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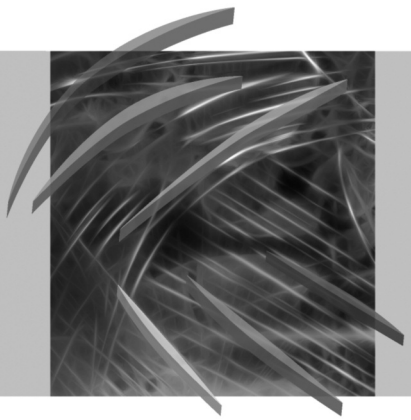
Information Systems in Business



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Information Systems in Business

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MANAGEMENT INFORMATION SYSTEMS FOR BUSINESS LOGISTICS. GUIDELINES FOR SME COMPANIES

Abstract: The paper presents the results of research on information system advancement of business logistics companies. The study was carried out among dozens of companies in Łódź region dominated by SME companies. In relation to IS advancement companies are classified into two groups. Group one: companies with intensive use of information systems support and wide range of services in their offer. Group two: companies occasionally using information system and narrower offer. Moreover, the market of information system for business logistics companies is presented and analyzed from the perspective of SME companies. Conclusion towards meeting customer needs is presented.

Keywords: business logistics, information systems, small and medium-sized enterprise.

1. Introduction

Business logistics is a growing branch of Polish economy, due to openness on common European market. One can observe huge foreign investments in logistic leading to enlarging storage space and multimodal centers [Brdulak, Archutowska, Żbikowska 2007]. Business logistics marketplace could be identified solely with well-known triad of logistics: supplier, logistics service provider, customer [Gammelgaard 2006]. Within the triad it is easy to associate logistics providers with the carriers. But nowadays, logistics service providers are not only involved in physical transport of goods between the successive stages of the supply chain, they offer their services as a complete link between the successive stages adding value to the product. They are called *3rd party logistics providers*.

It should be noted that there are 4th party logistics providers, who provide administrative support for logistics, leaving the physical movement of goods to other companies. Their presence on the market makes the consideration of the logistics triad not sufficient. So the business logistics can be divided into three groups:

– carriers,
– logistics service providers (3rd party logistic providers),

– intermediary companies in the provision of logistics services (known as 4th party logistic providers) [Gammelgaard 2006].

Even more complex look at the categorization of business logistics companies is presented by J.J. Coyle et al. [2003]. They show that functions of companies are divided into five categories: inventory/storage function, financial/information function, freight forward function, transport function, transport management function. Similar distinction is presented by A. Jeszka [2009], see Figure 1. Categorization distinguishes freight forward function, transport function, storage function, support services i.e. information, financials.

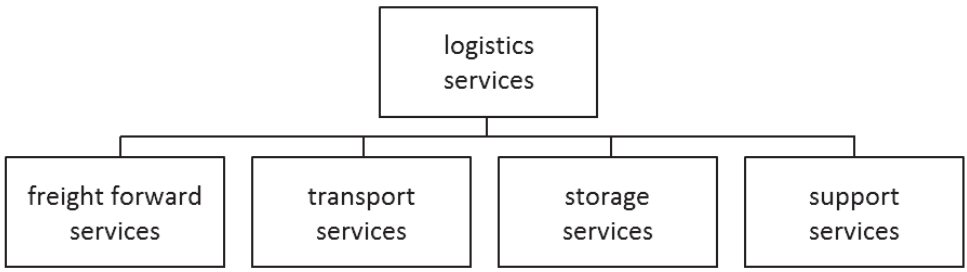

Figure 1. Breakdown of outsourced logistics providers

Source: [Jeszka 2009, pp. 59–60].

Both categorizations divide the service providers due to the business areas in which they may be involved, however, this division is rather of theoretical importance. In real economic activity functions such as financial services and warehouse functions cannot be separated. Besides, most logistics companies operate in at least two categories listed on Figure 1. Another division of business logistics based on the matter of actions is represented by I. Fechner and G. Cone [Fechner, Szyszka 2008]. They distinguish:

– railway transport and freight forwarding companies,
– road transport and freight forwarding companies,
– air transport and freight forwarding company and others,
– companies providing courier services,
– enterprise storage,
– logistics operators.

This criterion serves well to the business logistics market analyses. It depicts types of the companies. And almost every logistic company could be easily classified to one of these groups.

