

INFORMATION PROCESSES IN SUPPLY CHAINS

JULIAN VASILEV

ASSOCIATE PROFESSOR PHD
DEPARTMENT OF INFORMATICS
VARNA UNIVERSITY OF ECONOMICS

BULGARIA
VASILEV@UE-VARNA.BG

ABSTRACT: THE PURPOSE OF THIS WORK IS TO DESCRIBE AND ANALYZE INFORMATION PROCESSES IN SUPPLY CHAINS. A DISCUSSION ABOUT THE CURRENT PROBLEMS IN SUPPLY CHAIN MANAGEMENT IS GIVEN. DIFFERENT SOURCES OF LOGISTICS INFORMATION ARE DESCRIBED. ORGANIZATIONAL ISSUES ABOUT LOGISTICS ARE PROPOSED. SOME NEW AND INNOVATIVE IDEAS ABOUT INTEGRATION IN SUPPLY CHAINS THROUGH INFORMATION SHARING AND INFORMATION VISIBILITY ARE PROVED. THIS STUDY IS PUBLISHED FOR THE FIRST TIME. THIS STUDY PROPOSES SEVERAL NEW CONCEPTS IN E-LOGISTICS. SOME OF THE CONCLUSIONS ARE BASED ON THE ANALYSIS OF LITERATURE SOURCES; OTHERS ARE BASED ON OPINIONS OF IT EXPERTS, LOGISTICS EXPERTS AND PERSONAL OBSERVATIONS IN MANY BULGARIAN ENTERPRISES.

KEY WORDS: SUPPLY CHAIN INTEGRATION, ICT, E-LOGISTICS, INFORMATION SHARING, COLLABORATIVE LOGISTICS PROCESSES, LOGISTICS ALIGNMENT

INTRODUCTION

SUPPLY chains consist of several enterprises. The supply chain management (SCM) studies different aspects of planning, organization and controlling logistics processes in supply chains. The proper management of a supply chain means that managers must have managerial skills as well as IT skills and competences. The current state of supply chains is characterized by generating information in different places and taking corporate decisions. The need of collaborative inventory replenishment and collaborative SCM shows the need of adapting new concepts in SCM. One recent concept concerns e-logistics. The main idea is information sharing and information visibility of material flows. This study gives light to some problems in e-logistics and their solution.

THE rapid development of information technology is particularly noticeable in the last two decades. In global competition information resource in many cases replace capital. Raising logistics data is a prerequisite for competition at a new level. The development of hardware and software sets high requirements for Chief Information Officers (CIOs). **The importance of corporate information to participants in the supply chain is assessed at the time when it is shared.** Depending on the requirements of the industry, the used ICT, the information needs of suppliers and customers, enterprises collect business data to use later. The implementation of new information systems (such as software-based CRM systems) leads in many cases to information overload and loss of productivity. A number of publications give certain technological solutions to reduce manual labor from covering the logistics information. One of the modern aspects of e-logistics is covering the inbound and outbound flow of information in and out of organizations (associated with the movement of material flows).

VIEWS of the logistics managers about information systems and technologies in logistics change. The traditional view is the following. The information system is designed to capture data from the logistics processes. At a higher level, its functionality is associated with decision support. Nowadays we witness the ever increasing expectations of information systems and technologies in logistics. The growing need for effective information leads to extending the functionality of information systems with respect to: (1) input for new products, (2) respond to actions of competitors (3) opportunities to reduce costs, (4) innovation, (5) opportunities for the design of new products and (6) opportunities for new channels of communication.

THIS study consists of three parts. Part one is a discussion about the current problems in supply chain management. Mainly issues concerning organization of logistics and the adaption of IT in business are studied. Part two describes different sources of logistics information and ways of using it later for SCM. The third part gives some new and innovative ideas about integration in supply chains through information sharing and information visibility.

1. CURRENT PROBLEMS IN SUPPLY CHAIN MANAGEMENT

THE survival of companies in a crisis determines the change of some business processes. New economy and new market conditions of the 21st century require compliance with global trends: the development of new products, strong competition between similar products, global and local distribution networks and business orientation to customer needs. To improve the business processes enterprises often turn to logistics experts and informatics. This fact gives rise to the development of e-logistics as a specific type of business and managerial competence as a specific application of information technology in logistics.

PARTICIPANTS in supply chains exchange information to do business together. On the surface, information processes between vendor and purchaser are related to the exchange of some documents. The seller sends an offer. The customer approves or rejects the offer. In case of approval, the customer creates an order. The goods are sent and an invoice is generated. The presented processes can be realized in specialized software, but data is usually entered only by the seller.

SIMILAR example may be given with the suppliers of soft drinks to restaurants, situated within a town. Suppliers of soft drinks in Bulgaria usually provide free refrigerators to restaurants, distributors and periodically load refrigerators with the sold drinks. The current approach of working is as follows. The distributor visits each restaurant daily, checks sales in every restaurant, returns to his car and loads the restaurant. In a similar manner some supermarkets are supplied. The traditional approach of working may be improved if each restaurant sends information for daily sales. **The distributor has information on the availability at any time and he/she can make a schedule for supply without having to stop at places (restaurants or shops) that do not require loading.**

ALTHOUGH the approach is more organizational than informative, some distributors remain traditionalists. The proposed approach of working is very appropriate for tracking sales at peak times. A distributor may share information about discounts, which he/she offers, in conjunction with a larger volume of sales made. Similar discounts are popular with vendors of medicines that work only wholesale.

AN example may be given. A manufacturer of toothpaste can produce paper packaging, tubes of toothpaste and caps or outsource their production to a subcontractor. The solution is make-or-buy decision. It is connected with the study of these two questions: (1) the costs that are made and (2) the added value that is made.

ANOTHER example is a factory producing dairy products. It shares information about spare capacity tanks for milk. Another example from the field of tourism, we can mention, is sharing spare capacity of hotel rooms for a specified period of time with a tour operator. As an example of business practice we may mention a supply chain, consisting of supplier of wheat to customer of flour – a bakery, which shares information about its storage space and daily need of flour. Another example could be: supplier of frozen foods and a client (a restaurant), which provides information on the number of freezers available in the restaurant and their level of occupancy.

THE importance of information technology in transport companies is limited to displaying information with the touch of a mouse button. Growing needs of end-users and effective information logistics lead to application of the latest achievements of information technology for logistics services. **Up-to-date information can be obtained using electronic documents between participants in the logistics process.** The formal description of existing documents and information flows between participants is necessary. The scheme, which can be created, is intended to be used by commercial and transport companies.

LOGISTICS system consists of several subsystems. The warehouse subsystem solves problems related to control and update of stock reserves, logistics and invoicing. Another subsystem deals with task management, route planning, scheduling, and planning the load of the equipment and tracking orders. Depending on the field of business, the e-logistics has different forms. Most often electronic processes are: electronic contracting, video conferencing, Internet banking, and business transactions. In recent years, applications "business to business" (B2B) and "business to customer" (B2C) evolve in the "business to business to consumer" (B2B2C).

