

**INTEGRATED MANAGEMENT SYSTEMS AS SUPPORTING TOOLS  
IN TERMS OF NEW CHALLENGES AND TRANSFORMATION  
TRENDS IN LOGISTICS WITH AN ENTERPRISE  
IN THE KUJAWSKO-POMORSKIE REGION AS AN EXAMPLE**

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**Abstract:** The rate of growth in terms of the changes of dynamics in logistics is due to the development in services, including physical, information and financial flows, important for the entities of numerous economic sectors. The contemporary logistics not only has to catch up with the current changes, but also, in many cases, it must get ahead of them, meeting the expectations of its clients. A constant element of the logistics activity should be both the investigation and forecasting of the changes.

A growing complexity of business processes in the globalised economy, based on knowledge in the business environment with complex corporate relations, makes the managers support the decision-making processes using state-of-the-art information technology (IT) tools.

An essential supporting role is fulfilled by the integrated management systems, ensuring a cohesion and control of the internal and external processes performance in the enterprise operation.

The article aims at presenting the role of integrated management systems, considered as tools supporting business logistics processes. It demonstrates the specificity of the operation of a selected economic organization, which makes the management apply unitary measures.

With the development of integrated systems in mind – and using the example of the case study – the solutions were demonstrated, the aim of which is to effectively support the management of purchases, supplies and maintenance within the department in the enterprise under study, especially the logistics processes. An essential element of the research is the role of innovativeness in the logistics development, including the implementation of the latest teleinformation technology solutions.

**Keywords:** logistics, integrated management systems, quality.

## 1. Introduction

Today, in many areas of our life, permanent changes occur, due to the economic development dynamics. They mostly concern logistics, which is more and more essential, not only in the economy, but also in enhancing the quality of life, improving the operation of the entire societies, which makes the need of an ongoing improvement in logistics, in order to match the new needs and challenges, vital (Bujak, 2014).

The modern logistics must, therefore, respond dynamically to the emerging new needs, as well as fully use new opportunities. The rate of changes, as well as the scale of needs and expectations, calls for definite changes in thinking about logistics, its objectives, as well as the methods of executing the tasks. Logistics does not just have to only follow the changes, but, in many cases, it must be ahead of those changes, creating new solutions, concepts and methods of operation. They must fully respond to the new expectations and needs, especially in terms of new requirements of potential clients.

One must remember, that the logistics itself gradually affects the economy and its transformations, both in a direct and indirect way (Coyle, Bardi, Langley, 2012), thus generating new challenges for itself.

The 21<sup>st</sup> century is the age of multi-aspect changes with a permanent growth rate. Logistics is the field which, due to its importance for the economy, its responsibilities and role it has, keeps on evolving to meet the requirements of the modern business and adjust to permanent changes in the business environment. Globalization and networking, as well as a growing virtualization of the contemporary economy, constantly create a number of new challenges and needs, thus defining the directions and trends of changes in today's and future conditions (Bujak, 2016).

Many actions and decisions in logistics is burdened with time pressure. Therefore, one must hurry with implementing new methods and concepts of executing logistics actions. In many cases, the decisions on future and crucial changes must be taken today; however, one must be aware that each change requires time. Lack of such actions results in failure, which leads to a loss on more and more competitive market. The springboard for such changes is, and will always be, the knowledge and the results of research and considerations in a form of rational economic and social visions. They will provide grounds for taking the right and reasonable decisions, changing the way of executing logistics. Understanding them more accurately will not only allow for finding the way on how to meet them, but will also help in developing new logistics concepts, which will fully use new emerging opportunities, especially in the area of new technologies. The area, which will mostly affect the logistics development, will be new telecommunication solutions, new software solutions, transport systems changes and changing requirements, related to the concept of sustainable development (Taleb, 2013).

A permanently growing complexity of the logistics processes and actions, as well as the need of an ongoing improvement of logistics chains and channels, require taking a number of very precise and well-considered actions, building new innovative concepts and strategies (Szyszka, 2004). The changes accompanying the flow of goods in the supply chain aim at eliminating the unnecessary links. The integration occurs at the level of intercompany cooperation, as well as inside the enterprises. From the point of view of logistics, in a production enterprise today, it is adequate to perceive the area of logistics, production and supplies together, rather than separately (Fertsch, Cyplik, Hadaś, 2010).

