factor in the success of these companies was human capital than technical resources. In the management area the considered vision and a common goal is more important than innovative or trendy management methods. Typically, these companies are characterized by a flat organizational structures and policies of "open" door with its emphasis on cross-training and the development of interpersonal networks.

4. CONCLUSIONS

Polish machine-building industry enterprises require action in order to increase flexibility to respond to short-term customer needs and risks occurring in the business, the ability to produce customized products in small batches, reliability of supply, short cycle times and high productivity and economic efficiency. A decisive impact on the results of any business organization has an efficiency of the management system. To improve management information systems it is used in an increasing scale information technology in the form of integrated management information systems. IT Application Management may have a different functional and domain range. Small business organizations merely involve on the using the data packets of a small range and based on generally weakly integrated, simple and generally outdated technologies. Larger organizations, especially manufacturing companies that produce complex products in discrete manufacturing

processes, require highly efficient and flexible systems, multidisciplinary, comprehensive integrated which supported internal and external information processes.

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