A good logistics system depends to a large extent on the organization of the business. In many cases the maintenance of small warehouses, positioned appropriately, can accelerate the execution of orders. Another known technique of logistics distribution is the use of approaches such as cross-docking. A large truck is sent from the factory to the vicinity of a large town. An overloading of relatively small trucks (or pickups) is done. They quickly serve business customers in small streets and less accessible places. There are examples of business practice, where the distribution is done by 3PL companies. There are information flows of the two mentioned kinds. First, a managing information flow contains data on the time of overload, stock keeping units (SKUs) and vehicles. Second, an information flow for the really delivered SKUs.

TRACKING of goods is impossible without the use of automated identification systems. It is possible to use it as the standard code or as own (internal) numbers of goods. In both cases the transport logistics generates data streams.

FOR example, a manufacturer of garden equipment (e.g. trimmers, brush cutters, electric and petrol chainsaws) can offer his end customers a product catalog with descriptions of individual products (see the catalog of company Stihl http://www.stihl.ru/p/media/download/ru-ru/Viking_2014.pdf). The same manufacturer may offer its corporate customers (shops and services) complete product specifications and

instructions for repair under certain damage. A standard GS1 Global Data Synchronization Network (GDSN) is created (www.gs1bg.org/en). **The application of the standard is in terms of synchronization of databases of "supplier" and "client"**. Information integration between partners include: (1) information flows to service manufacturer of spare parts ordered and (2) information flows from producer to service delivered spare parts.

ACHIEVING competitive advantage is the goal of all enterprises. The goal is achievable with the use of different approaches: (1) by generating higher added value of the products, (2) through the promotion of new products in existing markets, (3) through the proper use of limited resources and (4) through application of new technologies (both information – such as web applications and industry-specific – such as the introduction of plasterboard in construction).

ACHIEVING competitive advantage is a difficult task. Many disciplines claim to provide know-how to achieve competitive advantage – for example, the marketing-oriented concept 4P (Product, Price, Place, and Promotion). According to the recommendations of marketing professionals a competitive advantage may be achieved by offering a specific product, at a fixed price at a specific market segment for a specified promotional period. Logistics experts use different methods to replenish SKUs in order to minimize the levels of held stocks. They try to apply concepts such as JIT in business practice.

FUNDAMENTAL questions of the application of information technology and information systems in corporate logistics are studied in the course "Information Logistics". Issues related to the application of modern information technologies and software systems in logistics are studied by students in Bulgaria. Lectures on "Supply Chain Management" (SCM) are present. The focus is primarily on logistics aspects. Information technology for supply chain management is often only mentioned without going into details. **This work precisely enlightens questions of application of information and communication technologies for supply chain management.**

PROCESSES of ordering and delivery are strictly regulated. It may be expected innovation in applications like B2B (business-to-business). Development of new products requires close cooperation between suppliers and the manufacturer. The manufacturer must be aware of the changing tastes and preferences of customers and the supplier must be able to perform new details outside his proposed specification. Enterprises that have adopted quality standard (such as ISO 14000) must ensure full transparency of follow-up of inventories of raw materials to transform them into a finished product.

THE ISO 14000 standard is not directed to the use of specific information technology. **The idea of "full transparency" may be realized with the use of automated information systems in small enterprises with relatively small documents turnover.** In medium and large enterprises (especially manufacturing) the tracking of material flows without the application of information and communication technologies (ICT) is almost unthinkable. A logical question arises. Which ICT is best to use? One answer to the question may be given if the field of activity of the investigated company is known. Usually a number of companies share the experience gained in the application of ICT in logistics in Bulgarian magazines such as: Logistics and CIO. The list of international journals is quite large.

IN practice, the business processes are described easily. A range of approaches for their formal description are known. One of them is called Data Flow Diagrams (DFD). Business Process Management (BPM) is also formalized. Substantial difficulty in understanding is the

re-engineering process, or more simply the "change" in business processes. It is clear that if business processes are changed appropriately, the financial performance indicators of the business may be improved. In recent years topic posts such as "business process improvement" (BPI) may be found.

STOCHASTIC demand predetermines high expectations towards logistics system in terms of solving a wide range of logistics tasks. The main results of an inadequate logistics politic usually occurs in the form of extended lead time, late delivery, lack of coordination in supply chain and logistics processes. Negative effects in most cases appear due to the lack of appropriate logistical information. On the one hand, logistical information is necessary. On the other, instruments (both methodological and software) are necessary for the reporting of logistics information.

MARKET changes seemingly affect supply and demand. The well-known microeconomic theory of supply, demand and finding the equilibrium price may be extended. According to this theory, the changes in the supplied volumes lead to changes in the end-user prices. The reasoning is not true. If the market is looking for a particular item of two units a day, and a certain store provides three or five pieces a day, the increased volume of deliveries will not affect the equilibrium price.

THE second output in the theory of supply and demand is that a change in demand volumes leads to changes in the equilibrium price. According to the theory of supply and demand the relationship is inversely proportional. With an increase in the quantity demanded, the final price is reduced. From business practice we may give many examples where growth in demand leads to both an increase in prices and their reduction. If a product has high level of sales, the retailer is able to increase the price. Similar situations occur in goods with inelastic demand (such as fuel, bread, yogurt and cheese).

IF a product is highly sought after, the retailer is able to offer lower prices, because the manufacturer has achieved economies of scale. Production overheads are allocated to a large number of products. As a result, the manufacturing costs are reduced. **Changes in demand volumes have a significant impact on the supply chain.** For example Hua and Li (2008) concluded that "Theoretical and quantitative analyses show that the retailer's dominance over the manufacturer increases with the increase in the sensitivity of retailer's order quantity to manufacturer's wholesale price under a limitation of retail-market demand uncertainty. Quantitative analyses also show that the retailer's dominance decreases with the increase in retail-market demand uncertainty".

THE conclusion shows that the final price depends on the reaction of other participants in the supply chain. Therefore, the expectations of e-logistics are in terms of refining the external factors that influence the price changes to changes in market demand. Developments in the field of e-logistics expand and complement the existing microeconomic theories.

LOGISTICS companies usually work with large volumes of heterogeneous documents. Most of them are directed to other organizations. Data in the documents generates transactions for the logistics company and the recipient of the document. The main activities of logistics companies are very varied, but examples can be mentioned: consulting, contracting, purchasing goods, sale of goods, selection of optimal route, receipt of goods, grouping of goods, organization of physical distribution, freight transport, creation of documents, certificates, documents according to the standard FIATA (<http://www.fiata.com/>).

