

Information Technologies in Logistics Services. Case Study

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Abstract— This paper presents a theoretical and empirical considerations about the use of Electronic Freight Exchange in the transport. An essential role in monitoring, coordinating and optimizing the operation of motor vehicles is played by telematics systems, which are used in Electronic Freight Exchanges (EFE). This computer tool facilitates and accelerates logistics services definitely. It is also responsible for creating new business relationships. The main aim of the article is to identify the most important benefits of EFE in logistics and present how does it work in practice.

Keywords—telematics, Electronic Freight Exchange, transport, information exchange

I. INTRODUCTION

The situation on the local and global markets of commercial transactions is very dynamic. More and more frequently, enterprises use IT tools to carry out transactions with contractors in supply chains in the electronic form. The importance of electronic exchange of information via the Internet is steadily increasing, which brings about a reduction in the time of conducting a transaction, global range of operation and an increase in flexibility and reliability of these activities [5]. Due to the application of electronic commerce (e-commerce) in trade, e-business is developing robustly and dynamically. Permanent development of knowledge allows enterprises to use some innovative solutions in the areas of: information technology, telecommunications and production techniques and technologies. As a result of these changes, the integrated management systems of logistics services came into being. The main advantage of the integrated management systems of logistics services is the improvement in the effectiveness of their operation. An essential role in monitoring, coordinating and optimizing the operation of motor vehicles is played by telematics systems, used in Electronic Freight Exchanges (EFE).

II. TELEMATICS IN TRANSPORT

Telematics amounts to telecommunications, IT and information solutions and automatic control methods, which are adapted to the needs of the supported physical systems. Physical systems are installations created as a result of the performance of a specific activity, devices and people operating them, users, and also the environmental conditions, namely, the natural, economic and formal and legal environment. The term “telematics” is most frequently

combined with an adjective specifying the area of its application, e.g. transport, medical, industrial, operational telematics [13].

Telematics in transport consists in providing information and communication using wireless technologies. The main objectives of telematics in transport are [11]:

- to support carriers and distributors in eliminating and reducing delays, too long detours and unplanned downtime,
- to support in avoiding too congested transport routes by directing to alternative roads,
- to reduce the risk of accidents,
- to support travelers by providing information on timetables, connections, changes in courses of public means of transport,
- to increase productivity by reducing (additional and basic) costs,
- to reduce pollutants emitted by vehicles.

The condition to achieve the objectives of transport telematics is constant and regular update of information available and used in the system. In the operation of transport telematics systems, it is essential to promptly respond to changes in weather conditions or traffic congestion. Transport telematics refers to the movement of people and loads using specific means of transport. Telematics services came into being with a view to transport companies but they are also used by clients of these companies. An example is, among others, delivery firms which enable the clients to observe the course of the delivery process of the commissioned consignment on websites.

The frequency and scope of the use of telematics in road transport are increasing steadily. Transport telematics improves transport company management, performance, transport planning and safety, and reduces negative impact on the natural environment. Telematics systems make use of different devices and applications: mobile networks and the Internet, satellite and radio communications, geographical databases, road databases, satellite navigation systems, traffic monitoring equipment (sensors, detectors, cameras, radars), weather monitoring equipment and devices for data transmission to the transport system users [9]. A popular and most frequently applied device in road transport is GPS navigation. The key element of the effectiveness of the navigation is the current update and a very accurate representation of the system of transport infrastructure. However, using only navigation by transport companies

does not allow them to determine the optimal option of the route, which is the source of fuel economy and drivers' working time saving. For transport companies, it is important for the navigation to be an important link of the transport management system in which the shipper, after selecting the route, provides the driver with the information on their choice. The navigation system consists of the three basic functional elements: satellite segment, surveillance and users.

III. EFE – THE CONCEPT AND THE ROLE IN TRANSPORT

Electronic Freight Exchange (EFE) is an information exchange platform between carriers and shipping companies, aimed at facilitating and improving communication and speeding up the conclusion and execution of transactions in the transport industry. An important method to increase savings connected with the operation of transport companies is reducing the presence of empty or incomplete runs of trucks. To improve the effectiveness of the operation of transport companies there are used Internet platforms where there are freight exchanges. The Internet platforms enable the access and exchange of information and entering into transactions, referring to free loads and loading space with the participation of transport, shipping and production companies. Depending on the area and the range of operation, it is possible to distinguish: local, national and international freight exchanges.

In reference to the freight exchange, there can be distinguished two basic elements [1]:

- cargo exchange, which includes the transport offer, that is, goods for carriage,
- vehicle exchange, which contains information on free loading spaces and free runs.

