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AWARENESS AND THE ROLE OF INTEGRATED INFORMATION SYSTEMS FOR MANAGEMENT SUPPORT IN LOGISTIC COMPANIES

Turbulent environment forces logistic companies to process increasing amounts of complex information. This is hardly possible without the use of the latest and specialized IT tools in the form of integrated management systems. The aim of this paper is to disclose the awareness of the use, and capabilities of integrated systems, implemented in logistic companies, among managers in the Eastern Europe.

Keywords: integrated information systems for management; logistic companies; awareness.

Івона Станець

РОЛЬ ІНТЕГРОВАНИХ ІНФОРМАЦІЙНИХ СИСТЕМ У ПІДТРИМЦІ ПРОЦЕСІВ УПРАВЛІННЯ В ЛОГІСТИЧНИХ КОМПАНІЯХ

У статті показано, що сучасне нестабільне середовище примушує логістичні підприємства опрацьовувати все більші масиви складної інформації. Зробити це без застосування сучасних спеціалізованих інформаційних технологій практично неможливо. Представлено результати аналізу даних опитування менеджерів логістичних підприємств, що працюють по всій Східній Європі, щодо їх поінформованості про існування інтегрованих систем управління бізнесом, функціональності таких систем та ступеню їх впровадження у щоденну практику менеджерів.

Ключові слова: інтегровані інформаційні системи для управлінців; логістичні підприємства; поінформованість.

Рис. 1. Табл. 5. Літ. 15.

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РОЛЬ ИНТЕГРИРОВАННЫХ ИНФОРМАЦИОННЫХ СИСТЕМ В ПОДДЕРЖКЕ ПРОЦЕССОВ УПРАВЛЕНИЯ В ЛОГИСТИЧЕСКИХ КОМПАНИЯХ

В статье показано, что современная нестабильная среда заставляет логистические предприятия перерабатывать всё большие массивы сложной информации. Сделать это без современных специализированных информационных технологий практически невозможно. Представлены результаты анализа данных опроса менеджеров логистических предприятий, работающих по всей Восточной Европе, по вопросам их информированности о существовании интегрированных систем управления бизнесом, функциональности таких систем и степени их внедрения в ежедневную практику менеджеров.

Ключевые слова: интегрированные информационные системы для управленцев; логистические предприятия; информированность.

Introduction

Today we cannot imagine management process without integrated information systems of management. Systems covering all processes and functions of the organization, i.e. integrated systems, did not emerge until the 1990s. Their development proceeded on many tracks: the systems for support of accounting and finance and

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the development of systems for support of production and logistics were developed separately. Modern systems of enterprise management were created as a result of long-term evolution of theoretical assumptions and technologies offered by the IT industry. Since 2000, a key role in information management systems is played by business intelligence software. Its advantage is generating standard reports, calculating business performance indices, followed by formulating hypotheses based on them, and their verification through the screening of detailed cross sections of the prepared reports. Business intelligence software is not sufficient in case of some analyses, particularly regarding further environment. The ideal solution for business in today's turbulent environment seems to be competitive intelligence software which in its analyses takes into account business environment, as well as competitors' data. Hence, it allows the evaluation of a company's position against competitors.

In the professional literature the attention is paid to the advantages of the use of integrated information systems for management support, and assessment is made of their impact on the effectiveness of managerial processes. It is generally thought that outside corporate firms, employees and managerial staff have little awareness of the capabilities and usefulness of these systems in their work; on the contrary, in their opinion these systems hinder work and do not allow obtaining necessary information on time. The aim of this paper is to review the studies on the awareness of the use and capabilities of integrated information systems for management support. The overall objective of this paper is to increase managers' awareness on the usefulness of these systems and their capabilities.

Literature review

The inspiration for this type of considerations was the information presented in the work of W. Urbanek (2013), containing the results of the studies on the use of information systems for management support in international organizations, and opinions on their usefulness. Based on these considerations, the researchers came across the report by Gartner² and in the light of it they wanted to present an approach to information systems for management support in logistic companies in the Eastern Europe.

