

Ryszard Barcik, Marcin Jakubiec
Akademia Techniczno – Humanistyczna w Bielsku Białej

Tools of e-logistics¹

Fundaments of e-logistics

In the background of changing situation on local and global markets of delivery and sales companies more often use the Internet tools letting realization of electronic transactions with partners in supply chain. Changes in management of supply chain happen with development of clients' needs and technological possibilities of cooperating partners. Globalization of economic companies cooperation (e. g. in delivery, production and distribution processes), technological growth and innovative manners of economic activity, as well as stronger competition and shorter products life cycles on markets have caused pressure on changes of dimensions of supply chains acts – shorter time of order realization, global scope of activity, bigger elasticity and durability. One of fundamental tool of supporting business processes became electronic data interchange through the Internet. It has caused epoch-making change for clients values – independent access to information about products' flow and localization of supply chain partners².

Growth of share of electronic commerce in commerce in general (over the world and in Poland) has caused a need of on-line access to logistic services amid suppliers and recipients on market. Growth of electronic commerce evaluating towards e-business has brought about a natural need of growth of processes of commodity flow service, in area of company front-office (e. g. sales, marketing, client service), as well as back-office (purchasing, warehousing, transport, production and co-production). Electronic data interchange between partners let them cooperate in real time and create integrated supply chain. Efficient, reliable

and effective functioning of supply chains requires beyond good management of physical products flow, set under functional and organizational aspect a system of information flow (flow and computerization)³.

Experiences achieved up to the present in area of e-business let separate following business models which define relations of market partners⁴:

- business to business model (B2B) – this model embraces main economic contacts, it means their preparation, assessment of partners' risk, negotiating and realization of order until full payment
- business to customer model (B2C) – it concerns financial services (e. g. electronic banking, insurances, investment

funds), non-financial services (e. g. touristic services) and trade centers (the Internet shops)

- customer to customer model (C2C) – this model mainly includes hobby contacts or attendance in auctions.

However, many trials have been done e-logistics term does not have one agreed definition. It is concerned that e-logistics means use of systems, informatics' tools and the Internet as communication medium to service logistic processes.

The most often used tools of cooperation in virtual scope of e-logistics are (fig. 1)⁵:

- the Internet portal,
- electronic platform,

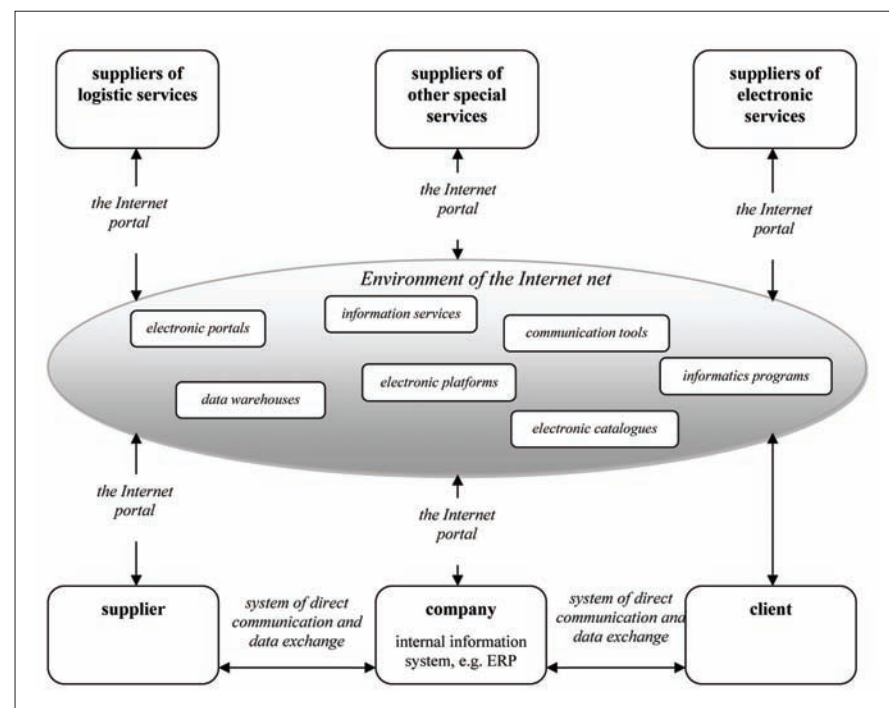


Fig. 1. Example of e-logistics' environment.