2. Business logistics market in Poland

Business logistics market in Poland has been growing rapidly, particularly since 2001. Regular assessment of the market, its situation, circumstances and observation of the players is made by School of Economics under the direction of H. Brdulak [Brdulak et al. 2007] and Poznań Institute of Logistics and Warehousing [Fechner, Szyszka 2008]. Value of Business Logistics Market is 18.57 billion zł (2010). In 2010 the value of the market increased by 15.4% in reference to 2009. Foreign companies are moving away from Poland. Market share of foreign companies dropped down from z 70% to 52% (2010).

From analyses carried out annually by these two institutions one can draw conclusions:

– the market of courier services is dominated by large companies with foreign capital;
– storage services market is also dominated by large players operating not only in Poland;
– logistics operators market is the place of competition for companies operating in other areas of logistics (look above). The main feature of these companies is continuous expansion of services and increase in number of customers, SME companies have to find their place and/or niche in this environment;
– growing interest in outsourcing of logistics services that gives the possibility of players from the SME sector to compete in the business logistics market.

3. The sector of small and medium size enterprises providing business logistics

In describing of the business logistics players, one can refer to the standard distinction of companies to small, medium-sized and large (depending on the number of employees and/or revenue). Most of the logistics market revenues are generated by large corporations, small/medium-sized companies are assigned to car transport activities and road freight forwarding. However, small and medium-sized enterprises of logistics services are a large group – which in addition to transport activities perform logistic service for small and medium-sized manufacturing companies. This is a niche where large companies have no suitable offer.

Business logistic market researchers predict that due to structural changes small and medium-sized enterprises have to undergo consolidation of the market (e.g. absorption by larger entities), or alternatively these companies have to focus on one specific type of activity provided as a subcontractor for 3PL operators [Rydzykowski 2007]. To stay on the market, these companies will have to adapt to changing conditions, among which application of information systems should be mentioned, namely the implementation and integration of systems.

4. Need for information systems

Computerization is necessary to ensure the sustainability of logistics chains in corporations and smaller companies to improve their competitiveness. The companies using the services of logistics operators (and other providers for the industry) argue that it is still too low status of computerization, and especially the availability of information by external users. Figure 2 represents the opinions delivered by 1500 companies expressing the demand for information systems and its current assessment of their logistics service providers. 50% of surveyed companies are not happy with their partners' information provision (studies have been carried out internationally, so you can expect that the results of the Polish market would depict even greater performance gap).

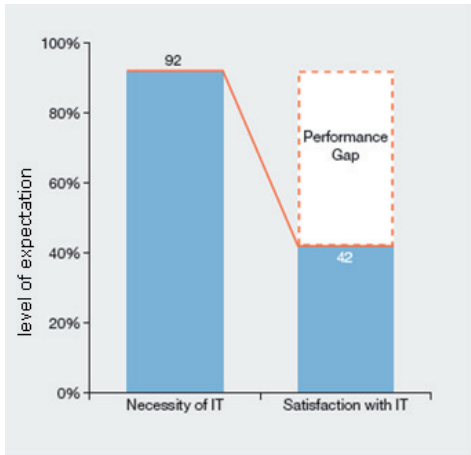

Figure 2. Expectations from business logistics towards IT service

Source: [Langley 2007, p. 28].

The opinions concerning availability of appropriate solutions, or systems supporting business logistics activity, are divided. Positive opinion is presented by W. Rydzykowski, who argues that the market is a broad spectrum of systems with different specificities, tailored to the needs of Polish companies in business logistic sector [Rydzykowski 2007]. On the contrary, both customers and companies themselves complain about the lack of appropriate software. Therefore, a research question arises: Is the software on the marketplace not appropriate for business logistic companies?

5. Management information systems for logistics

On the market there are different classes of applications for business logistics – the most important are SCM systems, ERP, WMS, TMS [Majewski 2006]. Other types of information systems, such as PDM, CAD, and accounting systems by definition are not related to logistics. In addition to integrated solutions, there are other industry specific solutions – among others: applications that support operation of systems, information exchange (stock exchange), electronic auctions, national tools to support transportation services (digital route planning trips), intelligent transport systems.