Today's business experience, as outlined in Gartner report, shows that having a high level of techniques and technologies or even high flexibility does not guarantee achieving, and most importantly, maintaining a satisfactory position at a market. Today, the assessment of the ability to compete, that has already been stressed by E.S. Buffa (1975), becomes appropriate efficiency of disposition and distribution of information in an integrated management process. It is the appropriate and appropriately communicated information that determines response to market needs and maintaining adequate performance; of great importance here is the management tool called controlling. Gartner report results emphasize that only through an effective, integrated information system it is possible to provide immediate information about the financial, cost and efficiency situation as it integrates information from all departments and company's processes for controlling purposes.

² Gartner's research release "Predicts 2011: New Relationships Will Change BI and Analytics," http://www.information-management.com/news/business_intelligence_BI_analytics_predictive_mobile-10019464-1.html [accessed online on 07/02/2013].

In the paper by G.M. Marakas, J.A. O'Brian, (2010), it is assumed that an integrated information system for management support is the major source of information which allow decision-making that shapes the current situation of the company and its further development. Moreover, it provides interaction between management systems and execution system, and affects the level of costs (by creating opportunities to take corrective actions to amend earlier decisions, or through providing communication between senders and receivers of information). The added value of an effective system is finding new material resources (raw materials, materials, energy sources or media).

R. Schiesser (2010) indicates credibility as the most important feature in the use of integrated information systems for management support, i.e. information obtained from the information system is based on the sources and methods of collecting information, verifiable as to their accuracy and reliability, as well as its storage and processing. T. Kotarbinski (1982) draws attention to the effectiveness of the systems used, and stresses that the system is efficient if it is effective (allows achieving the target), beneficial (brings benefits) and economical (the benefits of the system are higher than the costs incurred). The literature also highlights the following advantages of these systems (Magal, Word, 2011; Bradford, 2010; Phillips, 2012):

- availability – authorized users of the information generated by the system can obtain it at any time, from anywhere and from different devices;
- efficiency – the system provides sufficient efficiency while keeping other qualitative criteria;
- security – the system ensures the integrity of data sets and information, as well as their processing procedures, protecting them from unauthorized interference from outside and inside;
- intelligence – the system has built-in mechanisms, simulating human intelligence: inference, information processing, learning, responding to signals from the environment, simulating reality.