THE implementation of activities in a logistics company in the short term depends largely on the speed of preparation, transmission and processing of data that is generated. There are cases of business practice where the cargo is loaded and ready, but a waiting for a certificate or bill of lading or other document exists. The vehicle cannot continue to the destination without all necessary documents. **Positive aspects of the use of electronic documents in the activities of the companies are related to reducing costs and improving service to all participants in the logistics process.**

THE experience of many companies is reflected in the scientific work of many researchers. For instance Van Hoek (2001) presents a business model of the courier company UPS Worldwide Logistics. It is characterized by inserting a new actor in the supply chain – the fourth party logistics (4PL). The company "Anderson Consultants" defines "fourth party logistics" as "an integrated company in the supply chain that manages the resources and technologies of their own company with additional logistics services by providing a comprehensive solution of the supply chain." **While 3PL companies provide individual logistic services within the supply chain, the main thrust of the 4PL enterprise is integration of all participants in the supply chain.** In certain cases, **the expectations for the work of 3PL and 4PL participants in the supply chain concern information support of certain business processes, including logistics.** Third party logistics can deal both with building a website (or a web portal of a logistics company) and the design and implementation of a web portal for online services.

INFORMATION criteria (for choosing 3PL and 4PL) include reference points associated with the used information systems, technologies and standards and their possibilities for integration with other information systems. One possible approach for integration is the following: each enterprise uses its own software system. **Transactions are exchanged between pairs of participants in the supply chain as messages in the form of electronic documents in a particular corporate standard or in the form of a worldwide recognized standard (e.g. EDIFACT).** A second approach is to build a single web portal where all participants in the supply chain input data.

AS noted, a number of companies export their logistical operations to other companies. One reason for outsourcing is the physical distribution in space of companies and customers. Companies engaged in manufacturing and logistics services aim to achieve "lean manufacturing". It focuses on key competence of each company in the supply chain. As a result, quality products and services at low prices are provided to market. The methodology for the selection of a suitable supplier remains controversial and topical. Companies usually do not share their know-how because of fear of being displaced in the supply chain. Logistically, business partnerships are established with customers. As an example we can mention regional sales representatives and regional distribution centers. Usually suppliers integrate other participants in the supply chain such as transport organizations, companies dealing with the materials handling business and software companies.

THE reasons for the outsourcing of certain logistics activities to 3PL companies are due to the difficulties in adaptation of logistics and information technology in business. Restrictions may be in terms of capacity and suitability of warehouses restrictions and investment in information technology. Formation of business partnership begins by offering fast logistics services based on specific resources and technologies available to each

company. Technological, logistical and information integration is achieved. It is called "Supply Chain Integration" (SCI).

THE use of systems with bar codes for tracking goods is a common business practice. The application of approved standard codes (such as EAN-13, EAN-8, ITF-14, 2 of 5, 3 of 9, PDF417 and QR) and company specific bar codes is usual. Some stores have web cameras for tracking cargo in real time. Larger companies have specialized data centers. They use specialized hardware. As an example we can cite the IBM AS / 400. **The use of the same code of a product (by several participants in a supply chain) enables rapid and consistent interpretation of the data for transactions.**

ACHIEVING competitive advantage through new production technologies is usually achievable. Facts of the past and in particular the industrial revolution shows that the industry needs new production technologies that lead to improvement of manufacturing processes by reducing manual labor and by the use of machinery. In recent decades, companies mainly rely on new information technologies. It is noteworthy that despite the rapid development of information technology in the 90 years of the twentieth century. The last 15 years (2000-2014) are not counted (by some authors) as a rapid development of new information technologies. Open source software and proprietary software systems are created. Market needs technology solutions for the adaptation of information technology in business. Our opinion is based on the rating of a number of magazines and thematic focus of the conferences organized by professionals in the field of informatics and logistics.

IN recent years the business environment puts all the businesses with increasingly higher levels of competition. Links between businesses are sophisticated enough to be able to be standardized and typified. Substantial progress is reported in the Supply Chain Management (SCM). Decision making in modern conditions is based not only on the analysis of the cost/income ratio. Business representatives have realized the role and importance of logistics to improve the organization of logistics and information processes in organizations. The definition of the storage capacity may be given as an example. The accounting and ERP systems usually do not answer the question. The orientation of the accounting software in most cases is away from logistics, because the focus of accounting software is mainly on fiscal reporting. In most cases, operators register data only from some logistic processes in the middle of an accounting software. This process is normal and fully explainable. Subsequently specialized logistics information systems and logistics software products are created. They solve specific logistics tasks (e.g. tasks related to movement, transformation and storage of SKUs). At this stage, typical logistics software products implement the concept Materials Requirements Planning (MRP). Nowadays, a significant development and limited continuity in business practice is found in business intelligent systems.

SUPPLY chain management (SCM) is a complex task due to the range of different companies included in it. Most multinational supply chains include geographically dispersed enterprises. The marked fact further complicates the process of supply chain management. In cases where several companies are part of a holding structure, the management is facilitated. But these cases are exceptions. The use of a mentor or a controlling organization in a supply chain is a possible solution. The achievement of individual participants, conflict resolution, and the organization of movement of material and information flows is an extremely difficult task and few companies are engaged with it.

ONE of the reasons a company to enter a supply chain is to extract additional profit. In times of crisis a leading reason may be the highlighted one: the reduction of losses of a certain business activity. Obviously the competition is not between individual enterprises. The competition nowadays is between supply chains. This fact determines the emergence of new organizational forms of supply chains to meet market demand and pressure from competitors. Some authors named similar business model "virtual business" or "virtual organization". We do not accept such an opinion, because business is just real. Organizations cannot have virtual unique identifiers and virtual accounting. Employees will not be willing to accept virtual wages. Everything that happens in the economy, logistics and informatics is real. The unifying elements of virtual organizations (as far as it can be considered, that they exist) are information systems and technologies.

THE holistic view of the existence of the supply chain is supported by four types of statements: (1) customers are the driving forces for supply chains, (2) information technologies are the driving force, (3) marketing professionals formulate new needs, (4) manufacturers push products to the market and (5) logistics is basically a link. It is difficult to support or reject the representatives of the five scientific schools. We believe that each theory has contributed to reveal the lifeblood of the supply chain.

IN recent years supply chains are changed. One possible reason for the change is associated with the process of globalization and mass personalization (mass customization). Mass customization means that if you are looking for shoes priority number 41.5 and producer make 41st and 42nd number, the majority of customers go to buy shoes to competitors because 41st number are small and 42nd number big. **Mass customization is an attempt to find the exact tastes and preferences of customers.** In most cases, the purchased goods are close to customer expectations. We cannot consider that the characteristics of the goods meet 100% of customer expectations. In this regard, a number of surveys are carried out. Controversial issues are: (1) how they are written well or (2) whether they aim at detecting mass customization. Another example of mass customization is selling half foiled and sliced bread.

COMPANY size has a direct impact on the adaptation of systems for e-commerce (Teo, 2004). But the same statement may not be true for e-logistics. It should be investigated. The views of management for improvement of business are normally associated with the introduction of systems for quality management (Total Quality Management – TQM), systems for managing relationships with customers (Customer Relationships Management – CRM), systems for green supply management chain (GSCM) (Zhu et. al., 2008) and systems for e-commerce (e-trade, e-commerce, e-business).