The decisive management elements are becoming the data processing quality and rate, as well as reliability and frequency of the data updating, which conditions the quality and effectiveness of the implemented Integrated IT Management Systems (Banaszak, Kłos, Mleczo, 2011). The development of IT tools and projects facilitates a large-scale application of the solutions determining an effective flow of information, indispensable for logistics processes management (Nowakowska, 2011).

The logistics information system ensures the information required for planning, execution and control of the logistics actions (Coyle, Bardi, Langly, 2001). It is based on the teleinformation infrastructure, providing the grounds for further technical solutions, including the IT systems supporting management.

## **2. Information subsystem in the company's logistics system – ERP-class software**

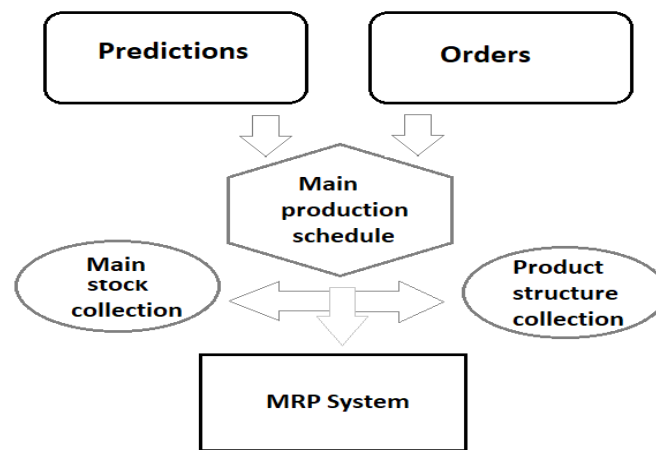
A functional ERP (*Enterprise Resource Planning*) program is adjusted to the client's needs and covers integrated business solutions in terms of the fundamental processes (to include planning and production management, as well as warehousing management) and the key administration functions (HR, accounting, payroll) of the organization. It is a process-oriented IT tool for enterprise business efficiency enhancement (Kłos, Patalas, 2004).

The ERP system development dates back to the late 1950s. Initially, they were referred to as *Inventory Control* (IC) and served only for the warehouse stocks management. A breakthrough took place in the early 1960s and brought significant changes in the management support systems' design, which, in turn gave rise to the MRP (*Material Requirements Planning*) systems, which facilitated combining a few related functions of enterprises. However, they still covered only a small area of the operation of the entire enterprise (Januszewski, 2008, p. 152).

The emerging business applications were e.g. separate from the others. Specific stations using the application could, thus, deal only with one domain, e.g. accounting or planning the material requirements in the warehouse, whereas the data generated while working was not

available at the other stations. Further development of the MRP base system led to a development of the *closed loop* MRP. A new system was created, based on the production model, considering the effect of feedback determining the production process condition at various levels of progress on various attributes describing the entire production (Knosala, Gołda, 2007).

Another stage of the MRP evolution, after the *closed-loop* MRP, was MRP II (*Manufacturing Resource Planning*), a system extended with modules related to the sales process and supporting decision-making at strategic production management levels. MRP II considers all the enterprise management domains: from production preparation, through its planning and control, to sales and distribution of the goods (Fig. 1). The 1990s brought further changes, as a result of which a new standard, ERP, emerged. It allows for fast planning. The structure was extended with book-keeping, finance and managerial accounting modules (Nowicki, 2006).



**Figure 1.** Material Resource Planning system diagram (MRP). Source developed based on (Skowronek, Sarjusz-Wolski, 2008).

The 21<sup>st</sup> century recorded a stage of changes in the entire enterprise management model, which goes beyond the formal area of the organization. The transformation triggered the evolution of ERP systems. The transformations resulted in the emergence of ERP II. The ERP II systems are internal-integration-oriented and they aim at solving problems together with business partners. The new idea has been mostly further expanded with intelligent customer support and supporting relations between business partners in a given chain (<http://www.systemyerp.com.pl/system-erp.html>).

The implementation of ERP-type systems is a long process, which requires an involvement of many client's resources and, unfortunately, very often it does not guarantee success (Miłosz, 2011). Implementing the ERP system in the organization must be considered in terms of project management. The implementation success determinant is, thus, the budget, scope and schedule of the execution of a given project. The benefits from the ERP operation in the enterprise must also include the system effectiveness prospect. Here are the respective groups of ERP implementation benefits (Kłos, Patalas, 2004):

1. Organizational benefits.
2. Management benefits.
3. IT structure benefits.
4. Strategic benefits.
5. Operating benefits.