Another group of management information systems for logistic are small applications that cover a small, usually very detailed or specific area of business, which are not included in the large systems. An example application is a small program to account for drivers' hours. Another example is transport exchange applications which are directed to both shippers and manufacturing companies. The applications make it possible to find a carrier to free space in transport, as well as to select an additional charge to cover costs. Online auctions allow the selection of the cheapest solutions (especially for carriers). Another group are country specific applications to assist in conducting business. One such offer is a maintenance planning tool of transport routes accompanied by data on weather conditions on the route. It is made available on the website of the General Directorate for National Roads and Motorways.

The main classes of information systems (SCM systems, ERP, WMS, TMS) are discussed below.

5.1. Enterprise Management Systems

ERP systems are characterized by the fact that they cover all areas of activity enterprise including:

- customer service,
- production,
- finance.

The advantage of this type of software is comprehensive support for all departments. At the same time, the system has the ability to integrate with other applications that do not belong to the standard ERP solution. ERP origin is based on the method of Material Requirements Planning. It is based on documents such as sales plan and production plan as well as internal company data (bill of material). Within ERP a lot of planning activities are possible starting from simple materials requirements planning finishing with calculation of complex financial needs of the enterprise. The enabler of planning capabilities is complete transactional system implemented in ERP system.

Implementation of ERP system is in many cases beyond the reach of SME companies. It is preceded by costly analysis of the company and its requirements, so that the implemented system will be suitable for company needs.

5.2. Supply Chain Management Systems

This class of software builds on the ERP systems with the capability of supply chain management. SCM allows for optimization of logistic processes in the enterprise and beyond because of the availability of current and confirmed information on customer demand, demand for materials and action plans within a single integrated system, it is without the use of any additional applications.

Because the SCM allows to manage not only the enterprise but the whole supply chain, it requires much more data coming from different sources and different manufacturing distribution phases. For this purpose, before the introduction of SCM it is necessary to implement material identification systems and automatic data collection to keep track on materials. Electronic data interchange EDI is also necessary to share data among different participants of SCM. Usage of SCM therefore requires the introduction of bar codes or other tags, the use of identifying the location of the goods (for example, using GPS) throughout the supply chain, and acceptance of a common standard EDI. This is beyond the reach of SME companies unless the company is forced to become SCM partner.

5.3. Warehouse Management Systems

WMS class systems are designed to manage warehouse activities related to storage and movement operations. WMS is dedicated to usage by manufacturing companies and logistics service providers.

WMS is an extension of ERP systems and is limited to the issues concerned with the storage. WMS systems have similar to ERP inventory transactional system but are equipped in the spatial definition of the storage space and include the actual distribution of goods on the shelves. The WMS system allows for accurate inventory management, and quality of information and accuracy of information are higher. It is possible to plan storage for the future periods and plan transport within the warehouse. WMS allows the recording of warehouse operations and design of storage according to the defined strategy.

5.4. Transportation Management System

Transportation Management System is not always treated as a separate class of software. By some authors it is recognized as one of the WMS modules. Here it was described as a separate class of systems, because in such form they exist on the marketplace. TMS is a kind of software used to support transportation planning and creating freight forward documents and supervision of their implementation, followed by generation of costs calculation, leading to cost optimization.

TMS is therefore recognized as a complementary module of the ERP system, in which it is possible to fully support transport management based on a database of contractors, transport vehicles, drivers, etc. The simplest model of this system allows the planning of transportation, shipping and preparing the necessary freight forward

documentation. As an extension of the system it is possible to plan routes based on a digital maps using GPS system, etc. If TMS is implemented as a part of the WMS, it also has a database of standard products and packaging in order to better organization of transport.

The above paragraphs described categories of systems supporting logistics. Systems classified as ERP, SCM system are not taken into account for further research, since they are not unique for business logistics required by SME.

6. Research project

6.1. The aim and object of study

For the purpose of this paper a survey was carried out. It was directed to 68 small and medium-sized companies in the Łódź region. According to the survey, companies deal with one or more of the following activities:

1st transport,
2nd shipping,
3rd storage,
4th customs services,
5th courier services,
6th other logistics services.

The formal criterion for testing was a reference to the basic business activity classified according to the Polish Classification of Activities (PKD) 49.41, 49.42, 52.10, 52.21, 52.24, 52.29.

In the Łódź region there are about 600 companies with activities related to business logistics. According to GUS data (Information Centre of the Łódź Region – www.stat.gov.pl), in the Łódź region's small and medium-sized enterprises represent a majority of the market of logistics services. Contact to 420 of these companies is presented in the Internet, but only 68 companies can be contacted by email, only 12 have a website.