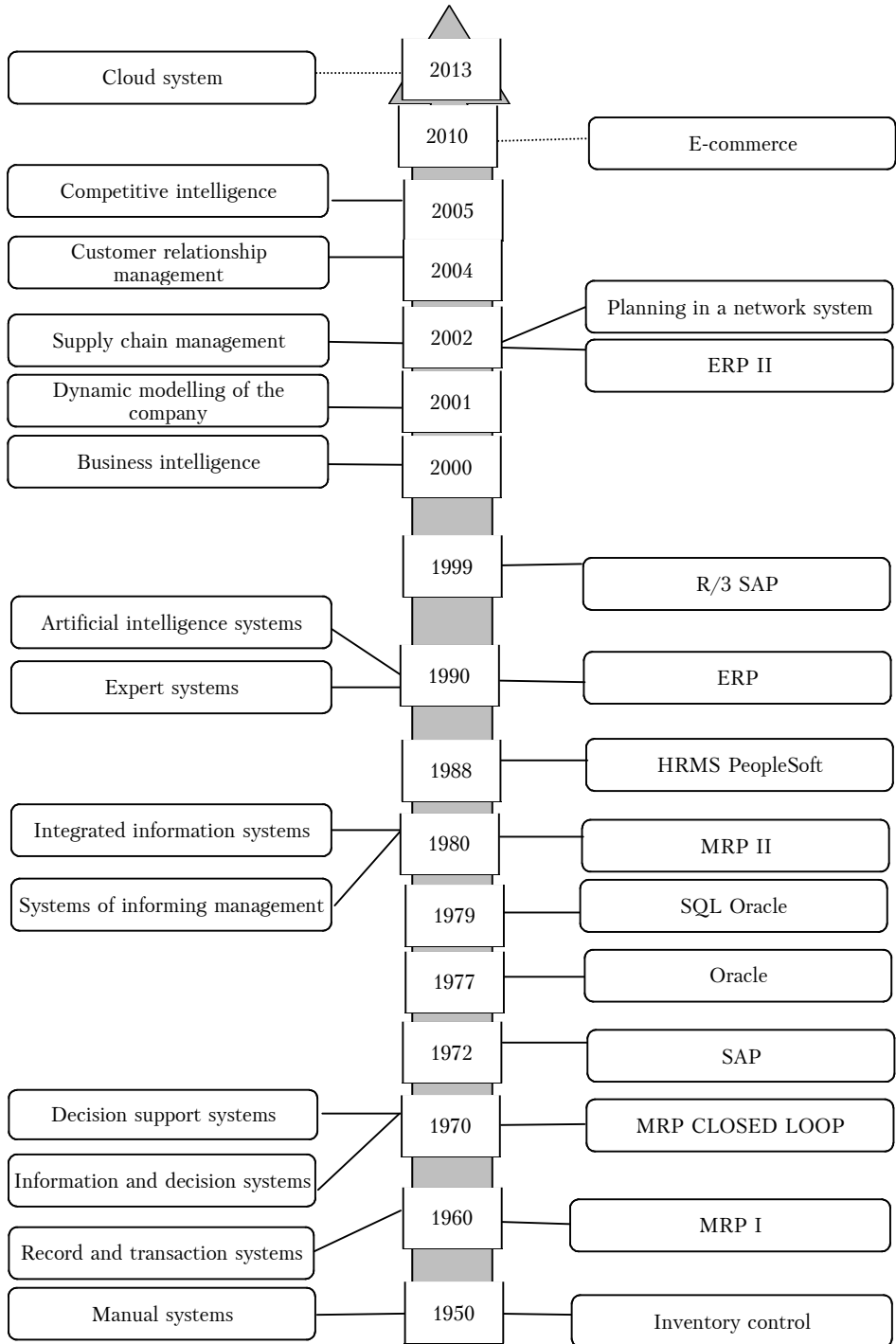
Figure 1 shows in a chronological way the evolution of management information systems, starting from the simplest and ending with the most innovative.

Innovations and prospects of created management information systems will go in the direction of cloud computing. Prospects for the use of this concept in the companies are presented in details in the works: T. Erl, R. Puttini, Z. Mahmood (2013) and J. Rhoton (2013). The Gartner Institute predicts that by 2015 cloud computing market will be growing at the rate of 19% per annum, and processing will increase 12-fold from 130 exabytes to 1.6 zettabytes.

The problem statement

The key objective of this paper is to identify the awareness and usefulness of information systems for management support in logistic companies. This will be achieved by determining, based on the research, the awareness among employees and managers of the capabilities of information systems for management support, and by determining their impact on the efficiency of companies.

So, the defined objective will allow achieving an overall applied objective, which are recommendations regarding the formation of awareness of capabilities of information management systems before attempting the implementation process.



Source: Developed by the author.

Figure 1. Chronological development of information systems for management support

In the first step of the research, the role and the function of information systems for management support from the point of view of literature analysis is revealed. The importance of integrated information systems for management support was emphasized and expectations, both quantitative and qualitative were verified. In order to show the level of use of integrated information systems for managing logistic companies, the research was conducted on the basis of secondary data from Gartner report, consulting firms' opinions, Panorama Consulting research and "Lodz – crucible logistics companies" research (Sekieta, 2012). Quantitative and qualitative research was conducted based on the data collected. The object of the study was the awareness of workers and managerial staff of capabilities of integrated management information systems and their impact on their work. The subject of the research was logistic companies. The research was conducted in the period from January 2012 to January 2013, and covered logistic companies in Eastern Europe operating at regional, local and international markets.

Theoretical considerations indicate that at logistic companies from integrated management systems the following is required: planning through defining a periodical plan (monthly, weekly); an operational plan (weekly, daily); estimating resource requirements; reporting through generating a report on the resources used; documenting every process through describing the preparation, specifications and standards; identifying at any time the key indicators defined for each process (KPIs), risk indicators (KRI), and control indicators (KCI).