In terms of logistics, the benefits the ERP users consider the most precious are, among others:

- Efficient supplier evaluation and selection.
- Advanced reporting.
- Effective information sharing.
- Real-time resources presentation.
- Time and capital savings, thanks to a constant access to data.

Each organization, wishing to implement the ERP system, should, at the initial system selection stage, define the benefits to be accomplished in specific groups. The expected benefits define the scope of the project and the functional areas the innovative solutions will be applied in.

Below you will find a case study for a selected transport company, currently implementing the ERP system, to exemplify the logistics solutions executed by applying the information technology tools.

### **3. Document circulation and transport company procedures X – case study**

The X transport company, with the headquarters in Bydgoszcz, has been operating on the market since 2004, continuously offering professional transport, logistics and customs clearance agency services to the clients. The company also operates a branch in Gdańsk. The company is a fully Client-oriented operator. It is a leading market supplier of services and consultant in terms of customs and tax law for international goods transactions. It communicates with the Client, proposes integrated logistics solutions, assists in implementing the effective procedure solutions, fully satisfying its individual supply chain management needs.

The company has qualified and experienced personnel in the field of logistics services, including a team of experienced customs agents, constituting a guarantee of professional service. The company ensures comprehensive solutions and supervision of procedures to production and trading companies, as well as to customers. The quality of service management provides grounds for the organization proposing optimal solutions with regard to all kinds of road, sea and air transport needs.

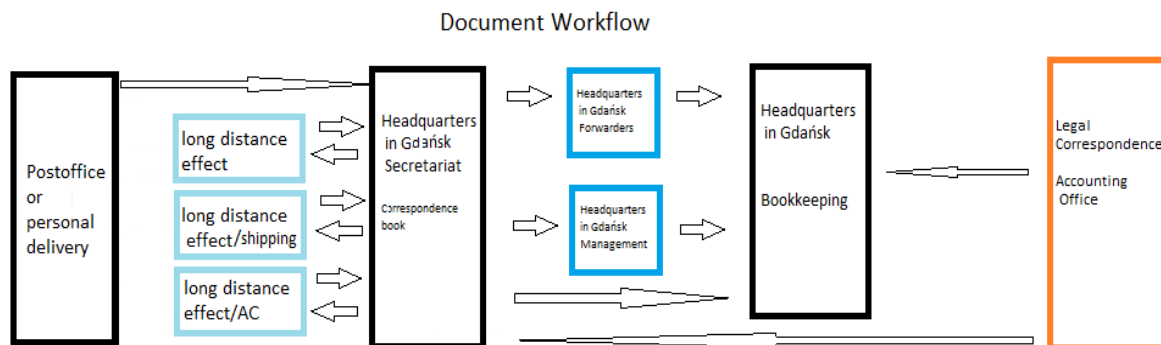
The X company is a provider of forwarding services, specialising in international road, air and sea transport.

The company has a variety of vehicles, from 1,500 to 24,000 kg in load capacity, at its disposal, thanks to which it provides its clients with full truck load transport services across the Europe and the country by providing *door to door service*. The company also offers LTL (Less Truck Load) service and the express service with vehicles up to 3.5 tonnes DMC, both across the country and the Europe. To meet the market needs, the company makes deliveries within a “just in time” service model. What is essential, it also owns AEOF and TCF Safety Certificates.

The organization, through cooperation with air carriers, proposes intercontinental transport services on American and Asian routes. It is definitely the fastest form of goods delivery to a specific destination across the world, offered by X. An alternative solution is the rail transport, which is also part of the scope of the services offered by the company, and it includes both LCL and FCL deliveries.

In its offer, the company also provides sea forwarding services. The transport services are executed under all kinds of INCOTERMS conditions, based on reliable ship-owners, carriers and leading agents from all over the world (Polityka jakości analizowanego przedsiębiorstwa X, 2017).

In 2014, the company launched the ERP-class system implementation process, which aimed at facilitating actions inside the organization, as well as communication with business partners. Earlier, the document workflow structure inside the company was as follows:



**Figure 2.** Document workflow in X. Source: own study.

As seen from the figure above, X company still uses standard procedures of sharing information, using also postal services. By implementing the ERP system, the company mostly wanted to use six system modules, including book-keeping, employment, logistics, distribution, resource planning and operational management. The core of the process was to, essentially, modernise the document workflow not only between the respective company branches, but also between outsourced entities providing services to the company.

