II. LOGISTICS CHALLENGES OF THE AUTOMOTIVE INDUSTRY

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INFORMATION TECHNOLOGIES SUPPORTING AND INTEGRATING THE FLOW OF INFORMATION IN THE LOGISTICS PROCESSES OF COMPANIES IN THE AUTOMOTIVE INDUSTRY

ABSTRACT

Background: To achieve market success, it is not enough to produce high-quality goods cheaply. First and foremost, one should take into account the proper customer service and the correct and quick flow of information in the logistics processes. This forces constant improvement of systems, processes and methods used. The purpose of the described research was to characterize selected IT technologies supporting and integrating information flow in logistics processes and assessment of their suitability and suitability in the logistics market in the automotive industry.

Methods: Using a research questionnaire, a study was carried out in 81 companies in the automotive industry in Poland. The anonymous research questionnaire contained 18 questions. The questions concerned mainly information systems and improvements in the identification of goods and well as the degree of satisfaction with them and a list of problems that occur during their use.

Results: The IT systems used in small enterprises are mostly: MS Excel (30%) and SAP (30%), in the second place is the GS1 (14%) and EDI (14%) system, while the third is the GPS system (12%). In medium-sized enterprises, respondents indicated that the ERP class system is most often used in 30% and EDI system in 4%, GPS system in 2.5%. In large enterprises over 50% of respondents indicated that the most common system in the company is the ERP class system (51%). The next place is the WMS system (21%). MRPII class systems (3%), SCM (3%) and DRP (2%) and MS Excel (1%) are the least used.

Conclusions: Enterprises taking part in the research, when using IT systems supporting logistics, notice many problems. The main is the low knowledge of the system, lack of adequate knowledge and training of employees and improper service. In the case of goods identification, it is the readability and failure rate of readers. Respondents stated that the implementation of IT systems improved the quality of customer service, the activities performed along with the acquisition of information took place in a much shorter time and the processes taking place in the company improved

Keywords: IT systems in logistics, IT technologies, logistics of the automotive industry, identification systems for goods

INTRODUCTION

Information Technology (IT) and its use in organization sand across the supply chain has become a determinant of competitive advantage for many corporations [Nair et al. 2019] The literature review clearly support the fact that supply chain performance is enhanced and improved with the implementation of ERP [Lenny et al. 2014]. The importance of IT systems for logistics management is growing rapidly in the automotive industry. The most complex are among them simulation systems. They present the results that can be obtained after introducing changes in the logistics process. The automotive industry is one of the most advanced when it comes to using IT solutions to support logistics. It was in the automotive industry that the "just in time" system was introduced as the first.

At present time, the speed of changes, modernization of processes and automation of information technologies forces entrepreneurs to constantly improve and adapt to the needs of the market. To make a profit and be a leader, it is not enough to cheaply produce high-quality goods, you need to take into account the appropriate customer service and the correct and fast flow of information in logistics processes. The market forces entrepreneurs to constantly improve and constantly improve their systems, processes or methods in order to gain competitive advantage and stand out on the market.

The processes taking place in the company, presented through reports, are called the information system [Adamczewski 2001]. This information system together with the organization of business processes additionally supported by IT solutions form an IT system. The information system is transformed into an IT system using information technology [Auksztol, Balwierz, Chomuszko 2012]. The flow of information between the sender and the

recipient takes place not only between companies, IT systems or employees, but also between clients.

The information system should be [Gołembska 2010]:

- reliable, should meet the requirements set for it at a given time,

- efficient, the ratio between expenses incurred for maintaining the system and the value obtained from the system should be at a satisfactory level,

- flexible, guarantee of reliability and efficiency in all conditions in the enterprise, ability to adapt to the changing environment,

- open, the ability to connect it to various information systems to ensure the flow and exchange of information between them,

- economically effective, to take into account the recognition of costs due to the system maintaining all of the above-mentioned features.

Information is a very valuable company resource. Is a starting point that extends the enterprise's information system. The role of information is to gain an information advantage, i.e. the ability to collect, collect, share and process information to overcome, for example, competition or improve processes.