Presentation of the research material

Consulting firms report the following as the benefits of full implementation of the ERP-class integrated information system at a logistic company³:

- improvement in productivity by approximately 10–19%;
- improvement of-timely delivery by approximately 95%;
- shortening the time of obtaining information by about 30–40%;
- increased profitability of companies by 50%;
- better use of the existing resources;
- reduced need for working capital.

However, in their opinion, they emphasize that the integrated information systems for management support, despite many benefits, should not be overestimated because they are not the ones who make decisions. This decision is in the hands of a manager and the system is only a transparent supporting tool. In addition, the discussed studies show that without the integrated information system for management support 30–50% of the working time of managerial staff at logistic companies is consumed by creating documents and presenting their contents at various types of meetings, discussions, negotiations, trainings etc. Thus, a primary contribution to implementation of integrated management systems at logistic companies is the desire to improve the work of managing staff who by using information from integrated management systems greatly save their time for other activities.

The reluctance to implement integrated management systems in the surveyed logistic companies results from the necessity for large investments in these systems

³ Quoted after Exc-Consulting Portal, MRP II class System, http://www.kajm.hg.pl/index.php?option=com_content&view=article&id=48%3Asystem-klasy-mrp-ii&catid=40%3Apublikacje&Itemid=18&limitstart=1 [accessed online on 06/02/2013].

and the delegating of staff to trainings. However, Gartner report⁴ indicates that 1 in 3 implementations of ERP in companies pays for itself, and companies who have this system and are convinced of its effectiveness spend annually about 20% of their IT budgets on introduction, development or standardization of ERP systems (as indicated by the data of 2011). Implementing companies give strong priority to defining the expected benefits as it helps to focus during the implementation on realization of those tasks, as a result of which the company can get the best return on investment.

At the strategic level it is related to changes in the relationships with partners (the transition from direct sales to content network) as well as to meeting requirements of the main partner (the implementation of EDI, the implementation of a corporate system). Moreover, the benefit group at the strategic level decides about the future image of the company. According to consulting firms, in case of logistic companies most important benefits are achieved by implementing a module for servicing of planning and control. Indirect effects of this action are⁵: an increase in sales by 1–3%, a reduction of the cost of returns by 2–5%, a reduction of the cost of defects by about 6%, the reduction of overtime by about 25%, the reduction of the cost of supplies and transportation by about 10%, the reduction of the cost of procurement by about 5%, the reduction of labor-intensiveness and scheduling by about 10%.

Interestingly, in the opinion of consultancies the least important benefit group constitutes operational activities, such as enabling the expedition of commodity at a specific time with a precision of 1 min., fast rescheduling after a failure to prevent the waste of resources; algorithms for calculating material requirements, the necessity to support bigger number of smaller orders or bigger diversity of products offered.

The Panorama Consulting research, the analysis of which covered 2000 ERP implementation projects in 61 countries, indicates that in logistic companies⁶:

- in 7% of cases new software reduced labor costs;
- in 28% of cases it was possible to close investments on time;
- in 72% of cases the implementations of changes absorbed more money and took longer than the schedule predicted, and the reasons for delays were people, not technologies;
 - the pace and the quality of work, and later the usefulness of the whole system were determined by attitudes, competences, motivation, information flow and mutual expectations;
 - the most common cause of failed implementations was the lack of involvement of top management whose expectations as to the methods of obtaining information from the implemented ERP systems differ significantly from the implemented solutions;
 - users appreciate the ergonomics of the interface, the ability to easier group- and optimizing information;
 - according to those users only a friendly and intuitive to use ERP system is a guarantee of the required logistic processes.

⁴ Gartner's research release, "Predicts 2011: New Relationships Will Change BI and Analytics," http://www.information-management.com/news/business_intelligence_BI_analytics_predictive_mobile-10019464-1.html [accessed online on 07/02/2013].

⁵ Return on investment in ERP implementation projects http://www.poksiniski.com/Strona_ERP_literatura.htm [Accessed online on 06/02/2013].

⁶ The findings are published in the article by M. Sikorski, "ERP as a strange game of chess" [in polish], *Businessman*. pl-2/2013, pp. 52-54.