Source: Personal elaboration based on Kisperska-Moroń D., Krzyżaniak S. [red.]: *Logistyka*, ILiM, Poznań, 2009, p. 423.

¹ Artykuł recenzowany (przyp. red.).

² Kisperska - Moroń D., Krzyżaniak S. [red.]: *Logistyka*, ILiM, Poznań, 2009, p. 421.

³ Ibidem, p. 421 – 422.

⁴ Adamczewski P.: *Informacyjne wspomaganie łańcucha logistycznego*, Wyd. Akademii Ekonomicznej w Poznaniu, Poznań, 2001, p. 121 – 123.

⁵ Kisperska-Moroń D., Krzyżaniak S. [red.]: *Logistyka*, ..., op. cit., p. 422.

- electronic catalogue,
- data warehouses,
- information services,
- systems of offers and purchasing,
- transactions systems,
- systems and communication tools,
- systems and software, e. g. applications of supply chain planning, dictionaries, digital maps, e-learning systems, etc.

In the article examples of e-logistics" tools would be described.

Tools of e-logistics

Data base.

In the modern world, it could not be visualized well functioning company without use of data base. Neither technical nor organizational means could not

building so called data warehouses collecting information coming from different links of those chains. In general, data base is defined as ordered collection of data holding in computer memory. System of data base stands for data with program means letting simultaneous operating on it and simultaneous searching and updating of included in it information⁶.

Reasoning and effective acting on data base is related with proper interpretation of collected in it data, what requires real and full description of semantics of real world modeling. In data base a tool to description of real world semantics reflected by data base is a data model. Data model stands for a collection of abstractive terms letting representation of properties of this world. Terms collection used to descrip-

Data base characterize four fundamental features⁸:

- independence of applications and data
- abstractive representation of data
- different ways of data perceiving
- physical and logical independence of data.

Electronic Data Interchange.

EDI (*Electronic Data Interchange*) is a non-paper technique of exchange of formalized data (documents) between informatics" systems of trade partners with minimum intervention of human being. Data which are an object of electronic exchange are counterparts of content of traditional trade documents: orders, invoices, production drafts, etc. An advantage of EDI is independence from hardware platform and operating system and software platform (from user application). EDI is based on international standards. Data transmission in EDI is done by electronic links between computers, not by exchangeable data carriers. EDI technique is a definitive manner of using of transmission nets (fig. 2)⁹.

EDI software realizes following functions (fig. 3)¹⁰:

- export and import of data from/to application – let cooperation with company usable applications, e. g. Excel
- data conversion – output documents are turn into EDI communicates; input ones translate on proper format for usable applications
- sending and receiving EDI communicates – service of communication net in scope of connections, setting of transmission parameters and data sending
- management and control of documents turnover – these are additional functions which scope is determined by software and could embrace: documents archives, data base of EDI partners, data coding and their compression, connecting and disconnecting operations, etc.

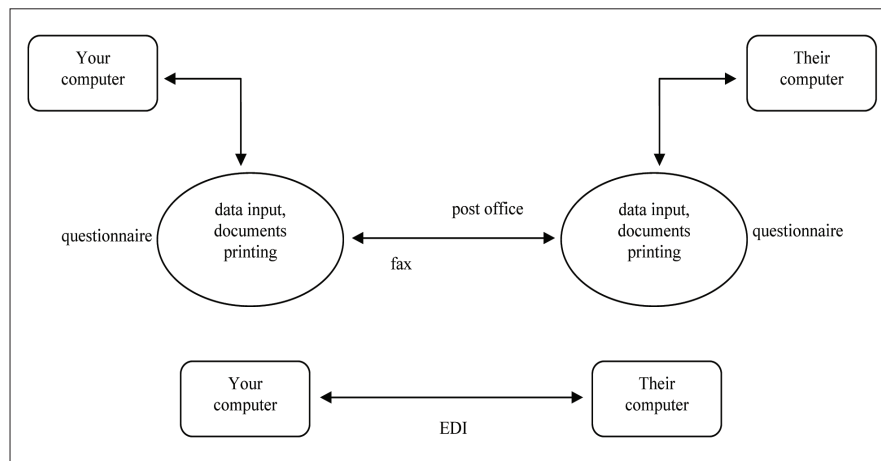


Fig. 2. Electronic data interchange versus traditional methods.