There are various definitions and approaches to information in the literature:

- according to Nowakowski et al. [2010], information is a type of resource that allows you to increase knowledge about us and the world around us,

- according to Wiener [1971], information is not energy and does not matter, it is the content that we received from the world around us in the process of adapting our senses to it,

- according to Niedzielski [1986], information is an intangible asset and a factor that can contribute as a "meta-energy" to the transformation of the economy,

- according to Sienkiewicz [2005], information is a set of events, facts, features, etc., specific objects, e.g. processes, systems, contained in a message, which are given in such a form that the recipient can take appropriate action (physical and mental) to be able to respond to the situation, e.g. on the market.

Information, therefore, should be [Rokicka-Broniatowska et al. 2006; Nowakowski 2010]:

- control factor,

- an energy factor that influences human decisions,

- knowledge component,

- a good that is produced for the market to achieve its goals,

- independent of the observer, diverse, should be an inexhaustible resource and should be processed, transferred in time and space.

The exchange of information between the sender and the recipient is the only condition for the flow of information / data from the sending point to the final receiving point.

The information path from the sender - to the recipient and vice versa, should be consistent, accurate, fast and reliable. So that the customer knows what is happening with his order, he was properly served, and the company's employees tried to meet the customer's needs and realized it as soon as possible and information was provided in a comprehensible, error-free and effective manner between departments. The purpose of this research was to determine information technologies that support and integrate the flow of information in logistics processes, and to assess their usefulness and usefulness on the logistics market in the automotive industry.

METHODS

The research was carried out using the survey method.

The following division of companies in terms of size was adopted: small to 25 employees. Medium companies from 25 to 250 employees. Large companies employing from 250 to 2000 employees. Very large companies employing over 2,000 employees.

The anonymous survey questionnaire contained 18 questions. The first 5 questions concerned the so-called metric questions (age, form of business, size of the company, type and scope of operations. The next 11 questions were single-choice and the other 7 were multiple-choice.

The questions concerned IT systems and improvements in the identification of goods, as well as the degree of satisfaction with them and a list of problems that occur during their use. The questionnaires were sent to 500 automotive companies all over Poland by e-mail (via e-mail or via the link to the electronic survey). 81 companies from the automotive industry responded to the survey. Only 17% of companies answered to which surveys were sent.

This is a small percentage of responses to the number of surveys sent.

Enterprises and employees working in these companies are reluctant to provide information on information technologies used in companies.

Knowledge of the system used is often company confidential information and not everyone wants to share this data, even though the survey was anonymous. Many companies

have their own internal software and do not want this information to be available to other companies that compete with them on the market.

Tabular and descriptive methods were used to analyze the responses from the survey questionnaire. The Excel program was used to develop survey results.

During the analyzes, we treated SAP systems and ERP systems offered by other suppliers separately.

RESULTS

The summary of data on the age range of the surveyed people, the company's form of activity, the size of the enterprise, the type and scope of the conducted activity are presented in Table 1 They work in a company that employs from 250 to 2000 employees and is a limited liability company operating on the global market, dealing with production. Most people using information systems are in the age range 36-45 years.

Table 1. Summary data of the surveyed enterprises in the automotive industry

Age range of people surveyed (years)	Percentage (%)
18-25	11
26-35	29
36-45	31
46-55	20
over 56	9
Company form of activity	**Percentage (%)**
Private business	12
Private Limited company	70
Joint-stock company	16
Limited partnership	2
Enterprise Size	**Percentage (%)**
Small (1-25 employees)	14
Medium (26-250 employees)	21
Large (250-2000 employees)	59
Very large (over 2,000 employees)	6
Type of business	**Percentage(%)**
Transport	21
Trade	42
Production	52
Services	47
Range of business operations	**Percentage (%)**
Local	13
Regional	19
National	25
European	10
Worldwide	33

Source: own work

The IT systems most commonly used in small enterprises are: MS Excel program (30%) and SAP system (30%).The second is GS1 (14%) and EDI (14%), while the third is GPS (12%). Universal program such as MS Excel are mainly used in small enterprises, because

they do not generate large costs associated with their implementation. Compared to other systems, this tool can be easier to understand, easier to use by users and cheaper.