The main task of freight exchanges is to collect orders, share and present the transport offer and information on the free vehicles and to manage the order database from the formal and organizational point of view.

There can be identified two systems of using databases [1]:

- offline freight exchanges – where it is necessary to connect to the database to gain or/and send own offers, then, the connection is ended. The process of introducing own offer takes place before and review of the offers usually after making the connection, when it is already updated. This form of organization of freight exchanges is most frequently used by people who have the Internet access via modem since they bear the cost of the actual connection time, which brings about the possibility of cost reduction.
- online freight exchanges – they consist in transferring own service offers and following the resource of offers already existing in the database of the system, at the time of the Internet connection. This way of organization of freight exchanges is most frequently used by users bearing the costs of Internet connections in the form of the fee, where the fee does not depend on the connection

time. It should be noted that it is a very comfortable and economical way of using the database, which is disposed by the freight exchange.

In Europe, there are more than one hundred different freight exchanges. They are constituted by both small, often free portals and the specialized freight exchanges with a small number of recipients, as well as the European giants in this field, with thousands of users.

“The largest from among the European freight exchanges - Trans.eu. has about 200 thousand users. The next largest freight exchange in the ranking is TimoCom, the services of which are used by most of the German market. An essential supplement to the possibilities of the European freight exchanges is the French exchange - Teleroute. In Europe there are also popular the exchanges from Lithuania (Cargo Lt) and Czech Republic (Raal), but they mostly provide services to the local market [2]”.

On electronic exchanges there are registered shipping, production and transport companies with a diverse resource of cargo trucks. Among cargo trucks there are trucks with a mass of 1.5 tons and tractors with semi-trailer weighing 24 tons, and also custom vehicles, or the ones used for carriage of dangerous goods. On account of a large number of transport companies using the exchange, the shipper does not have a bigger problem with finding specific transport for each type of cargo. Also, the carrier notes an increase in the performance and effectiveness of their transport activity by eliminating or reducing empty carriages, and optimizing the time and routes of the carriage.

The exchange is a huge contact database with the national and foreign companies, which creates an opportunity for the acquisition of standing orders and the establishment of relatively stable, repetitive business relationships with the same contractors. The exchange is an effective tool for the shipper which is an intermediary between two companies: the one possessing the load for carriage and the one providing the carriage. It is also the tool for the shipper which, through the exchange, may find a transport order for a single route and the load for the route back. Carriers also use the exchange very often to find added load, that is, in a situation when they do not have used full loading space. Also, producers who do not dispose their own means of transport and must send their goods to specific destinations are the ones who use the freight exchange. An additional argument, which is significant for manufacturers, is: lower transport costs than shipping costs, which justifies their interest in freight exchanges. Freight exchanges are used both by large production companies and small ones, with a few employees.

IV. THE PRINCIPLES OF EFE OPERATION

Electronic freight exchanges have become a common tool used in the activity of transport and shipping companies. These systems enable posting and the availability of information on loads and free vehicles and loading space. The detailed description of a specific offer and the identification of some relationships are possible due to the appropriate computer application.

“The fundamentals of the construction and operation of electronic exchanges are largely analogous to the construction and operation of other e-business services (e.g. e-stores, auctions). They refer to the documents and ways of communication used in business processes of electronic exchanges. In case of circulation of documents on electronic exchanges, there is assumed: total elimination of documents on paper (e.g. offers, orders, contracts, invoices) and replacing them with electronic documents and electronic acquisition of information, e.g. by electronic forms [...]. In the area of communication on electronic exchanges, the following are aimed at: the elimination of traditional direct meetings (so called “face to face” meetings), organizing only virtual meetings [...], the broadest possible communication automation [...] as well as organizing video-conferences [12]”.

Electronic freight exchanges are a very popular kind of exchange of B2B type, that is, they combine the two parties: shipping companies and transport companies. By means of freight exchanges the company which has a means of transport can find a corresponding offer without a search engine.

The advantages of electronic transport platforms [10]:

- they improve the external communication of the company,
- they make it possible to manage all loads and direct information on the freight to particular recipients,
- they can be treated as platforms for streamlining communication with clients and collecting transport orders,
- they enable access to pan-European freight market,
- they facilitate the effective controlling of all dispatchers working in the system,
- they save working time since it is possible to simultaneously communicate with a number of potential contractors,
- they enable global freight management (the information on all loads is in a single system),
- they contribute to savings in fuel costs and car service,
- they reduce the costs of administrative and office support in shipping companies.