Source: Personal elaboration based on Gołemska E. [red.]: *Kompendium wiedzy o logistyce, wydanie IV zmienione*, Wyd. Naukowe PWN, Warszawa, 2010, p. 184.

ensure such quick and elastic access to reliable information as well projected system of data base. For an obvious reason data base are the most important component of all platforms supporting business processes, especially supporting supply chain management. They constitute a core of advanced logistic systems, e. g. ERP. Data base are also a fundament of functioning and information exchange between business partners across supply chains called as SCM systems and

tion of real world part properties, important from the point of view of exact use creates a schedule of data base. Important term, often confused with data base term is system of data base management. It is described as a collection of programs letting creating and exploitation of data base. These are programs (software) of overall use making easier defining processes, constructing and computerizing data base for different applications⁷.

⁶ Długosz J. [red.]: *Nowoczesne technologie w logistyce*, PWE, Warszawa, 2009, p. 34.

⁷ Ibidem, p. 34 – 35.

⁸ Ibidem, p. 38.

⁹ Gołemska E. [red.]: *Kompendium wiedzy o logistyce*, wydanie IV zmienione, Wyd. Naukowe PWN, Warszawa, 2010, p. 182 – 184.

¹⁰ Ibidem, p. 186 – 187.

Identification Technology – Radio Frequency Identification (RFID).

A new technology of identification called „radio bar code”, from one side steers thinking on change of medium from bar code on radio waves, from the other side new possibilities of product’s describing on label put on every package could be easily noticed. In this new technology not radio technique is so important, but a way of data saving in memory of microprocessor, called as a chip. Radio wave about proper frequency stimulates chip antenna, what implicates radio data transmission from chip memory to reader and then to a computer. RFID term could be a little bit confusing because not a radio wave is a medium of information, but a memory put in small chip (in terms of parameters, not in terms of capacity). E. g. chip capacity 0,5kB is 512 bits to free use. Free use of bits” potential will not give much if it is not standardized. Similarly to bar code technology, from many symbols to global use five were chosen, so in example of bits” potential some of its scope was chosen with beginning address and length 96 bits to common use by all who want to act in global supply nets. In the example of chip capacity 0,5kB, minus 96 bits reserved for global use, minus 16 bits reserved for individual number of chip given by its producer stays 400 bits for individual use. Those 96 bits is Electronic Product Code (EPC) identifying with „radio bar code” should have been called „bar code of next generation”. EPC code is a big challenge for Fast Moving Consumer Goods branch because it exploits RFID technology in which identifying number is saved in special tag put on a product and to its read radio wave about proper frequency is used¹¹.

RFID technology is not a new one, but its connection with the Internet brought about big potential hidden in it – creation of EPC concept. EPC implementation lets quicker and easier identification of transportation packages” content and possibility of goods” flow tracking in real time, also over integrated supply chains on global level of supply nets. EPC