In medium-sized enterprises, respondents indicated that the ERP class system is most frequently used (30%). The second place is occupied by the SAP system (24%), then WMS (23%), Excel (9%) and ADC (7%). The EDI system (4%) and the GPS system (2.5%) are next. One of the companies uses an internal JET system specially created for its needs.

These data provide clear information that in larger companies that employ more than 25 employees, universal and standard systems are less used. The group of medium-sized enterprises has the largest diversity of IT systems used.

In large enterprises, the most common system in the company is again the ERP class system (51%). In the next place, the WMS system was chosen by users to a much smaller extent (21%). MRPII (3%), SCM (3%) and DRP (2%) and MS Excel program (1%) are the least frequently used systems.

In very large enterprises, where the number of employees exceeds 2,000, as many as 80% of respondents again indicated that the ERP system is used in the company in which they work. The second place is the GPS class system (8%), followed by the EDI system (7%).

The least companies use MS Excel program, only in 5%. Companies with many employees invest in systems developed for their own needs. They rarely use universal programs available for most companies.

Figure 1 shows the share of IT systems used depending on the size of the enterprise.

The ERP system is the system most often chosen by users and companies. This is in line with the analysis presented above.

It was not only mentioned by respondents working in small enterprises. This may be due to the fact that it is too expensive or too extensive a system that is unnecessary for companies employing from 1 to 25 employees. The GPS, EDI systems and MS Excel systems are the only ones indicated by all the sizes of the surveyed enterprises.
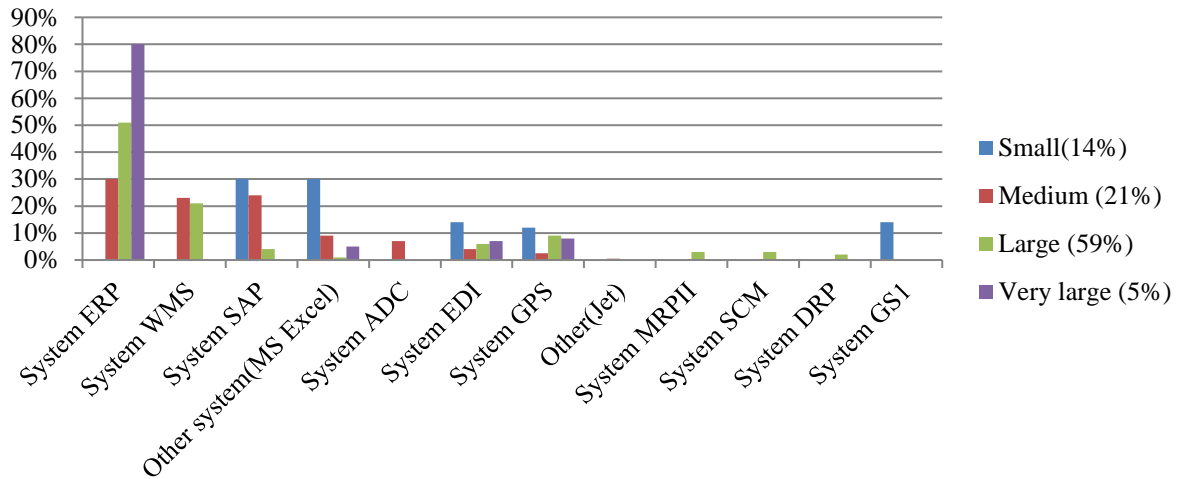
Fig. 1. Dependence of the type of IT system on the size of the enterprise. Source: own work