Together with the team of X, the company supporting the implementation developed additional functionalities in the ERP system. It facilitated online communication and data sharing between the most essential systems of the company, mostly in terms of reliability,

automation and a high operation capacity. The system also performs a sales profitability settlement analysis. The current solution in place operates in a few modes:

Mode no. 1 refers to the client, who has also instructed a postage to be sent; the order and the invoice have been placed at the same time. If the payment is not settled, the order awaits a transaction completion signal, which is possible thanks to the integration of the ERP system with the bank. The system keeps monitoring, whether the payment has been made, and whether it has been credited, and after the process' completion, the invoice is automatically issued and the information is forwarded further.

Mode no. 2 refers to the transactions sent using pre-paid accounts, with clients holding their own accounts. The accounts get charged and the shipments are made using the available pool. In that case the ERP system, the operation is simplified, as it does not have to send any signals. Waiting for the bank transfer is not required, as the payment is made immediately; the entire process is automatic.

Mode no. 3 is related to those clients, who, under the contracts signed, make shipments as they come and, at the end of the week, the system issues invoices for all the shipments and sends them via email.

The company partially released the internal IT department from keeping its own invoicing system; that functionality is served and updated in the ERP system. It essentially enhanced the document issuing effectiveness, their ordering and analytics. It also improved the delivery deadlines and conditions; an enhanced punctuality of deliveries from 68% to 83%. Thanks to the operation in the system, a decrease in transport costs by 15% was also recorded, as well as a reduction of delivery time by 26%.

Despite the system, deliveries are made following the applicable procedure. First, the order conditions are established, including the date, pick-up address, as well as the date and place of delivery, the payment for the order and the amount of load insurance for the transport period. The payment rate and date, as well as the payment method are usually determined by the business partner in EUR, translated at the average currency exchange rate on the day preceding the loading date. Also, the period free from the layover pay is usually agreed as 24 h for loading and 24 h for unloading. Thanks to the GPS in the vehicles, the X company can monitor *online*, in real time, where the vehicle with the delivery can be found. The system also provides information on the vehicle speed, whether the engine is on and the fuel availability in the fuel tank, which is very useful for the exchange rate settlement. Thanks to the vehicles monitoring, the business partner can, at any time, learn where the load is located at a given moment. Often, in the case for longer routes, the clients require email information about the goods. Each goods type is provided with the applicable packing slip. The transports are made under Incoterms. Those are brief phrases describing the International Commercial Terms. They have been published in 1936 and provide a set of 11 principles, defining who is responsible for what during international transactions. They are extremely important, as everyone knows and respects them, from Austin, all the way to Zanzibar. Providing the requirements on every single

invoice decreases the risk of potentially costly misunderstandings. The carriers of the X company hold a third-party civil liability insurance policy.

While implementing the IT system and tools, during many discussions with the transport enterprise managers, it was agreed, that planning the transport route is really one of the key actions to be performed by dispatcher services. With the interviews, one can see that the basic criterion of optimising the transport tasks for the company is the profit generated as a result of serving all transport routes. Any other criteria are less important. It is thanks to the IT systems, with built-in planned routes calculation and optimisation, used in the company, that the profit of the right value can be generated.

For the purpose of warehousing management, the company used standard MS Excel spreadsheets (Fig. 3). As part of the ERP implementation, the company benefited from the feature of data sorting. As for that enterprise, applying even the simplest system would decrease the administration workload. All kinds of calculations and recapitulations are made automatically. Thanks to it, the reporting process has become faster. This implementation has resulted in the reduction of employee overtime by 20%.

| No | Company     | Date of submission | Case number | Description of the product | The number of packages | Type packing | Gross weight kg | Parcel no | Damaged? | Host person | Release date | Receiving Person / Company | Issued from the magazine |
|----|-------------|--------------------|-------------|----------------------------|------------------------|--------------|-----------------|-----------|----------|-------------|--------------|----------------------------|--------------------------|
| 1. | Polish S.A. | 20.12.2013         | 100/09/13   | Cable                      | 1                      | Box          | 120             | HAW 0000  | No       | A. Rost     | 21.12.2013   | M. Alson                   | K. Nowak                 |
| 2. |             |                    |             |                            |                        |              |                 |           |          |             |              |                            |                          |
| 3. |             |                    |             |                            |                        |              |                 |           |          |             |              |                            |                          |

**Figure 3.** Warehouse register in X. Source: own study.

As for the purchases for the company, the situation is as follows: they are verified once and processed separately, depending on the current needs. To maintain the vehicles in an operating condition, the company employs a mechanic, who performs vehicle overhauls and inspections. In the case of complex failures, an outsourced company is hired.