AS a result of the research in part one several conclusions may be made:

1. The supply chain management concept has to be enhanced as a specific managerial competence on the adaption of IT in supply chains.
2. The stochastic characteristic of market predetermines high expectations towards logistics system in terms of solving a wide range of logistics tasks.
3. The change in demand influences the whole supply chain.
4. There is a need of describing logistics information not only on an enterprise level, but on the level of supply chains.

2. LOGISTICS INFORMATION IN SUPPLY CHAINS

LOGISTICS information at any point of time can be classified mainly into two groups: (1) active and (2) passive. Passive information is stored in databases and data warehouse. It is not used for a relatively long period of time. Active information is used to display daily reports. Observations in several enterprises showed that the active information is only 2%. About 90% of the entered logistics information is never used after it has been stored in databases. Some organizations formulate their strategy in the field of information logistics based on the functional areas of logistics. Business processes are clear. The information they provide is also clear. Opportunities to improve business processes in most cases are obvious.

FROM the perspective of the theory of information systems, only information that is encoded and stored in a database can be used subsequently. The locations of the databases, the consumer rights (such as Read, Write, Read / Write) are specified by the administrator of the database. In terms of logistics personnel, the following questions should be answered:

- (1) Where does the logistics information arise?
- (2) What logistical information is used for decision making?
- (3) What should be done to improve information processes?

IN the process of analysis and audit of logistics information systems, IT managers and IT auditors generally conclude that **logistics information is gathered fragmentally from multiple information systems**. Each information system stores data in its database. The traditional solution in this case is the formulation of a proposal to build an integrated logistics information system. Similar research theses are defended by several postgraduate students in Bulgaria.

ANOTHER common recommendation is training the staff how to use the logistics information system. In most cases, the logistics software offers more functionality than it is used in the business units. Employees of some software companies recorded in a log file the following information: the menu of their program (which is used), user, date and time. After analyzing the log file it has been found that end-users of the company use 20% of the functionality of the software product. A typical employee uses most often 2-3 points in the menu, which means that he/she enters data or prepares regularly several reports.

SOME skeptical views of authors writing about information logistics are the following. According to them, information logistics generates islands, where data are not used subsequently. Their proposal is to build information logistics highways and information metabolism. We do not comment on the stated opinions. We mark only certain views of information logistics. The essences of the object of study of information logistics are information flows in the logistics system.

SIGNIFICANT discrepancy is obtained in places where business operations take place, logistics operations arise and information flows are generated. Usually the complete scheme of logistics processes and the accompanying information flows is quite complex. In the literature on information logistics there are given a number of established approaches for the description of information flows. Despite the existence of established standards in the field of IT, few logistics and CIO managers dare to engage in a formal description of the logistical processes. The complex and multidimensional nature of logistics processes hinder their description. However, some publications are known, which describe clearly fragments of the logistics information system of enterprises.

IN cases where the customer requests logistical information from his supplier, the customer wishes to improve its logistics activity, using the additional information which is not available in his enterprise. The supplier must be able to provide logistical information on his resources to facilitate customer planning of material flows. The need for additional information (both for suppliers and customers) is the main driving force in an effort to request information logistics partner. At first glance it seems that the spark for sharing information (in terms of information) is set at the premises. Companies build websites, logo of the company, provide price lists, company structure, certificates by ISO, history, mission, cases of successful implementations (case studies), product catalogs, publications in specialized journals (white papers) and other additional information. Striving to provide advertising information is determined by the projected human instinct for self-preservation. Nowadays the seeking to remain on the market means that companies rely on the numerous Internet audiences.

IN most studies in the field of logistics the object of the study is (1) an enterprise or (2) a specialized technological solution for the supply chain. Data collection relies on accountants. They usually do not have full access to logistics information, because in most cases they have only accounting information.

IN the minds of some of practitioners logistics and accounting information are overlapped and sometimes taken as identical. It should be emphasized that the accounting information is very specific and regulated by law. It concerns the change in assets and liabilities of an enterprise. For example, the accounting items to be taken to account for the sale of finished products are precisely established. Logistics information refers to the movement of material flows and there is quite a wide range of accounting information. For example, requests from clients are carrying only logistics information, but not accounting information. Receiving a request from a customer still does not reflect changes in assets and liabilities. An update of the output of a manufacturing enterprise is connected with the preparation of a primary document "Manufacturing list", which contains both accounting and logistics information. **The route of a distributor contains only logistics information.**

LOGISTICS information is closely connected to the marketing activities of companies. Marketers conduct market research to make inquiries. Objectives are opening conscious needs and latent needs. Summary information on demand is available to manufacturing enterprises. Logistics experts usually are mixed with employees in the "Supply" department. Problems solved by logistics professionals are not limited to generate orders to suppliers. The European Logistics Association (ELA) has created qualification standards for logistics professionals ([http://www.elalog.eu/sites/default/files/downloadables/ELAQF Qualification Standards 20 14.pdf](http://www.elalog.eu/sites/default/files/downloadables/ELAQF%20Qualification%20Standards%2014.pdf)). In textbooks logistics has a detailed explanation. **Typical logistics tasks** (such as stock management, warehousing, transportation and cargo consolidation) **are carried out on the basis of additional information received from partners in the supply chain.**

THE lack of appropriate effective logistics information in most cases leads to: (1) difficult formulation of problems in short term, (2) difficulty in forecasting demand and (3) difficulties in controlling the logistics process. The reasons for the lack of appropriate logistical information in most cases are internal to the enterprise. Fragmented data collection (by functional subsystems logistics) and the management of individual activities usually lead to difficulties in operation with logistical information.

IN some cases, customers and suppliers are proud of optimal organization of information flows in logistics. According to Lalwani et. al. (2006) enterprises usually react with difficulties to quick changes in supply mainly due to: (1) difficulties in calculating the cost of stockholding and (2) difficulties in calculating the time between two deliveries, not because of: (1) changes in volumes demanded by customers and (2) transportation costs. Processes: (1) globalization, (2) reduced duration of the manufacturing cycle, (3) the emergence of new materials and (4) technologies (such as nanotechnology) puts traditionally minded managers in difficult situation.

LOGISTICS service has a supporting role for e-logistics. The managers of e-logistics are usually associated with e-commerce. With the development of information technology and logistics, improvement is reported for improving the organization of manufacturing. Outside the scope of this study there are questions concerning organization of production and operational management. **Thanks to information technology, logistics technology develops.** "Logistics of zero stocks" is a technology known in some writings as just in time (JIT). It is administered in a number of Japanese companies and subsequently it found broad acceptance worldwide. In the 90s of the last century companies realize the logistics function within their organization. For 20 years since then, some companies are outsourcing part of logistics activities to 3PL companies. **Besides logistics, some companies outsource their logistics information system to an external organization.** Outsourcing of logistics activities to 3PL companies is traditionally practiced in the field of transport logistics and reverse logistics.