"Inbound Logistics" magazine, which publishes the ranking of the top 100 logistic software providers⁷ for companies around the world, points out that as many as 78% of the logistic software providers increased their profitability by more than 5% per year, which is due to attaching even greater importance to software in logistics management. Studies confirm that the formula of software is changing because now software is not a commodity – logistic companies acquire IT service which can be accessed by customers via computer or cellular network (SaaS-Software as a Service). Thus, a supplier is performing updating operations, maintaining necessary infrastructure, application management and data protection (O'Reilly, 2012). The surveyed providers among other things mention:

- in 90% it was offered to manufacturing companies;
- in 90% it was offered to traders, mostly in e-commerce;
- in 86% was offered to transportation companies.

The conducted research shows that the most versatile software providers are Oracle, SAP and One Network Enterprises. They have large IT competence and knowledge of logistics at their disposal. They are the leading integrators of logistic networks and are able to design and manage any logistic network, taking into account the individual needs of customers.

The level of demand for computer-aided management in enterprises, the problems related to the implementation and use of these systems and employee awareness of the role of these systems were obtained under the research project "Lodz – crucible logistics companies". In the study there participated 239 representatives of logistic companies from the Lodz region, comprising of 46.85% representatives of manufacturing companies and 53.15% non-manufacturing logistic companies. The operating range of the analyzed companies is local, regional, national and global markets. 70% of the respondents declared using information systems in their business activities. They believe that choosing the right system depends on the needs of their enterprise.

The research shows that most companies, as many as 58%, use systems written on commission. 25% of the companies use systems that do not meet the ERP/MRP II standard, and only 17% of the companies use systems that meet the ERP/MRP II standards. Among the surveyed companies systems written on commission are very popular due to the implementation of the processes in a manner known to employees, the possibility to technologically adapt them to the already operating systems and the lack of licensing restrictions, e.g. regarding positions. 76% of the respondents emphasize the need to protect information resources of the company. Functionality and areas of use of computer-aided systems in the surveyed companies are varied. One of the aspects studied was transport services (see Table 1).

The surveyed companies indicate a very low demand for computer support in the provision of transport services. Only about half of the surveyed companies use information systems to provide services in external transport. Much larger percentage of companies (77.52%) uses computer support for their internal logistic processes. Low demand for computer-aided systems for internal transport results from the lack of employees awareness on the effectiveness and efficiency of these systems and even on the possibility of their use, as it was stated in qualitative research.

⁷ This research is conducted annually.

Table 1. The demand for computer support in delivering transport services

Transport services		
Transport services provided by the company	Is it computer-aided?, %	Is there the need for computer support?, %
External transport	44.95	7.80
Internal transport	77.52	7.80

Source: own study based on the research “Lodz - crucible logistics companies”.

73% of the surveyed manufacturing companies use information systems for management support for their business operations. The factors determining the introduction of information systems for management support in manufacturing companies in the Lodz agglomeration are shown in Table 2.

Table 2. Factors determining the introduction of information systems for management support in manufacturing companies

Factors determining the introduction of information systems for management support	Number of indications	%
Faster information flow	70	63.1
Better control of the company	57	51.4
Fewer errors	56	50.5
Increased effectiveness	53	47.7
Improvement of production processes	51	45.9
Better contact with contractors	50	45.0
The ability to monitor competition	13	11.7
24-hour customer service	10	9.0
The clarity of data	1	0.9

Source: own study based on the research “Lodz - crucible logistics companies”.

The dominant factor in the introduction of information systems for management support in manufacturing companies was the expectation of faster information flow. More than half of the surveyed manufacturing companies identified as the decisive factors better control of the company and fewer errors.

In the surveyed manufacturing companies, information systems for management support are used at different levels and encompass a variety of functions and processes. Information between workstations in the surveyed manufacturing companies is passed by using not only one method. Most often orally or by phone, of course with the aid of internal computer network. The frequencies of use of particular methods in manufacturing companies are shown in Table 3.

Table 3. Method of passing information between workstations in manufacturing companies

Method of passing information between workstations	Number of indications	%
Via internal computer network (e-mail, in-house messenger)	76	68.5
Using data carrier media	16	14.4
On paper	54	48.6
Orally	80	72.1
By phone	81	73.0

Source: own study based on the research “Lodz - crucible logistics companies”.