General systems least frequently used by the automotive services catalog are: MRPII system (1.8%), SCM system (1.8%), DRP system (1.8%), GS1 system (1.8%) and ADC system (1.8%). Systems such as the ERP class system (19.6%), WMS system (10.7%) and SAP system (7.1%) are the most popular. The results are presented in Fig. 2.
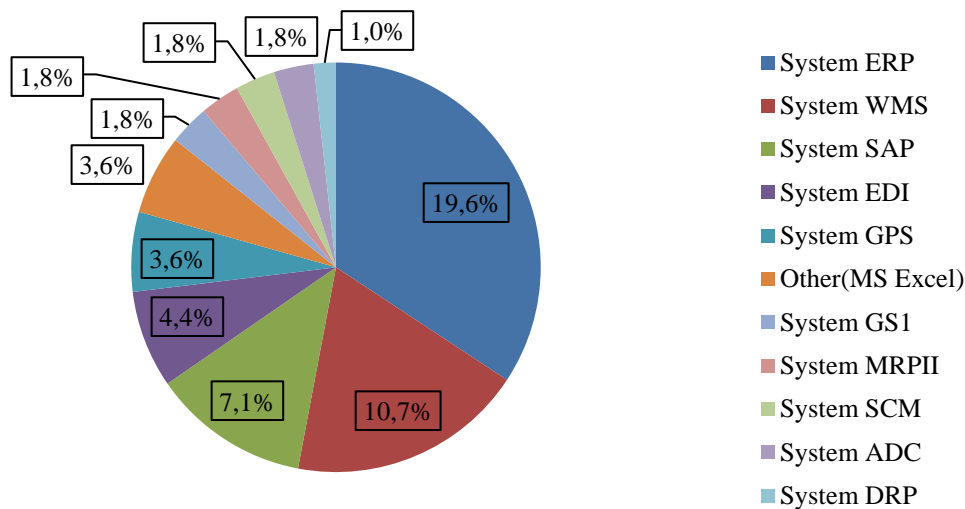

Fig. 2. Share of using individual IT systems in enterprises of the automotive industry. Source: own work

In the next question regarding logistics areas supported by IT systems in companies, the result exceeding 45% of the indicated answers concerns the areas of sales and distribution, production and material management. The sales and distribution area is computer supported to the largest extent, up to 74.5%. The least need for computer support concerns areas such as: work time records and renovation management (Fig. 3.).The presented results may depend on the fact that the majority of respondents answering the questions in the questionnaire

indicated the type of business activity of the company as production (57%), service (47%) and trade (42%). Therefore, the largest number of responses concerns sales and distribution, and production.
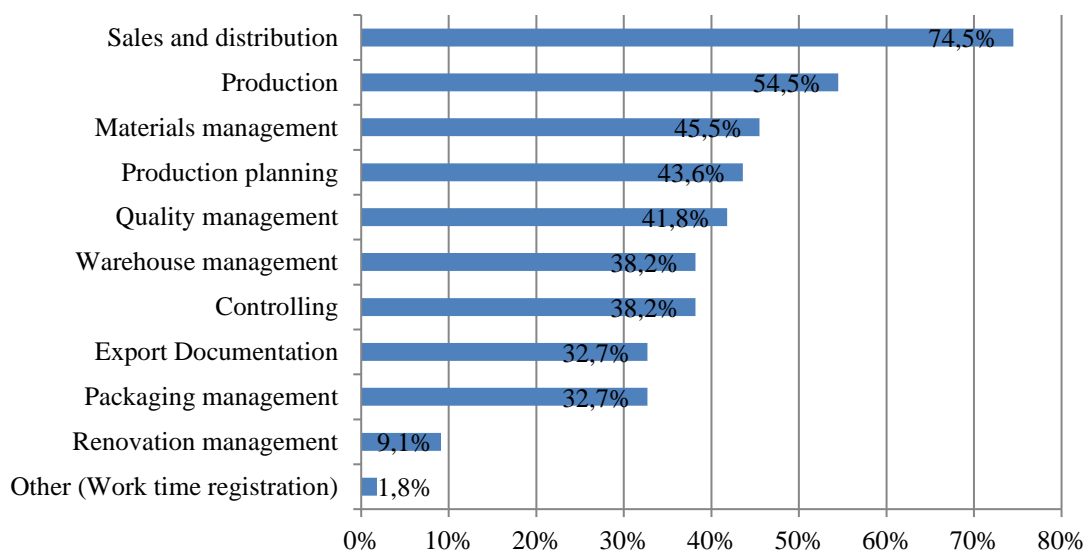

Fig. 3. Areas supported by IT systems in companies. Source: own work

From among 81 automotive companies participating in the research questionnaire, over 50% of them indicated that the biggest problems occurring during the use of information technologies are: "incorrect software support", "lack of appropriate employee knowledge" and "lack of appropriate employee training".