OUTSOURCING of IT services for logistics operations is an aberrant activity. Some authors Bruckner (2004) offer GRID computing in e-logistics, which is very unusual, but innovative practice in e-logistics. GRID technology is used, if necessary, by parallel complex calculations. Resources on computers, which are not used during certain hours of the day, are provided to software applications that may use them. The most popular examples are in aerospace, bioinformatics and genetics. **It is normal GRID technology to enter in e-logistics.**

THE need for integration of enterprises in supply chains leads to the development of scientific articles in the field of Supply Chain Management (SCM). It is typical of the most research in SCM the focusing on a company (usually the object of study is a manufacturing enterprise, because it takes a central place in a supply chain) or on a specific subsystem (purchasing, production, marketing, distribution, accounting or reverse logistics). Few studies focus on the presentation of a comprehensive business model that can be adapted to business practice and leads to an overall improvement of the business. This model may be quantified with specific indicators.

OUR opinion is that even if you do not find the impulse to initiate supply chain, the fact is that logistics functions thanks to ICT and logistics know-how. In order to assess the logistics, it is necessary to assess: (1) what is happening in e-logistics (2) how well e-logistics functions, (3) the extent of use of information and communication technologies, and (4) how e-logistics system generates effective information to be used in the support of logistics management.

COMPETITION in the world today is primarily between supply chains rather than between individual companies. Management of time in the supply chain is a difficult task. Through appropriate information technologies several indicators may be measured: (1) the

waiting time and (2) the time to perform logistics operations. Such an analysis aims to find time to perform unnecessary operations and downtime. **By working a map of logistics processes the expenditure of time per operation may be visually presented.** Clear examples may be seen in textbooks of operations management.

FACTORY Gate Pricing (FGP) is particularly a relevant approach in the marketing of fresh fruit and vegetables. It is considered that the appropriate architecture for the distribution network can result in maintaining relatively low prices of fruit and vegetables. **The focus is on a simulation model of the logistics network to find a model of the logistics network, where fresh products are delivered for the shortest possible time and with minimal costs.** Some recent studies are known. Distribution centers at various locations on the map are put and the optimal solution is found by applying sound mathematics. The initial set of their location may be random. **By simulation the number of distribution centers, an optimal solution may be found.** It is finding the "center of gravity" in the case of a distribution center. **Processors (CPUs) with multiple cores are appropriate for loading software applications (having heuristics or genetic algorithms) to solve logistics problems in business.**

THE presented formulations in this study lead not only to the introduction of new approaches to the management of information flows, but a new class business model. Improved efficiency is achieved by proper load of fixed assets, position of warehouses and movement of material flows. In recent years there is a trend to use the JIT technology. Small volume deliveries are made daily. This fact leads to the use of relatively small vehicles. From the information point of view, **the volume of information transmitted along the supply chain increases, because the number of orders and deliveries increases.** For similar reasons, manufacturers of vans offer: (1) vans with long wheelbase and (2) vans with small wheel base.

MANAGERS have a direct impact on the perception of e-logistics technologies and systems. Managers usually take decisions on financial matters. In most cases, some factors (such as system functionality, system suitability, ability to multi-user access, interface, ease of operation, the ability to export and import data) are ignored. The list of information features is too large. We mark only some of them.

THE advent of e-logistics alters the ways of functioning of supply chains. Logistically, material flows are maintained. From the information point of view, we are witnessing multiple information systems and technologies that are used in business practice. During the execution of logistics operations various types of information arises. It is stored in corporate databases. Decision-making is a priority of people. Software systems are used to generate reports to assist the managerial processes.

THE achievement of competitive advantage in a supply chain should be seen in terms of "supplier" and in terms of "customer". From the provider's perspective a competitive advantage is achieved if the supplier delivers supplies as quickly as possible. If the supplier offers a competitive price, even remote, he can win the competition. Many examples may be given. In Varna, pastries are offered by many companies. Some pastry shops are in the town of Varna and nearby villages and others are considerably more distant suppliers (e.g. located in the city of Pernik). A number of suppliers have been selected for the given concessions, although they are geographically distant.

THERE are examples with the wholesale of medicines. Warehouses for medicines give discounts to local pharmacies in the form of an additional amount (rebate). The quantity of the rebate is calculated on the ordered quantities. From the perspective of "customer", he pays a higher price for fast and reliable supplies which do not always happen. Usually the cost of holding stocks is smaller than the cost of purchase.

E-LOGISTICS is interpreted by logistics managers, depending on the outlook for supply chain involving. A speaker presents his views on an issue, but he cannot be sure that the audience understands and realizes the problem in the light lit by the lecturer. An author of a literary work using techniques such as hyperbole and metaphor may hint some aspects, but we are not certain whether the author will be correctly understood by the reader.

LET'S give an example from the field of logistics. The management of a linear supply chain implies an internal functional integration. Management of logistics activities are carried out within the company. Information technologies and systems are adjusted to the parameters of the organization. For example, software that calculates the need for materials and generates a supply contract complies with storage capacity and free space in it. But it does not comply with the characteristics of the provider (distance, price conditions, discounts and reliability) and in most cases it does not recommend the most appropriate supplier.

IN linear supply chains, e-logistics is used to give effective information to other internal subsystems (such as financial, accounting, marketing and manufacturing). Coordination between partners is usually done through telephone conversations and exchange of e-mails. More advanced enterprises usually apply the concept Collaborative Planning, Forecasting and Replenishment (CPFR). **A characteristic of the concept CPFR is sharing demand forecasts between retailer and manufacturer.**

CPFR concept combines the processes of demand management and submission of offers within a linear supply chain. Thanks to the information collected (by the retailer) a demand map is created. The demand map is used jointly by: manufacturer, wholesaler and retailer. The launch of new products in the market means gathering information for sales and sending it to the upstream partners of the supply chain.

IN supply chains with network architecture information flows are considerably more complicated. The fact is that logistics information is gathered in several places and stored fragmented. The following questions should be answered:

- (1) What kind of information can be shared in the supply chain?
- (2) Who can share information?
- (3) What is the frequency of sending data to participants?
- (4) What information is required from participants in the supply chain?
- (5) How to meet participants' standards for data formatting and electronic communications?

THE answers to the marked questions are quite complex. Some answers and technological solutions to the questions are given so far. New questions arise:

- (1) Why do some enterprises leave a supply chain?
- (2) Why are companies included in a new supply chain?

THE natural desire to search new raw materials, new materials and new technologies leads to permanent dynamics in supply chains. Usually supply chains with network

architecture re built to realize certain "project", although no one speaks about a particular project. Usually the goal of the project is "pushing" product to the market or "withdrawal" of a product from the market (according to changes in demand).

THERE are known different types of membership cards, but they will not be commented. The use of loyalty club cards aims at accurate demand forecasting, reporting seasonal variations and making reports such as "Goods by clients" (after each product a list of customers who have bought it is given) and "Customers by products" (for each customer a list of bought goods is given). Both reports can be made both in the middle of an ERP system and by using: (1) instruments such as spreadsheet – Pivot Table and Subtotals and (2) instruments of database management systems (DBMS) – Query Wizard, Crosstab Query Wizard and OLAP Reports.