The sample constituted all-party logistics providers (i.e., transportation, freight forwarding, warehousing, customs agencies, courier services), the contact with whom has been made possible by electronic means.

The aim of this study was to analyze and interpret the use of software logistics management support for small and medium-sized enterprises from business logistics sector in the region. This objective translates into three tasks to complete:

1) analysis of small and medium-sized logistics companies in the Łódź region,
2) analysis of the software that support the use of logistic processes,
3) identification of incentives and constraints to use the software: motivations and barriers – factors motivating and restraining from the use of software, awareness of industry-specific solutions.

6.2. Research results

The outcome of the research depicts structure of business logistic sector on the example of province of Łódź. Figure 3 shows the distribution of income between different areas of activities.

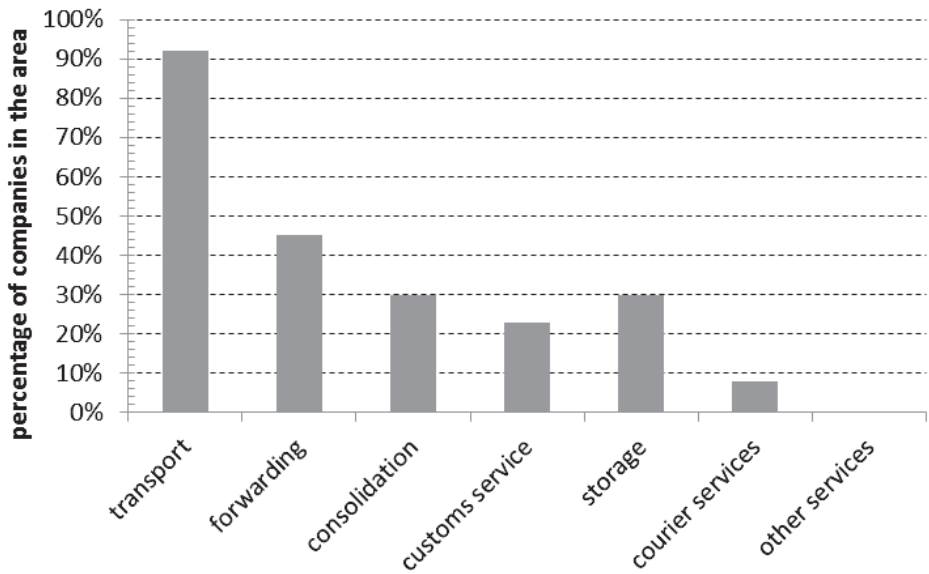

Figure 3. The scope of business activities

The biggest share is achieved in the field of transport – an average of 78% of revenue comes from this type, other areas do not exceed 50%. It is associated with the specialization of services – companies working as subcontractors to the customs of other companies, and another character of customs services (in cooperation with companies only on the international market). Revenue from forwarding does not exceed 35%. It is closely connected with the provision of transport services which are the core of business logistics companies surveyed – all companies associated with the forwarding, transport services in only one case has been declared to higher revenues from freight forwarding activities than transport. Income from other services compared to total revenues is small.

Although 46% of surveyed enterprises declare the use of software supporting logistics processes, most of them use small pieces of software, not involving fundamental processes of the company (for example, applications to control working time for drivers with regard to the Act on working time of drivers). Only 23% of companies use software that fully corresponds to the activities carried out by them. Only one company has a piece of software created especially for them, designed according to their guidelines. Also one company uses MS Excel sheets prepared by employees

of the company, allowing to plan and control the activities of transport and forwarding. Other companies have not admitted to usage of logistic software supporting the management of their business. Figure 4 shows the use of logistic applications.