Moreover, freight exchanges improve the performance of transport companies by reducing “empty returns”. Freight exchanges make it possible to find cargo pursuant to the offered loading space, e.g. for deep-frozen products or the carriage of live animals. The advantage of exchanges is also round-the-clock access to offers and their actual current timeliness. A big advantage is also the fact that it is possible to make use of the exchange using a mobile phone.

The basic principle of the operation of cargo exchange and loading spaces is the fact that it operates online. Everyone who disposes of means of transport and does not have a load for carriage, or has a load but they lack free means of transport, may search for contractors on the freight exchange using a computer, a tablet computer or a telephone. Most freight exchanges possess significantly streamlined options of entering information concerning the offer, since an accurate, detailed description of a specific

order is very important as it accelerates and facilitates the successful search for the contractor and entering into the transaction.

To ensure the safety of the course of the service and the settlement of the transaction through online platforms, its supplier must apply appropriate remedial measures. This, most of all, refers to large freight exchanges which cannot afford to unprofessional behavior. “Freight exchanges aim at increasing the safety of their Internet platforms and the transactions conducted there. The companies using the systems available on the market, most of all, are afraid of cargo loss (shipping and production companies) and delays in payment (transport companies). Taking into account the concerns of their clients, the owners of Internet platforms provide appropriate security packages in two areas: transaction security and data security [7]”.

Transaction security is guaranteed under the system of assessment of the company before listing on the exchange, i.e. the analysis of the final situation of the potential participant of the exchange, the date of registration of the business activity and references from the previous contractors. Moreover, freight exchanges introduce the system of assessment of the exchange participants, by means of which it is possible to evaluate the quality and reliability of the load ordering party, which is the participant of the exchange. Some exchanges also possess the debtor reporting system – the company reported as a debtor is listed on the national list of debtors of TSL sector and loses access to the exchange. Freight exchanges, more and more often, have the department of debt recovery and legal advice.

On the other hand, data security is guaranteed on the basis of the personalization of the user, i.e. each participant of the exchange receives a login and password which must be entered before entering the platform and each time while entering into the transaction. Every company which signs up for the exchange is verified by the exchange consultants. As a part of authorization, it must show the documents confirming its credibility, e.g. copies of NIP, REGON, KRS documents and licenses for national and international carriage. Entrepreneurs aiming at the operation on the exchange are verified by the external databases, there are also verified the addresses, phone numbers of the company and the relationships of the client with other companies operating on the market. If the company has lost its financial liquidity or if it is bankrupt, it should not get an opportunity to access the database of the exchange services. Moreover, freight exchanges secure data transfer and access to servers where there is detailed information on each participant of the exchange.

The carrier is obliged to follow the regulations, and the consultants pay a special attention to the attempts of forgery of documents, making accounts available to other companies and spamming the exchange.

Reporting the offer of free vehicles or free loads takes place by filling in a form and providing the basic data concerning the offer, i.e. the place of loading and unloading, type of bodywork or cargo and validity of the offer. When the form is completed, the offer is passed on to the exchange and it is immediately available for shippers, carriers and

logisticians from production and trade companies from the whole Europe. The load or a specific type of a vehicle are searched for in a similar way. While having a computer with the Internet access, it is possible to easily use the system, messenger or route calculator. It is also necessary to install the software. A lot of operators offer a mobile version for a smartphone, which allows to locate the load or vehicle within a few hundred kilometers. The mobile version is used particularly by small shipping companies which, after unloading, urgently wish to find the return load.

Most freight exchanges use the system of users' assessment and comments [2]. It is so called rating system, that is, the carrier, when the order has been executed, may evaluate the reliability of payment and post the comment on the ordering party in their profile. The ordering party also has the right to assess the carrier with reference to the timeliness and quality of the service they provided.

In most systems, there operates the index of reliability of payment of the companies ordering the cargo transport. While calculating the index, there are taken into consideration the financial data of the company and the potential presence on the lists of debtors. The index is most frequently presented in the form of status, i.e. designation as a very good or average payer. Freight exchanges, available on the market, have different systems of charging fees for clients. Some exchanges collect funds for each transaction conducted via the exchange or for a single check of information on the company presenting the offer. However, the most frequently applied is the system where clients pay a single flat-rate fee, which depends on the time for which the subscription is purchased (e.g. monthly, bi-annual, annual). The cost of such subscription usually amounts to PLN 1.5 to 3 thousand per year and depends on the size of the package of additional services [2]. The operators of freight exchanges frequently enable free system testing for a specific time, e.g. a month. It is a very beneficial proposal since it provides, in practice, an opportunity to choose the appropriate fee option, which includes the elements of the system necessary for the transport activity of the user.