IT is clear that the image of old cities nowadays has changed. Small streets and squares, dotted with family shops and restaurants is replaced by supermarkets, hypermarkets and malls. Although the manifestations of globalization (in the way of shopping and life) most middle-aged people remain traditionalists. They seek peace and romance of the small towns and old cities with a long history. According to some analysts, fashion malls will soon pass.

IF we analyze what happens to the information systems in the transition to globalization (which is ongoing), we can formulate some conclusions. Both small and large stores use software systems to track sales. The use of barcodes for automatic identification is required. Making processes of operational decisions are supported by software. Small shops usually use their own tracking sales software. Each store uses a different software system. Each store maintains its own database for the sales. In the big chain stores in each store is using the same software system. Typically, data from several shops are summarized at the end of the day. Decisions regarding the choice of provider, the scope of delivery and periodicity of sending requests to suppliers are taken centrally, rather than by a regional manager or by a store manager.

INTERESTINGLY, the major cities of the Roman Empire (existed before 16 centuries) on the territory of Bulgaria such as Durostorum (Silistra), Nove (Svishtov), Marcianopolis (Devnya) and Abritus (Razgrad) have the same economic impact and size as in today. Other cities like Odessos (Varna), Dionisopolis (Balchik), Tommy (Constanta) and Philipopolis (Plovdiv) failed to maintain its considerable influence over the centuries. Furthermore generational change into account and change in religious and age structure of the population. These changes have an inevitable change in supply chains and used ICT.

THE period during which a new product stays on the shelves of stores before deciding to leave it or withdraw it is different. In some European stores it usually stays an average of one month. After a one-month trial period (if customers do not buy it), it is withdrawn from the shelf of the shop or it is offered at a promotional price or bundled with other products or exported at the end of the rack, which offers promotional products.

OBTAINING added value in a supply chain is possible, because each enterprise invests own funds and efforts to improve the quality of the final product or service. The use of ICT in logistics leads to three effects. First, the added value of goods and services could be significantly increased. Second, the value of the final product and the cost of providing information for logistics processes can be calculated. Third, the final price may drop significantly due to the application of ICT in logistics.

IT is normal for companies to pursue the implementation of a business model, leading to a reduction in total costs (of all participants in the supply chain). Successful examples may be mentioned, e.g. the companies IBM, Microsoft and Hewlett Packard. It is typical of the three companies the offering a set of hardware and software solutions. Over the past 10 years the Service Oriented Architecture (SOA) and data centers provide new opportunities for partners in supply chains. Over the past five years a new type of cloud services (cloud computing) are offered (both hardware and software).

WHEN the customer has specific requirements to the supplier, it is combining the resources of the provider with specific customer requirements. The more requirements a client has to the supplier, the more information is provided by the supplier without explicit request. Inevitably the described interaction leads to expansion of the website of the provider with additional functionality. As an example we can mention the addition of a section on the website of the supplier "Frequently Asked Questions" or a hyperlink with the text "Download specification". Hence the need to share information on available resources with partners in supply chains generates information flows containing strategic information. **Usually both the supplier and the customer (in a buyer-supplier relationship) invest in information technologies to improve the used information systems and to achieve integration between information systems of the supplier and the customer.** Such investments typically have a multiplier effect because they are directed to the particularities of creating partnerships.

AS a result of the research in **part two** several conclusions may be made:

1. Logistics information is generated fragmentally in different places of supply chains. The need of additional information from buyers and suppliers is the main moving power in the process of requesting logistics information from partners.
2. Some companies outsource not only logistics activities but processes concerning IT services of logistics.
3. The adaption of the JIT in business leads to the increase of logistics information in supply chains.
4. The implementation of e-logistics concepts changes the way supply chains operate. E-logistics is adapted in supply chains with linear and network architecture. E-logistics aims at integrating the information systems of buyers and suppliers.

3. INTEGRATION IN SUPPLY CHAINS THROUGH INFORMATION SHARING AND INFORMATION VISIBILITY

AT this stage of business development, many companies realize the need of logistics and information integration. A significant number of managers consider the fact that certain supply chains operate for a long period of time, while others fall apart due to the bankruptcy of one of the participants. Previous studies regarding the sharing of information on orders and demand forecasting focus on the problems of information sharing between participants, with priority focus on three aspects. First, reduction of errors in the collection and transmission of orders. Second, sending signal information for demand planning. Third, the reduction of the bullwhip effect in the supply chain. In case of demand from customers, the retailer raises the levels of stocks held by a small amount (which is greater than demand). The wholesaler elevates guaranteed stocks with larger quantity and the manufacturer with even greater amount. Some researchers propose sharing information on future manufacturing of products

and future payments. Lee et. al. (2000) proposes the idea of sharing manufacturing plans to improve the distribution and storage of inventory. The approach is appropriate in cases where information on demand cannot be obtained directly from historical sales data. We believe that we may not expect just demand planning solely due to the expanded sharing of information.

THE new management thinking about the possibilities of e-logistics in many cases is dictated by companies that offer specialized software. As examples we can cite: (1) the replacement of paper documents with electronic and (2) the approaches to digitization of paper documents using a scanner and Optical Character Recognition (OCR) software (Lichev and Vasilev, 2010). **Technological improvements in information technology lead to better use of data and high speed of information flows in the supply chain.** The improved information provision of logistics ensures reliable supplies. The more logistics processes are provided with information, the more reliable is their controlling.

IN recent years we have seen a number of scientific fields, concerning logistics and informatics that are aimed at improving logistics, for example: re-engineering of business processes, lean manufacturing, manufacturing cycle time compression, theory of constraints, total quality management (TQM) and e-business. A large part of the scientific fields remain only theoretical. A number of consulting companies rely on additional knowledge and skills for business management to outgrow known theories.

THE participation of enterprises in a supply chain suggests data collection from several participants and data sharing with other participants in the logistics process. Individual functional areas of logistics and the various types of business determine the wide variety of information interactions between participants in supply chains. Most often the starting point in the search and identification of information flows are the sales of goods and services.

THE participation of an enterprise in a supply chain involves both smooth material flow and smooth information flows. This requires standardization of the applied information technologies and systems. Using a platform for e-commerce facilitates interactions between information provider of a product or service and its clients. **Strategic planning of e-logistics proposes expanding the functionality of the platform for e-commerce, so that information flows from customers to be directed to the manufacturing department, supply department and a transport company.** The choice of a suitable supplier is based not only on traditional criteria such as reliability of delivery, execution, payment terms, minimum, maximum amounts that can be ordered, but on information criteria.

THE apparent entry of supply chain processes (such as risk-sharing and cost-sharing in the supply chain) is obvious. For their implementation, there is a need to change technology and architecture of the used software applications. The relationship between business processes is growing at the expense of decentralization offered logistics services. In response to these changes, the utmost importance is placed on information technology as the only tool for process integration in supply chains. Forecasting is necessary for compiling information on certain historical events from several participants in the supply chain.