The ERP module system, proposed for the company, has also facilitated access to a wider group of clients at much lower costs, which resulted in a market potential of the small enterprise to be almost the same as in the case of the potential of large enterprises.

#### 4. Summary

In contemporary business processes, in which the information workflow is an inseparable part of an efficient operation of the enterprise on the market, they must be supported with IT technology. Logistics has been – and will still be – changing. Of many concepts and conditions which, today, have the greatest impact on the development of logistics actions and strategies, especially in Poland, it is the development of information and teleinformation technologies, the emergence and development of the concept Cloud computing and Big Data,



which must be pointed to. Knowledge, as a determinant for being competitive on the transport services market, is a derivative of the processing efficiency of the data and information that the enterprise manages. With that in mind, a fast data collection, storage, processing and in-depth analysis, not only inside the enterprise, but also acquiring it from the environment, are so important.

The struggle to remain competitive on the market calls for an increased interest of the companies in integrated logistics support systems. Fortunately, a growing awareness of the benefits from ERP-type system implementations facilitates a progress in that field. More and more enterprises break the stereotype, that the ERP system is dedicated to large enterprises, which is evident from the company analysed in this article.

To recapitulate, one can state, that the Polish logistics is facing an interesting future. However, what it will be really like depends, to a much extent, on the decisions taken by the entrepreneurs, as well as the enterprise's capacity to see new conditions, challenges and potential, including developing new adequate solutions to the current (future) needs, logistics concepts and operation principles. And so, one cannot disregard a fast implementation of new technical and technological inventions for the benefit of logistics actions.

## References

1. Banaszak, Z., Kłos, S., Mleczek, J., (2011). *Zintegrowane systemy zarządzania*. Warszawa: PWE, 15.
2. Bujak, A. (2014). Współczesna logistyka i kierunki jej rozwoju. *Logistyka*.
3. Bujak, A. (2016). Uwarunkowania i czynniki rozwoju polskiej logistyki. *Logistyka*.
4. Coyle, J., Bardi, E., Langley, J. (2012). *Zarządzanie logistyczne*. Warszawa: PWE.
5. Coyle, J.J., Bardi, E.J., Langly, C.J. Jr. (2002). *Zarządzenia logistyczne*. Warszawa: PWE, 325.
6. Fertsch, M., Cyplik, P., Hadaś, Ł. (2010). *Logistyka produkcji. Teoria i praktyka*. Poznań: ILiM, 7.
7. Januszewski, A. (2008). *Funkcjonalność informatycznych systemów zarządzania, Volume I. Zintegrowane systemy transakcyjne*. Warszawa: PWE, 152.
8. Kłos, S., Patalas, J. (2004). *Rola ERP w transferze wiedzy i technologii, Realizacja systemów Wspomagania Organizacji SWO*. Katowice: Wyd. Akademii Ekonomicznej, 543-550.
9. Knosala, R., Gołda, G. (2007). *Komputerowe wspomaganie zarządzania przedsiębiorstwem: nowe metody i systemy*. R. Knosala et al. Warszawa: PWE.

10. Miłosz, M. (2011). Wdrożenie systemu ERP w ocenie użytkowników – studium przypadku. *Studia i Materiały Polskiego Stowarzyszenia Zarządzania Wiedzą*. Bydgoszcz: PSZW, 111.
11. Nowakowska, A. (2011). Wpływ projektów informatycznych na zarządzanie łańcuchami dostaw. *Studia i Materiały Polskiego Stowarzyszenia Zarządzania Wiedzą*. Bydgoszcz: PSZW, 175-182.
12. Nowicki, A. (2006). *Komputerowe wspomaganie biznesu*. Placet.
13. *Polityka jakości analizowanego przedsiębiorstwa X*, 2017.
14. Skowronek, Cz., Sarjusz-Wolski, Z. (2008). *Logistyka w przedsiębiorstwie*. Warszawa: PWE.
15. *System ERP*. <http://www.systemyerp.com.pl/system-erp.html>, 05.10.2019.
16. Szyszka, G. (2004). *Sieci logistyczne – nowy wymiar logistyki*. Polski Kongres Logistyczny – Logistics – 2004. Poznań, 19-21 May.
17. Taleb, N.N. (2013). *Antykruchłość*. Wyd. Kurhaus Publishing.