Electronic freight exchanges significantly enable the business activity of shipping, production and trade companies. National and international shipping companies find cheap and reliable transport companies on the freight exchange. Producers and trade companies find free means of transport for carriage of goods on the freight exchange and they reduce empty runs of their vehicles. The cargo exchange is a set of offers among which it is possible to come across: free loads, free vehicles, return loads, national and international shipping, transport orders, cheap transport companies, and also transport information.

By means of freight exchanges, companies can reduce costs of transport services and establish new relationships on the market of transport services. To increase the number of contracts and have an opportunity to access a larger number of offers of loads and vehicles, companies often use two cargo exchanges at the same time, which provides them with faster and more efficient transport orders and reduces transport costs.

V. TRANSPORT OPTIMIZATION BY MEANS OF EGT TOOLS

The freight exchange is a tool using the available achievements in the field of techniques and technologies of information transfer and communication. The appearance of new possibilities of communication and information transfer amounts to an opportunity of the implementation of new applications and functionalities for the exchange operators [4]. More and more frequently, it becomes real to currently observe means of transport (e.g. loading). Due to the improvement of the process of making financial clearance via the Internet, also the financial settlement, more and more often, takes an electronic form. Another important area of the exchange operation is the possibility of the automated transfer of information on the phone.

Electronic freight exchanges are a popular type of exchanges of B2B (business to business) type. They bind the carriers, shipping companies and the parties ordering loads. High competition in the sector of TSL services brings about that entrepreneurs are willing to use electronic exchanges which significantly support the management process.

It can be concluded that exchanges operate like a notice board, on the one hand, for shipping companies and carriers and, on the other, the consignors. The main objective of these information and communication systems is the effective exchange of information between the involved parties, improvement in the use of vehicles and reduction in empty runs, which is economically and ecologically significant.

Shipping and transport companies, possessing excess cargo or free spaces in cargo trucks, post their offers on online exchanges. The detailed description of the specific offer and clarification of the specific relationship is possible due to appropriate computer application. The ones interested in loading spaces or loads may select the offer on the basis of regional criteria or properties of goods for carriage. Along with the offer selection on the exchange of transport space, there is presented the information on the load and delivery, type, weight and dimensions of goods, as well as contact and personal details. If the price and the other conditions of the service performance are established, there takes place the immediate transport booking.

Freight exchanges are not really varied in the field of their basic area of operation, their diversity refers to a scope of additional services provided to clients. In Poland, there are several exchanges, among others: *Trans*, *TimoCom Truck&Cargo* and *Wtransnet*.

A useful tool is the possibility of using the freight exchange as the Internet messenger, which makes the information flow between the parties of the commercial transaction more efficient.

Also, the security and credibility of exchange of information and funds on the freight exchange is very important. The *Trans* exchange (which is used for the operation of the investigated company) has the version *Trans 3.0*, including so called *Pakiet Bezpieczna Firma* (the Package of Safe Company), i.e. a set of services increasing financial security of users. This solution is to impede, and finally fully eliminate from the sector, the companies which

should not operate in it. Pakiet Bezpieczna Firma includes the following [8]:

- the system of ratings and comments of contractors – (similar to rating systems of popular auction services), which allows for the assessment of the quality and reliability of the load ordering party,
- TransRisk Index – the indicator of reliability of payment of companies indicated as percentage, and created, among others, on the basis of the data coming from renowned credit information agencies, e.g. Creditreform, Dun&Bradstreet or financial data of the company,
- the system of “Report a debtor!” – as a part of the system there operates the debt exchange, i.e. the list of debtors, containing the data of unreliable companies from TSL sector. Each company, which is on the list, automatically loses access to the exchange.

Clients’ expectations towards the services provided by EGT are varied depending on specialization, market or size of the company. However, the standard required by all the participants is an accurate, actual and currently monitored map. “Modern software offered to transport companies should be possibly intuitive and easy to operate (and even maintenance-free). In a multitude of different duties, the client will choose such solutions which will not disrupt the course of their classical work process but they will just bring about saving time and funds [6].”

VI. CASE STUDY. THE ANALYSIS OF THE USE OF THE ELECTRONIC FREIGHT EXCHANGE IN THE INVESTIGATED COMPANY

X-Car is a shipping and transport company which operates in most countries of the European Union. The company operates twenty four hours a day, seven days a week. The greatest asset of the enterprise is the rapidity of operation since it provides the delivery of loads within 24 hours to most European cities. If there is such a necessity there is sent a double manned vehicle, which influences the speed of the cargo delivery even at large distances (JIT: Just in time, ASAP: as soon as possible). X-Car cooperates with the largest shippers in Europe and the leading companies from the automotive industry.