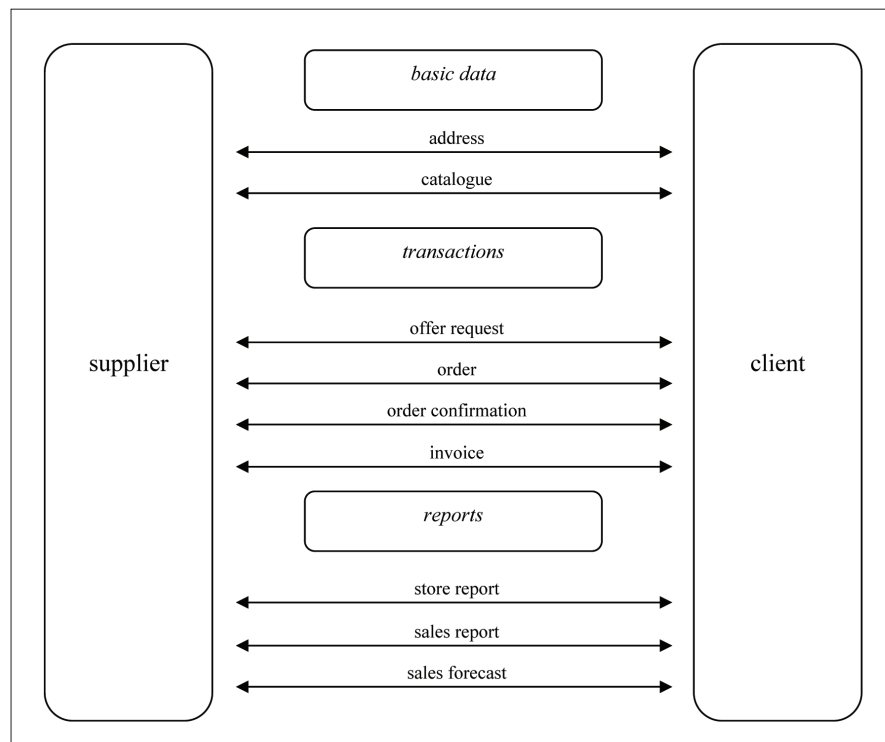


Fig. 3. Examples of exchange of EDI communicates between trade partners

Source: Personal elaboration based on Golebska E. [red.]: *Kompendium wiedzy o logistyce, ...*, op. cit., p. 185.

solution brings much more possibilities of its use than bar code because it constitutes a connection of RFID with global link means through the Internet, often called „products” Internet”. EPC was designed on pattern of used bar codes GS1, where object identification is separated from information, what causes that system is elastic. During changing of identifying object’s feature or its use, identifier always will stay unchangeable. Information about products will be placed in dispersed data available in the Internet. Implementation of EPC does not require any change of functioning numeration in GS1 system¹².

Information Integrated Systems.

Beginnings of information integrated systems go back to 50s of twentieth century. Their goal was to manage inventory using known methods (IC – inventory control). Those systems embraced only one area of company’s activity, so it was difficult to call them integrated. At the beginning of 60s breakthrough in creating of systems to management support

was noticed. Its direct consequence was implementation of MRP system (material requirements planning). MRP systems were perceiving as a tool to calculate and control of store – they do not give any possibilities of system monitoring and do not leave a place for feedback. Lack of monitoring was causing that systems were not sensitive on differences between plan and reality and on unpredicted accidents. MRP systems had to be extended. They got additional functions to collect and respect of information from suppliers and salesmen. Static MRP model got needed dynamics. Further evolution brought about MRP II systems (manufacturing resources planning), which became more complex tools embracing gradually much more areas of company’s activity. MRP II systems meet following functions: sales and operation planning, demand management, master production scheduling, material requirement planning, bill of material subsystem, inventory transaction system, scheduled receipt subsystem, shop floor control, capacity requirement planning, input/output control,

¹¹ Majewski J.: *Informatyka dla logistyki*, ILiM, Poznań, 2008, p. 265 – 267.

¹² Ibidem, p. 265 – 267.

purchasing, distribution resource planning, tooling planning and control, financial planning interface, simulations and performance measurement¹³.

Another type of information integrated system is ERP (enterprise resource planning), which was created in 90s of twentieth century as the effect of MRP II evolution. ERP systems support company management in area of planning, production and distribution and let quick response on demand change in terms of conditions and restrictions on the market. ERP is defined also often as a packet of software to enterprise resource planning, which is ready to implementation of integrated group of modulus, servicing all business functions of company and letting dynamic possibility of configuration. A main purpose of a packet is full integration of all areas of company. It should support specialized production functions, e. g. management of construction and technological changes, as well as quality management, re-decorations, services, staff, etc. Amidst many tasks of ERP systems their characteristic element is generating of multi-dimensional financial analysis for top management. ERP systems let setting of information to needs of users and simulation of activities, their analysis and effects¹⁴.

