

# **INFORMATION AND COMMUNICATION TECHNOLOGIES USAGE FOR ELECTRONIC BUSINESS DEVELOPMENT**

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## **ABSTRACT**

The article deals with the dynamics of information technologies and communication (ICT) and electronic business (e-business) development in the European Union (EU) and Lithuania, analyses problems, practical and theoretical aspects, raises priorities, reveals tendencies related to introduction of e-business technologies aimed at integration of logistics processes and information. Internal integration of logistics processes in an enterprise is more common than integration between enterprises; therefore the main priority in the field of e-business development is efficient external integration of logistics processes. Research shows, that integration is becoming an important necessity to many leading enterprises.

Apply of information technologies (IT): automatic identification (Auto-ID), electronic product code (EPC), automatic speech recognition (ASR) used for voice picking operations, global positioning system (GPS) technologies for external integration of logistics processes and information are introduced and technological capabilities of these technologies towards e-business development and effective external integration are presented.

## **1. INTRODUCTION**

The world moves from the industrial economy to network and digital economy. The economy world has shifted business from national to global and more interdependent marketplaces; this business is based on activities and information around the world. Therefore importance of ICT is rising. Then ICT is used, automatic data exchange methods in logistics changing traditional manual methods. This builds efficiency in logistics, influences logistics business models and e-business development.

The target of e-business is to reach better efficiency by integration of logistics processes and information. Nowadays integration of logistics processes inside enterprise is more developed, then between business partners. Integration may be focused on data exchange and processes. IT of different enterprises have to be able to communicate among themselves and

to use information which was exchanged, therefore enterprises need complex IT and e-business solutions adapted to the technical and organizational needs.

The goal of this article is to disclose the dynamics of ICT and e-business in the EU and Lithuania, to generalize the trends while implementing e-business technologies for the integration of enterprise logistics processes and information, to identify technological possibilities, IT solutions for e-business development.

In the paper are used methods of systematic, empirical and statistical analysis.

## **2. E-BUSINESS CONCEPT AND THE DIVERSITY OF PROCESSES**

E-business concept covers processes that use the internet or other telecommunication means for the implementation of business operations. If enterprises associate their activities with e-business, their aim is to combine different IT and information received electronically between subsidiaries, units, divisions, suppliers and clients, and to create a strategic advantage and efficient operations of enterprises. The term of e-business was first started to be used by *IBM* in 1997. *IBM* e-business defines as an ambition of an enterprise to adapt the internet for the implementation of business operations, to combine different technologies and processes, and to create an added value to business.

There exists dual integration of logistics processes and information:

- when logistics processes of an enterprise (order management, invoice issue, etc.) and information are integrated mutually – such integration is called internal;
- when logistics processes and information are integrated among different enterprises, such integration is called external.

Enterprise uses the internet, intranet, website, local computer network (LAN) and other technologies for the integration of logistics processes and information. Data transferred to the computer stations and databases may be integrated into the IT.

Irrespective of the fact that one third of enterprises apply the internal integration of logistics processes and information, use the ICT to a great extent, the external integration of logistics processes and information has not been widely spread: only 15 % of enterprises have integrated their order management process with the order management process of their business partners [6].

### 3. INFORMATION TECHNOLOGIES FOR E-BUSINESS DEVELOPMENT

There exist several enterprise internal IT, which, if connected to the internet, website, mobile and wireless communication, may be used for the exchange of logistics information between business partners, and together for the development of e-business.

Daily management of workload and job allocation is more flexible with IT. Theoretical and practical aspects of IT are presented in Table 1.

Table 1: Theoretical and practical aspects of information technologies

Information technologies (IT)	Definition	Analysed by authors	Implemented at
Global positioning system (GPS) technology	Tracks real-time events of deliveries globally.	Barnes, Scornavacca and Innes [2], Smith [14], McGee [13], Jonge [9].	<i>DHL, UPS, Cemex</i> [3; 4].
Automatic identification (Auto-ID) technology	Identifies and tracks objects, data, locations and events.	Mason, Chimka, Yeung and Greiner [12], Furness [8], Kinkade [10].	3% of EU enterprises are using advanced Auto-ID [6]. <i>Unilever, Coca-Cola, Ford</i> [4].
Electronic product code (EPC) technology	EPC fixed to objects (goods) works as identification, operations and sales' tracking tool, serves as unique forecasting data tool.	Thiesse and Michahelles [15].	<i>Wall-Mart, Procter &amp; Gamble, clothing industry, Ahold, Metro</i> innovation center [4].
Automatic speech recognition (ASR) technology	Computer-based system that recognizes and translates spoken words into computer data [11], presents the real-time events of tasks execution. Most commonly is used for voice picking.	Trocchia and Ainscough [16], Fernandez [7], Lcefield [11].	<i>Tony's Fine Foods, C&amp;S wholesale, U.S. Foodservice, Save-A-Lot, Metro</i> innovation center, <i>Tesco</i> for DVDs [4].

The IT help enterprises to improve the existing and create the new logistics process, make the processes more automated, "intelligent and mobile". The identification IT may be used for managing information about the movement of goods and property, e.g. for identifying the arrival and departure of transport vehicles from the territory.