A surprising result of research is that 48.6% of manufacturing enterprises in the era of digital lifestyle uses paper and rarely data carriers as a form of communication

between workstations, despite the widely held view about companies leaving the paper form of documentation. This result can only be characteristic for companies operating in the Lodz agglomeration, or else is due to the overrepresentation of small businesses in the study.

Research confirms (see Table 4) that more than half of the manufacturing companies in the Lodz agglomeration use dedicated information system. 26% of the surveyed manufacturing companies use information systems that do not meet ERP/MRP II standard, and 17% of manufacturing companies use information systems that meet ERP/MRP II standard. These results for manufacturing companies are not significantly different from the results for the logistic firms as a whole. It is well known that for SME sector these systems are very expensive and this can significantly affect the results obtained.

Table 4. The IT support systems used in the surveyed companies

Used IT support system	Percentage of firms, %	Number of indications for manufacturing companies	Percentage for manufacturing companies, %
Written on order	58	46	56.79
System below ERP/ MRP II standard	25	21	25.93
System up to ERP/ MRP II standard	17	14	17.28

Source: own study based on the research "Lodz - crucible logistics companies".

The study pointed that the ERP programs received the title of "Application of the Year", awarded by Microsoft, in the competition for the best computer program supporting management of SMEs. The research shows that only 25% of the respondents were aware of this.

The study confirms that:

- 43% of manufacturing companies in the Lodz agglomeration use EDI (Electronic Data Interchange) in their business dealings;
- 11% of manufacturing companies in the Lodz agglomeration use mobile EBI systems (Electronic Information Database);
- 25% of manufacturing companies in the Lodz agglomeration use the modules of CRM systems;
- 11% of manufacturing companies in the Lodz agglomeration use RTLS (Real Time Locating System).

The research shows that manufacturing companies in the Lodz agglomeration use information systems for management support in external and internal transport services. In one third of the surveyed companies external transport is supported by an integrated information system. However, as much as 36% of the surveyed companies believe that supporting external transport with an information system is needed. In the case of internal transport, 1/4 manufacturing companies benefit from the support of the information system. The same number believes that support with integrated management system in this area is necessary. The study could not determine, apart from the cost barrier, why 3/4 companies do not use information support systems in these areas.

In the opinion of the respondents the implementation of information systems in manufacturing companies affected the operation of external and internal transport.

Subjective impact (measured on the Likert scale) of implemented management systems on business activities in the area of internal and external transport is shown in Table 5.

Table 5. Subjective impact of implemented IT support systems in manufacturing companies in the area of transport

Impact	External transport	Internal transport
lack	6	9
low	7	6
average	16	16
significant	13	10
high	8	9

Source: own study based on the research "Lodz - crucible logistics companies".

The predominant indication is that in the surveyed manufacturing companies the implementation of information management systems had an average impact on the implementation of actions in the area of internal and external transport. Above average impact on external transport was indicated by 21 companies (out of 50), and on internal transport – by 19 (out of 50).

The results demonstrate that system support of the areas of both external and internal transport is a still underestimated sphere of optimizing supply chains. It is known from the results of the studies that about 75% of companies considers using data cloud or prepares for its application because of the benefits and general availability, as well as mobility of knowledge and information.

Summary and directions for further research

The results lead to the conclusion that there is insufficient awareness among managerial staff and employees on the capabilities of integrated information systems for management support, about the functions performed by them and their impact on the efficiency and value added. It is worth noting that those who use systems are aware of their capabilities, effectiveness and impact on their work. Regarding logistic companies in Eastern Europe, it seems that only the requirements of their stakeholders will be incentive to their widespread use. As a part of further research, it is needed to identify barriers to the implementation of integrated management systems and means of counteracting them. Moreover, the evolution of these systems show that new directions of development of ERP-class management systems will refer to: Internet Supply Chain Management, XML-EDI, e-sales, e-procurement, CRM (Customer Relationship Management), GUI (Graphical User Interface) based on web browser, Collaborative Commerce (c-Commerce).

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