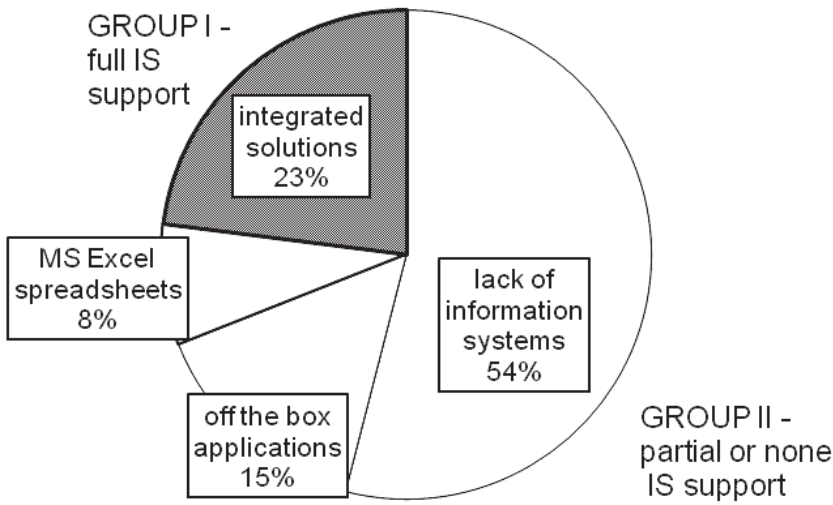

Figure 4. Usage of computer based information systems

Companies with full information system support were classified as Group I. In this group there are companies that have complete systems tailored to their needs, either as designed for each system (dedicated), or as a standard solution. These are companies with a wide range of activities they deal with almost all logistic processes including freight forward function, transport function, storage function, financial services. A second group of companies has different configurations of logistics software. They do not support management with integrated software, they rely on ad hoc prepared spreadsheets, or do not have any IT/IS support for logistics processes.

Some of the surveyed companies were not seeing any profit for usage of information systems. They declare low interest in usage of information systems because of low profit-loss margin (38%). Low suitability of the architecture of the software was declared the second reason of low interest (31%). The third barrier is lack of compatibility with accounting systems (15%), the fourth barrier was fear of costly maintenance and training (15%). Some of the companies declared no knowledge about information systems support for business logistics. Based on that the question arises whether these statements are rational. So this was a challenge to describe the offer of software houses for business logistic as an answer to these questions. Fourteen software houses providing such software were selected. Their offer was scrutinized through a list of selected groups of functions. Namely freight forward list, fleet management list, inventory management list, customs list, HR including driver work

time management list, additional functions list including route planning and control via GPS is isolated as a separate group.

6.3. Management Information Systems for business logistics

Table 1. List of software for business logistics on Polish market

CarLo – Soloplan product, the modular design allows for comprehensive management of shipping and transportation company. Each module is very powerful, allows extension of databases. The company provides comprehensive assistance for their clients.
Compass Transport and Forwarding – is a complete management system forwarding process, from initial contact with the contractor and ending with it being informed of the arrival of the goods and send the invoice. Based on an extensive set of forms and schedules, organizes it and provides shippers work is always up to date information.
Eurotrans 2000 – Trans Soft's product, the product is entirely Polish, adapted to economic realities and national standards. The system was designed and created by people associated with the problem of transport for many years. Each new version of the product includes both adaptation to changing laws and creating new functionality to increase the ergonomics of work.
InterLan Speed + clo – InterLAN company specializes in producing software for Transport Shipping and Logistics companies, to assist company management in the use of transport and freight forwarding and groupage loads, fleet management and accounting of working time for drivers and transport planning and optimization. The program has a lot of functions.
Menedżer pojazdów – Vehicle Management Software, mileage counter, records of the vehicles, traffic card and hours. The program for the settlement of transportation and machinery. Storage of fuel and parts, analysis of repair, damage of vehicles and operation of vehicles in the division for drivers, types. Insurance management, the validity of vignettes, review the warranty period.
PasCom Transport II – PasCom company operating on the Polish market since 2001, offers a solution for Business Logistics. This application, like most complex solutions, has a modular structure. The manufacturer offers such benefits as reduced costs, decision support, time saving.
Qguar – modular program, offers a wide range of additions. It supports the operations of logistics warehousing, both in the processes of storing the goods, as well as own service stores. Qguar WMS PRO includes a huge set of specialized functions.
Rokos – Marcos Bis – A very comprehensive program to support transportation, freight forwarding, and heavy construction. The company operates in 16 years and during that period range of services were improved.
Sigma-S Transport is designed for businesses wanting to record and trace the costs associated with the use of vehicles. The program is not intended for shipping companies due to lack of the use of tachographs.
spedTrans Sql 4.000 is an integrated system supporting the management of freight forwarding and transportation. It is also an excellent tool for manufacturing and trading companies that want to automate company's logistics processes.
Speed 2 SQL – a program to support domestic and international freight forwarding. The company already has nearly 10 years of experience in building applications dedicated to forwarding and transportation. It includes the preparation of orders, waybills, settlement, invoicing, payment control of registration of profitability, management of own transport.
TachoAnalizer is a program to analyze data from digital tachographs and driver cards and analogue tachographs.
Ts sql – another program that uses technology with SQL and modular architecture. It consists of three parts: a SQL database, the TS site service program, usually installed on the same computer (server) as the database.
WinSAD – is designed to carry, store and print customs documents certificates of origin, summary declarations, and to issue VAT invoices, ECS, netting in transit security, a comfortable generation of Intrastat declarations and – with additional modules – filling documents INF1-9, T5, WPR1, CIM, SMGS, ADT and UDT, TIR, CMR consignment notes and certificates of ATR.