A classification of integration in e-logistics is made by Gulledge (2006). The first group integration is named "manual". The sharing of information is carried out with the direct involvement of people. Data is transmitted by phone calls, faxes and e-mails. The second group integration is called "semi-automatic". The interaction is man-machine. It is

implemented using a web-based information system. An example of the second group is a web portal of a company used by customers to enter data for orders. The third type of integration is called "fully-automated". The communication is direct. **One information system connects with another information system without human intervention or with minimal human involvement.**

THE communication between partners in the supply chain is leading to the emergence of several dependencies: the supplier becomes dependent upon the customer and the customer becomes dependent upon the supplier. The dependence on customers from the supplier means that both sides invest in information technologies and systems to be used together. The need to monitor the performance indicators of the joint operations naturally arises. E-logistics poses challenges in informatics and logistics specialists. IT should offer an adequate solution for the implementation of logistics enterprises. Logisticians must orient the concept of thinking from "logistics of an enterprise" to "joint logistics" or "logistics of a supply chain". Apparently logisticians have the difficult task to assume greater responsibility on the monitoring of inventory through the whole supply chain, not only within a single enterprise.

THERE have been many attempts to assess the partners before their admission to participate in the supply chain. Geringer (1998) concluded that the following factors are the most significant: culture of the partner, past experience, size of a company, company structure, technical know-how, financial asset management experience and access to markets. In later studies in Mehta et. al. (2006), Hafeez et. al. (2007) and Buyukozkan et. al. (2008) two sets of criteria are formed. The first group includes the following criteria: similar goals and values, similar size of the company, financial stability, similar corporate culture, maintenance of a database for logistics processes and a tendency to develop strong business relationships. The second group of criteria include: technical competence, quality of goods, services, logistics and managerial experience.

THE content of logistics information sharing has moved researchers a decade ago. Seidmann and Sundararajan (1997) define four types of proprietary information that is traditionally shared in the supply chain: (1) ordering information, (2) operational, (3) strategic information and (4) competitive information. Operational information includes data on manufacturing plans, inventory, machinery and equipment. Sharing of operational information leads to better allocation of material resources, better calculation of buffers (of stocks reserves) and synchronization of volumes of storage destinations. Strategic information is focused on financial information related to revenue and profit by products. Sharing allows the reduction of costs through better allocation of financial flows. Competitive information includes marketing information necessary for market positioning. **When sharing competitive information partners benefit from coordinating sales and evaluation of marketing campaigns.**

ONE of the most common examples of integration in supply chains in the literature on logistics is related to the relationship between manufacturers of cars and their suppliers. Suppliers of spare parts for cars rely on sales of the manufacturer to realize turnover. Some manufacturers of cars also take into account logistics integration and information integration. Examples in automobile industry show how supply chain management is transferred to the preceding (upstream) participants in the supply chain. The dependence is twofold: both the factory depends on the reliability and quality of supplies and the supplier is dependent on the factory.

AS an example we may mention the creation of weekly promotions of a product of a specific supplier. Sales are monitored both by the supplier of the product (e.g. a manufacturer of confectionery) and corporate customers of the product (supermarkets). Both sides are interested in the sales of promotional products. The natural process is generating expectations among end-users for new weekly promotion of a new product. The implementation of this innovative approach leads to the following changes in the information systems of the supplier (manufacturer of confectionery) and its corporate customers (supermarkets). **The manufacturer integrated his information system with the systems of his corporate customers at the level of monitoring of promotional products.** An information interaction is realized in January 2011. But due to the confidentiality of the information, we do not go into depth regarding the software aspects of the integration.

COMPANIES are involved in supply chains not only because of the opportunities for electronic exchange of data. They try to share the risk they take to acquire new knowledge and to provide access to new markets. Certain operations (including tasks in the information service of logistic processes) are sometimes exported to 3PL companies. A number of cases where supply chains break down are known. One possible reason is incorrect (or wrong) risk assessment. Another reason could be the ambition of every participant to transfer the risk to the other partners. A third reason can be the extremely high added value of one certain participant. It makes him the dominant participant in the supply chain.

POTENTIAL participants in the supply chain plan their involvement with certain goals and expectations for collaboration and return on investments (ROI). Companies seek to find partners with compatible goals, similar motivation and similar strategic orientation. The ambition of top managers is the seeking of mutually beneficial transactions. A number of examples of business practice are known where two or more companies jointly invest. Shares in the partnership are usually clear before proceeding with the investment. When the time for the distribution of income and profit comes, sometimes shareholders do not understand on their contribution to the collaborative work. The choice of a suitable partner is an operation that precedes the entry into a supply chain.

RESEARCHERS at Cardiff University (Mason et. al, 2006) explore the opportunities for integration of freight transport in supply chains. The time, when isolated logistics solutions are taken, is over. The pressure of the partners in the supply chain puts competitors and companies under conditions in which the desire to improve productivity is dominant. Familiar examples are obvious, when state policy is aimed specifically at measures to improve labor productivity. A number of studies are aimed at assessing the effectiveness of the work of enterprises in supply chains. A search for reasons to adapt a successful logistics strategy is carried out by several researchers. Some authors prove that transport has a key role; others focus on material flows, third absolutize customer needs, and fourth are aimed at psychological and social aspects of the supply chain.

WHEN building a model of the distribution network ICT remain aside. Information and communication technologies (ICT) do not impose restrictions on the physical model available at distribution centers. In any organization of the distribution network, the IT infrastructure is built on the model of the physical infrastructure. Therefore data in e-logistics may be used by all distribution centers regardless of their physical location.

SUPPLY chains are created to meet the following criteria: (1) flexibility, (2) rapid response to market changes and (3) high efficiency. Unfortunately, mass manufacturing is

difficult to meet the criteria. Mass manufacturing cannot meet market expectations for a lower price. **Rapid response to market changes is a rapid shift of demand information in the supply chain.** Rapid transition is unthinkable without applying the latest developments in the field of information and communication technologies in logistics practice.

THE Manufacturing Integration (MI) occurs in the 70s of the 20th century. It received popularity in the concept of MRP. The concepts MRPII and CRP are subsequently developed. It should be noted that first logistics information systems are designed on the underlying concept MRP.

INTEGRATION at an enterprise level is called "Enterprise Integration" (EI). EI emerged in the 90s of the 20th century. The ERP concept is developed in logistics. The software industry is developing software applications. The ERP concept is embedded in software products. A lot of software products are named "ERP systems" on the name of the basic underlying concept in them. The concept "Enterprise Application Integration" (EAI) is emerging in the software industry. The basic idea of ERP systems is the integration of information processes of various business processes within an enterprise.

THE third concept "Customer Integration" (CI) is born in the late 90s of the 20th century. Its development is supported by the experience of specialists in sales, marketing and e-commerce. The need for data integration for online sales with the used corporate ERP system arises. Here we find the initial phase of the emergence of e-logistics. There is a perceived need for integration of the ERP system on the needs of the customer. As a result of the development of information technology, logistics concepts tolerate new improvements. In theory we meet several logistical concepts: Make-to-order, Fulfill-to-order and Build-to-order, which in most cases have the same effect. The latest concept is an adequate reflection of the pull system in logistics.