Less than 40% of respondents said that the problem is also "system failure", "administrator errors" and the least "hacker attacks" (21.8%), or that "the system is underdeveloped" (1.8%) and it needs to be constantly improved (Fig. 4.)The data shows that the main and most important problem that appears in enterprises is the lack of appropriate employee training. Employees are not properly trained and have difficulties in using company information technology. The main problem affects the others.

If employees do not have adequate training, they do not have full or transferred knowledge in this field. From this it follows that there may be additional problems, i.e. system failure, or errors in the system created by untrained users.
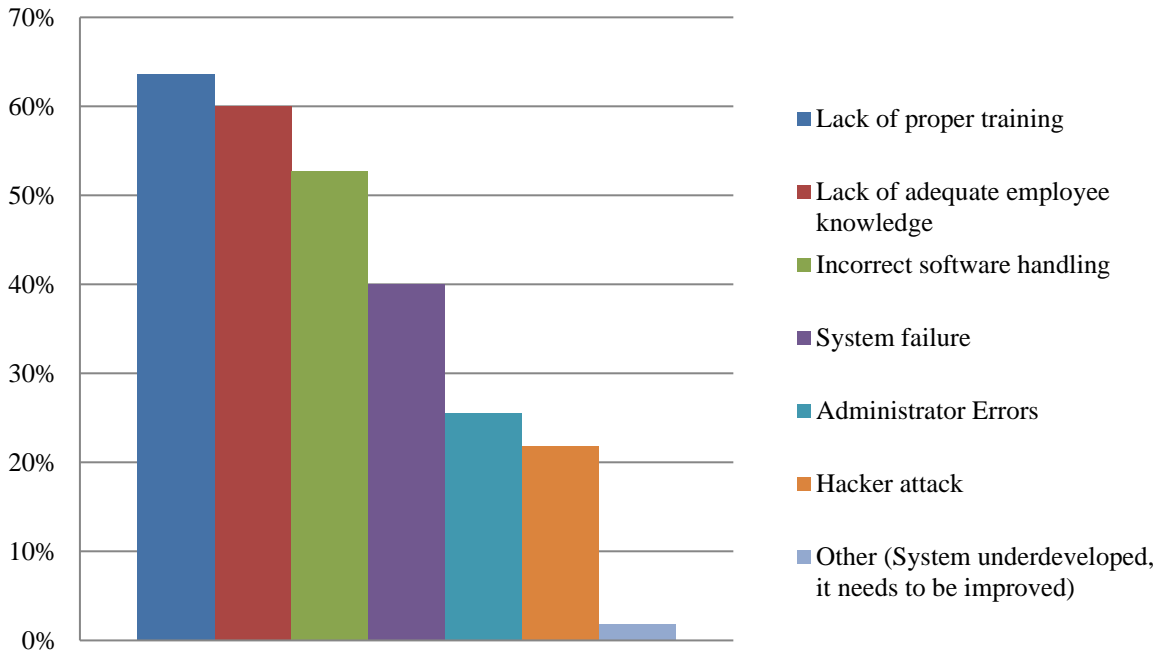
Fig. 4. The biggest problems occurring during the use of information technologies. Source: own work