The results of the analysis of software market offers for business logistics can be found in Table 2. The analysis was performed by defining more than one hundred of potential requirements from the system and grouping them into six categories specified in column headings.

Table 2. Summary of selected applications for business logistics

Producer	Software application	Freight forward management	Fleet management	Inventory management	HR management	Route planning (GPS)	Customs
InterLan	InterLan Speed+, cło	full	full	partial	partial	full	partial
Quantum System	Qguar	full	partial	full	partial	none	none
SoloPlan	CarLo	full	partial	none	partial	full	none
Marcos Bis	Spedycja + Rokos	full	full	none	full	none	none
PASCOM	PasCom Transport II	full	partial	none	partial	full	none
SOFT TRANS	EuroTrans2000, Transport	full	partial	none	partial	none	none
CARMEN	eCar	partial	full	none	partial	none	none
Rutkowski	TS Rutkowski	partial	partial	none	partial	partial	none
Pel.pl	Speed 2 SQL	partial	partial	none	partial	none	none
Merge	4Way	partial	partial	none	partial	none	none
Software-Project	Menedżer pojazdów	none	full	none	partial	none	none
COMPASS	Transport i Spedycja	partial	partial	none	partial	none	none
CAS	Win Sad	none	none	none	none	none	partial
DPK SYSTEM	Tachoanalizer	none	none	none	none	none	none

Most of the software in the summary is of Polish origin. Soloplan GmbH – a German company specializing in programs for logistics and planning is one of examples of foreign software.

One of the major producers of the software for business logistic is InterLan, a Polish company, operating since 1991. The main product Speed+ is dedicated to small and medium-sized enterprises. This company could be seen as market leader of transport management systems.

By analyzing individual records in Table 2, it is apparent that the market provides the whole range of systems to choose from, and business logistic companies searching IS support have wide choice of software suitable for their needs. No software system meets all customer needs. The broadest range of functionalities identified in Table 2 has InterLan Speed+, and other programs are presented in order of decreasing range of functionalities, until the last programs have virtually no required features outlined in this paper.

7. Conclusions

The research shows that the area for expansion of information systems into business logistic branch is large because only limited number of companies are using IT support. The offer of the software houses is broad and on different levels of advancement. Guidelines for software houses include the advice to enlarge the number of accounting systems their software cooperate with. More effort should be put in the development of training material to facilitate software usage.

On the other hand, it becomes apparent that there is a substantial obstacle in the development of IS support. This is due to the fact that most Polish companies are competing in transport function only, without plans to develop the business to become a third party logistics. The impulse for the development of information systems business logistics is expected from the awareness that customers have large expectations concerning information feedback and are willing to pay more for full logistic service.

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OPROGRAMOWANIE WSPOMAGAJĄCE ZARZĄDZANIE W BRANŻY LST. PRAKTYKA PRZEDSIĘBIORSTW SEKTORA MŚP

Streszczenie: Artykuł zajmuje się problematyką wsparcia informatycznego branży LST (Logistyka-Spedycja-Transport). Badany jest poziom zaawansowania systemów informatycznych w tej branży. Badaną grupę stanowiły wybrane przedsiębiorstwa MŚP z regionu łódzkiego. Odnaleziono związek pomiędzy dobrym wsparciem informatycznym firm z dużym wachlarzem proponowanych usług a słabym wsparciem informatycznym firm świadczących wyłącznie usługi transportowe. Sprawdzono, czy deklarowane bariery stosowania systemów informatycznych mają uzasadnienie. W tym celu dokonano przeglądu dostępnego oprogramowania. Wskazano możliwe kierunki wprowadzenia ulepszeń.