In its activity, X-Car uses the Trans exchange, i.e. the platform of exchange of information on free loads and trucks from the whole Europe. The Trans exchange disposes one of the largest databases of transport offers in Europe.

The Trans exchange provides a range of benefits for trade and production companies, shippers and carriers. The benefits for shipping companies, resulting from the use of the exchange, amount to: up to 150 000 offers of loads and vehicles daily, efficient and fast execution of transport orders and cooperation with certified carriers. For carriers, the most important benefits are: prompt establishment of cooperation by a messenger, the system of assessment and reliability of payment of contractors, and also a new return load every 0.9 second. Trade and production companies, due to the Trans exchange, may easily establish the cooperation by a messenger, efficiently and timely arrange the transport of loads and are supplied with efficient security procedures [3].

The Trans system is a package of solutions which enable the establishment and implementation of the efficient and secure collaboration: carriers, shippers and the ones carrying loads in the whole Europe. The Trans system consists of the following solutions[3]:

- a simple system of searching for and posting offers,
- monitoring the most interesting offers, the possibility of filtering by the type and kind of the offer, the required bodywork, physical parameters of load, properties of the freight or the assessment of the carrier;
- a simple system of posting offers in the form of intuitive application form, facilitating the specification of the detailed parameters of the load;
- text messaging and voice communication with the contractor;
- detailed information on the contractor, i.e. address details of the company, the description of its activity, and also the required registration documents and licenses.

The analyzed X-Car company uses the Trans freight exchange because they have confidence in it. The exchange provides the security of transactions, makes it possible to check the documents of the carrier and to find out the assessment and opinions of other users. Ratings and opinions posted by users are an important source of information – particularly, if the company wants to establish the cooperation for the first time. There is a possibility to rate the specific company in the three-tier system, that is positive, neutral and negative evaluation. Ratings and comments of clients are, therefore, a tool allowing the exchange users to assess their contractors: the carriers – to assess the solvency and credibility of the ordering parties, and the companies ordering the carriage – to express their opinion on the professionalism, timeliness or quality of the service provision by sub-contractors. The information on the assessment received by the company is posted next to its offers on the exchange, and also in a bookmark “Information on the Company”.

The Trans exchange uses TransRisk Index, i.e. the indicator of the reliability of payment for the companies ordering loads. This indicator is calculated by a special algorithm and it contains important information for carriers whether it is worth trying to cooperate with a specific company ordering load or if a potential contractor is a reliable payer. The analyzed X-Car company, in its activity, uses not only the services of the Trans freight exchange. As a tool supporting the transport offered by the company there are also used the ViaMichelin maps of Europe. It helps calculate and plan the routes taken by vehicles.

While analyzing the activity of the X-Car transport company, it should be noted that it provides complex transport and shipping services in the field of carriage of loads in the area of the European Union. The activity of the X-Car company, without using supporting tools, that is, electronic platform, would be significantly limited and less efficient. Due to the Trans exchange, X-Car cooperates with many transport companies, using the access to the global network of information and contacts. The X-Car company

must run its activity on the market of transport services on the basis of the electronic freight exchange, but also on the basis of accurate and currently updated maps of Europe. Using the whole of the available information and supporting tools by the company will allow X-Car to accept orders, determine the optimal conditions of carriage, drivers' working time, and also the price level of the provided transport services.

VII. CONCLUSIONS

The use of the freight exchange allows transport companies to reduce empty carriage, optimally use loading space, added load and to gain additional transport orders and, consequently, to reduce costs of providing services and gain additional profit.

The main advantage of electronic transport platforms is efficient external communication of the company. The analyzed X-Car company, in its activity, uses the Trans exchange, due to which it easily finds orders for carriage of goods, and also reduces empty carriage. The exchange also provides the detailed information on every user, along with the assessment of their activity and payments made on time.

It should be noted that not every company may become the user of the Trans exchange. The exchange provides security through a perfectly working system of monitoring the companies, which intend to sign up and become the exchange users.

The rapid rise in popularity of online exchanges mainly results from reducing the operation costs of companies and the ease of acquisition of business contractors and the course of completion of new transactions. The attractiveness and availability of electronic platforms for different companies is connected with the openness of the Internet and low costs of using electronic platforms. In the current economic relations, long-term, fixed contracts are abandoned for the benefit of the current and ad-hoc search for business partners who offer the most favorable conditions of cooperation.

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