Analyzing the answers regarding the problems that occur during the use of goods identification systems, we can conclude that the main and most worrying problem is "improper service" (67.3%).In addition, every second respondent stated that the problem is "scaners failure", "lack of appropriate employee training" (47.3%) and "lack of adequate knowledge of employees" (45.5%). The smallest problems, but also very important are "reading inaccuracy" (38.2%) and "database problems" (20%), as shown in Fig. 5.
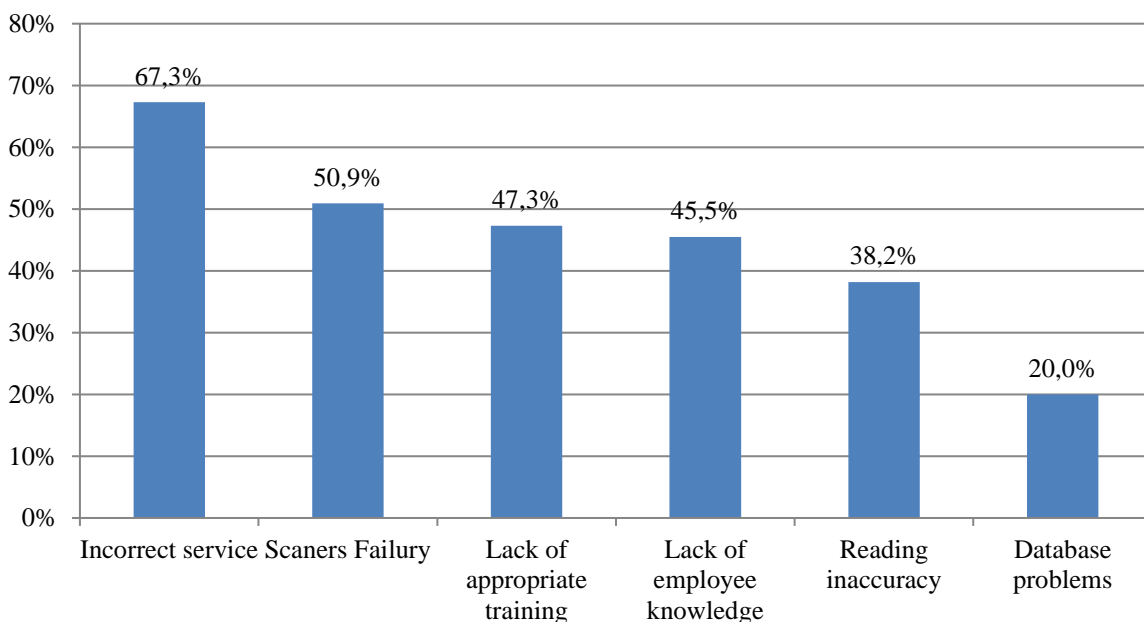

Fig. 5. The biggest problems occurring when using goods identification systems. Source: own work

The last question asked to respondents in the research questionnaire is: "Is it worth implementing new IT systems in the company?" The vast majority answered "yes".

71.4% said "yes, because they facilitate, speed up and support employees' work".

53.6% "yes, because they modernize and improve the company's operations".

Certainly the implementation of the new system is profitable for the employer because "the company achieves greater success" (35.7%), "the company does not differ from the competition" (33.9%) and "new systems are safer" (32.1%).

Only 21.4% of respondents believe that it is not worth implementing a new system in the company, because "it is very expensive", "you need to train employees" (16.1%) and that "implementation does not give major results" (5.4%).This is definitely a minority of enterprises participating in the survey that have a negative opinion on this topic.

Most enterprises are satisfied, and the implementation of a new IT system in the company, because it brings the expected profits and effects, and also affects the work of employees, making it more pleasant, easier and more professional for them.

CONCLUSIVE REMARKS

The analysis of the answers from the research questionnaire shows that the interest of small, medium, large and very large enterprises in modern information technologies and modern identification of goods in the automotive industry is at a fairly high level.

Enterprises participating in the survey are not completely satisfied with the implemented systems. They notice many problems and errors during their use.

The main problems were poor knowledge of the system, lack of adequate knowledge and training of employees as well as improper service and in the case of identification of goods, among others read inaccuracy and failure of readers.

The respondents pointed out that thanks to the implementation of IT systems, the quality of customer service has improved, activities performed and information acquisition took place in a much shorter time and the processes taking place in the company improved.

Many companies said that it is worth implementing new IT systems.IT systems improve the company's operations, facilitate and accelerate the work of employees, the company is more competitive in relation to other companies which increases the chance of success.

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