THE fourth type of integration "Inter Enterprise Integration" (IEI) occurs at the beginning of the 21st century. The aim of the developers of ERP systems is to cover data from different sources: suppliers, customers, distributors. Again companies aim to reduce the levels of stocks held (logistically) by application of tools for business intelligence (from information point of view). Benefits measured by quantitative methods are reducing costs, reducing the final cost to client, shorten the time from order to delivery to the customer (time-to-market) and reducing the production time and reducing wait times (and relatively lead times). Benefits measured by qualitative methods are customer experience, improved labor productivity and facilitation the processes of logistics management. To achieve the fourth kind of integration (EIE) it is necessary: (1) to integrate business processes (logistically) and (2) to integrate information flows (from an information point of view). The fourth type of integration IEI outlines one of the guidelines for the development of e-logistics after its occurrence.

OPTIMIZATION models for stock reserves use different objective functions. The most common are: (1) to minimize the annual costs of storing inventories, (2) to minimize the risk of unavailable goods, (3) to minimizing the number of supplies to replenish stocks, (4) to minimize the costs of ordering and order processing and (5) to minimize costs due to lack of supplies. In systems with continuous replenishment, the quantity to be ordered (or the economic order quantity – EOQ), is included in the request to the provider when the presence in the store falls below the point of ordering (the reorder point – RP).

SUCH a system for inventory replenishment may be applied in a number of enterprises. Warehouse software used in business sometimes has a function to set the quantity and the RP

for each stock. In this case, **the warehouse software may generate automatically regular queries to suppliers.** It is needed a human intervention to check the ordered quantity. A similar situation may occur if the input in the MRP system is wrong, i.e. if a user is wrong with the introduction of the requested amount of a finished product or a technical error when entering consumption rate (a certain recipe).

THE focus of logistics management in the past few years is aimed at different management approaches (such as horizontal and vertical integration, differentiation), the launch of new products and diversification into new markets. In order to achieve a competitive advantage organizations use information technology and systems to cover information flows. Building supply chains nowadays is complemented by business networking. Participants in business networks are usually part of several supply chains. Logistics coordination is an important factor for the realization of a successful business. Proponents of both views of the architecture of supply chains (linear and network) accept the use of information technologies and systems in logistics.

IN recent years, the literature in logistics contains the term "logistics alignment". **The essence of logistics integration alignment is the following. A participant in a supply chain aligns to another one according to the characteristics of a certain product.** For example, a distributor of cigarettes can be "aligned" to the cigarette manufacturer, if the truck of the distributor has a built-in it safe. A distributor with a refrigerated truck can be "aligned" with the producer of dairy products. In both cases, the specificity of the product determines the integration between partners. Typically, a manufacturer works with several distributors. Distributors expect the manufacturer to react quickly to orders, to offer price discounts and high level of service. Decisions to reduce prices are unthinkable without the use of information from the logistics information system.

MOST of the researchers who write about SCM, seek approaches to maximize the total profit in the supply chain and to minimize the overall costs and/or time-to-market. The objective function is usually achieved by reducing the quantities of stored raw materials in warehouses, work in progress and finished goods in warehouses. The elimination of redundant activities is another popular approach. In recent years, more active attention is paid to the ability of the supply chain to respond to market changes. Because the final customer is the same for several supply chains, persons, conducting market research and preparing estimates, must be very careful.

ACHIEVING a stable structure of the supply chain is not only an organizational issue. **E-logistics (through information integration and by logistic alignment) allows a stable and long-term relationship in the supply chain.** Information sharing in the supply chain is a prerequisite for extracting additional value from participants in the supply chain.

METHODS to adapt to market changes are too diverse. In most cases, a change in the organizational structure of the supply chain is sufficient to enable the supply chain to adjust. Joint action on the development of new products or joint information systems leads to increased stability of the supply chain. As the information links between the partners get narrower, the more important are the individual participants and it is more difficult to change the architecture of the supply chain. The application of e-logistics is a prerequisite for increasing trust between partners in the supply chain.

AS an indirect result, the network structure of the supply chain is difficult to change. Therefore, a supply chain can easily lose its flexibility. In this sense, many companies are

afraid of linking information in a supply chain. The preferred conventional methods of communication are telephone, email, fax and online orders. Certain suppliers have fear (and perhaps uncertainty) that they may not be able to adapt to the software system of its supply chain partner and they may fail to submit correct information.

To solve the problems, we offer companies, which have experience in the field of e-logistics, to share it with their "suppliers" and "customers". Nobody can oblige them to share their know-how. **The possibility of economic benefit can make them open their information systems to their suppliers and customers.** There are some known organizational approaches aimed at creating "modular organizations" and "virtual organizations" (in order to provide a product to the market) also need communication between information systems. Question of the application of information and communication technologies in logistics organizations of this type are not discussed. Here we find a new direction for the development of scientific potential.

SUPPLY chain management is unthinkable without rethinking of IT links between enterprise departments and functional areas of logistics. The transition from supply chains to logistics networks suggests a number of organizational changes, including the adaptation of e-logistics systems and technologies. The process of developing new products is usually performed by employees of the manufacturing department. Modern operating conditions require a broader range of specialists to get opinions for new products.

CONCLUSIONS

INFORMATION sharing problems are not widely discussed. Information that is shared with upstream and downstream partners may be quite different. For instance – information about sales, new product development, products specifications is shared within a supply chain. Information about future demand may also be sent back to upstream partners.

IT enhancements lead to better use of ICT in business and smooth material and information flows among partners in supply chains. Enterprise integration may be done only by the application of recent software products. Integration among enterprises in supply chains is studied in several layers. The most difficult task is the integration of business processes.

THE new concept e-logistics means that partners in supply chains exchange information about material flows. They have collaborative logistics activities such as joint replenishment of inventory. The evaluation of partners in supply chains is made by the estimation of their logistics and information integration. Supply chains get flexible on fast information passing upstream and downstream. The adaption of the e-logistics concept leads to reducing the bull-whip effect, reducing lead times and reducing the time-to-market.

E-LOGISTICS through information integration and logistics logistic alignment allows a stable and long-term relationship in the supply chain. Information sharing in the supply chain is a prerequisite for extracting additional value from participants in the supply chain. The application of e-logistics is a prerequisite for increasing trust between partners in the supply chain

THE essence of logistics alignment is the following. A participant in a supply chain aligns to another one according to the characteristics of a certain product. The logistics alignment helps new companies to enter easily supply chains. As the information links between the partners get narrower, the more important are the individual participants and it is more difficult to change the architecture of the supply chain.

FUTURE research may focus on extending the proposed concepts in e-logistics and solving other types of logistics problems. Future research may focus on other aspects of business and logistics alignment. Future articles may discuss the problems concerning the change from supply chains to supply networks. New quantitative and qualitative methods may be applied for the estimation of the contribution of each partner in a supply chain and for measuring the collaborative work. New case studies about logistics alignment may be created.

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