Summary

Dynamically growing possibilities of interactive partners cooperation, electronic data interchange and access to global information sources have brought about visible change of company business model. Possibilities of dynamic planning and control (24 h/7 days per week) caused another phase of interest in outsourcing. Many companies have moved their core business from production to deliveries management from subcontractors, electronically targeting order realization and client service. Global supply chains, possibilities of their configuration and options of cooperation have caused interest of logistic services integration in supply chain, realized by logistic operator (4th Party Logistics). In-

creasingly common access to electronic data nets and logistic services, electronic data interchange, as well as electronic integration of planning and organizing of supply chains, also coordination and management of subcontractors' activities create fundamentals of another stage of outsourcing development, described as 5th Party Logistics. Electronic access to many data geared managers interest towards niche markets, letting precise management of size and term of delivery to remote places, as well as areas of high competitive products satisfaction or low level of customer service¹⁵.

More often appreciated source of logistic strategy success is concentration on client needs' satisfaction. Purposes of strategy are clear¹⁶:

- ensure clients access to good quality products
- ensure products access when clients need them
- achieve level and structure of costs letting compete of prices
- ensure trustworthy and reliable image of a company.

It is possible, although it was difficult to connect strategy of products' differentiation and individualize client service with strategy of high capacity of supply chain, mass market service, high efficiency of acting and visible for clients low level of prices.

Abstract

Globalization of economic companies cooperation (e. g. in delivery, production and distribution processes), technological growth and innovative manners of economic activity, as well as stronger competition and shorter products life cycles on markets have caused pressure on changes of dimensions of supply chains acts – shorter time of order realization, global scope of activity, bigger elasticity and durability. One of fundamental tool of supporting business processes became electronic data interchange through the Internet. It has caused epoch-making change for clients values – independent access to informa-

tion about products' flow and localization of supply chain partners.

Streszczenie

Globalizacja współpracy gospodarczej przedsiębiorstw (na przykład w procesach zaopatrzenia, produkcji, dystrybucji), postęp technologiczny i innowacyjne sposoby działalności gospodarczej, a także wzmożona konkurencja i coraz krótszy cykl życia produktów na rynku – wywołały presję na zmiany wymiarów działania łańcuchów dostaw – krótszy czas realizacji zamówienia, globalny zasięg działania, większą elastyczność i niezawodność działań. Jednym z podstawowych narzędzi wspomagania procesów biznesowych stała się elektroniczna wymiana danych poprzez sieć Internet, wywołując epokową zmianę wartości dla klienta – dostęp do informacji niezależny od przepływu produktów i lokalizacji partnerów łańcucha dostaw.

REFERENCES

1. Adamczewski P.: *Informatyczne wspomaganie łańcucha logistycznego*, Wyd. Akademii Ekonomicznej w Poznaniu, Poznań, 2001.
2. Barcik R.: *Logistyka dystrybucji*, wyd. II zmienione, Wyd. Naukowe Akademii Techniczno-Humanistycznej, Bielsko-Biała, 2005.
3. Barcik R., Jakubiec M.: *Zarządzanie informacją w systemach logistycznych*, Logistyka 6/2008.
4. Barcik R., Jakubiec M.: *Controlling w logistyce dystrybucji*, Logistyka 4/2009.
5. Ciesielski M. [red.]: *Instrumenty zarządzania logistycznego*, PWE, Warszawa, 2006.
6. Ciesielski M. [red.]: *Instrumenty zarządzania łańcuchami dostaw*, PWE, Warszawa, 2009.
7. Długosz J. [red.]: *Nowoczesne technologie w logistyce*, PWE, Warszawa, 2009.
8. Golebska E. [red.]: *Kompendium wiedzy o logistyce*, wydanie IV zmienione, Wyd. Naukowe PWN, Warszawa, 2010.
9. Kisperska-Moroń D., Krzyżaniak S. [red.]: *Logistyka*, ILiM, Poznań, 2009.
10. Majewski J.: *Informatyka dla logistyki*, ILiM, Poznań, 2008.

¹³ Ciesielski M. [red.]: *Instrumenty zarządzania logistycznego*, PWE, Warszawa, 2006, p. 56 – 59.

¹⁴ Ibidem, p. 60 – 61.

¹⁵ Kisperska-Moroń D., Krzyżaniak S. [red.]: *Logistyka*, ..., op. cit., p. 432.

¹⁶ Ibidem, p. 433.