Auto-ID technologies have the following advantages: fast data transmission speed, fewer manual operations, bigger control and management, accuracy and efficiency; technologies connected with the internet, help the enterprises and business partners to manage information more efficiently and reduce the operating costs. Auto-ID consists of the object identification

and data communication elements. Object identification may be performed automatically using bar codes, worker cards, speech, etc. Information about the identified object is transferred to databases wherein data is accumulated and stored.

The Auto-ID was formed in 1970. In 1970 the technology was started to be applied for identification using the bar codes. The history of some Auto-ID goes as little back as 1987: the ASR has been fast integrated into the market since 2000 [11], whilst the EPC is still in the process of introduction, therefore it is planned to be fully used in 2010.

ASR may be used for the internal and external integration. The ASR recognizes the voice dialect, tone, and accent; words, sounds and phrases. The technology converts words into computer data without using any special codes. Databases intended for converting the voice signals usually consist of a 125-250 word vocabulary. The ASR equipment consists of a microphone and a computer with the sound system. The computer is integrated with the warehouse management system (WMS) using the server that collects data and distributes it in the language understandable to the WMS. The ASR enables to manage and perform the operations of merchandise acceptance, assembly, inventory taking more efficiently, besides, these operations are performed faster and less mistakes are made as compared to the traditional manual way, also, it is possible to control and manage the order execution process.

The ASR especially improved during the last years: presently, the technology recognizes the words better, and eliminates the surrounding noise during its recognition. The ASR does not require any human intervention: the worker and the program communicate mutually by wireless LAN. The ASR records a worker's voice and allows the worker to select the language in which he will hear the WMS tasks.

The ASR may be applicable to the model B2B. By connecting the ASR with the website, the goods suppliers may be electronically informed about the process of delivery acceptance, whilst the goods receivers about the process of order assembly. With the increase in the order execution quality, the correction of mistakes will incur smaller costs, what will enhance the trust between enterprises. Since the ASR enables to monitor the order execution process, the buyer of goods may refuse to verify the goods received.

The early development of the majority of Auto-ID is associated with military industry; the Auto-ID technologies are quite new and have not been analysed in greater detail. The publicized reference sources usually provide a review one of Auto-ID technologies, with a description of its technological aspects, identification of advantages.

The EPC technology is focused on the efficient external integration. This is a complex solution having a common public portal, wherein the data transmitted by suppliers, manufacturers and clients is synchronized.

The EPC is an analogue of the bar code. The EPC consists of the following chapters: standard version, manufacturer, product code and serial numbers that together make the product<sup>1</sup> unique. The unique number is transferred on a microchip that is placed on the label identifiable by the radio waves. The EPC reader identifying by the radio waves reads the unique number. Contrary to the case of bar codes, seeking to ensure the EPC, no precise location of the EPC has to be illuminated by the scanner, it is only necessary that the EPC label was within the coverage of reader scanning. Communication elements ensure the communication of information. Using the enterprise's computer network and internet, the reader transfers information to the local data accumulation server that communicates the data received to the global server. Data about the products is compiled in the database of the global server. Trade partners authorised to see these data may find information in the database associated with specific EPC [5].

The EPC code is expected to change the bar code within 10-12 years. The enterprises expect from the EPC solution that real-time supported data [5] will hold reduce the cases of stock depletion, enhance the efficiency and sales turnover in the world market [1].

For the management of property and freight, a GPS technology is used even more often in enterprises. This is a satellite navigation technology enabling to identify the location of an object at any time and at any place with accuracy of several meters. The satellite navigation system transmits signals containing time and distance. These data is accepted by a receiver that, with consideration to the time of radio signal propagation, measures the distance and identifies an accurate location on the Earth globe [9]. Each square meter in the Earth planet system has a unique address.

GPS had a crucial effect in the wars of Afghanistan and Iraq. Presently, GPS becomes a mass-consumption merchandise; such as computers, cars. The GPS is applied in planes, ships, cars, etc. Each day navigation companies may observe the travel of ships sent on the screen of a compact GPS device. Presently the GPS is quite widely applicable for transport monitoring. Using the position identification sensors the transport monitoring system revises

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<sup>1</sup> UPC code and European Article number EAN consists of 2 sections: manufacturer and product identification numbers.

data, accumulates it, analyses and represents it in the digital geographic data map. Transport monitoring system may control the team comprised of several thousand transport vehicles, to inform about the places of their congestion.

In many cases the enterprises when hiring a transport company for freight carriages seek to observe the location of freight. Therefore, using the ICT and by developing e-business opportunities, the freight dispatcher, recipient and the shipping company could exchange GPS information about the freight carried on the internet. Using the GPS enterprises may improve the client service, plan the time of freight delivery.

**4. THE DYNAMICS OF E-BUSINESS IN THE EUROPEAN UNION**

The ICT application in the EU enterprises for the development of e-business [6]:

- purchase orders are received electronically by 33% (in Lithuania by 7%) enterprises;
- sales orders are submitted electronically by 10% (in Lithuania by 6%) enterprises;
- the internal integration is applied more widely than the external integration (in Lithuania the internal integration is applied by 18 %, external- by 6% of enterprises).

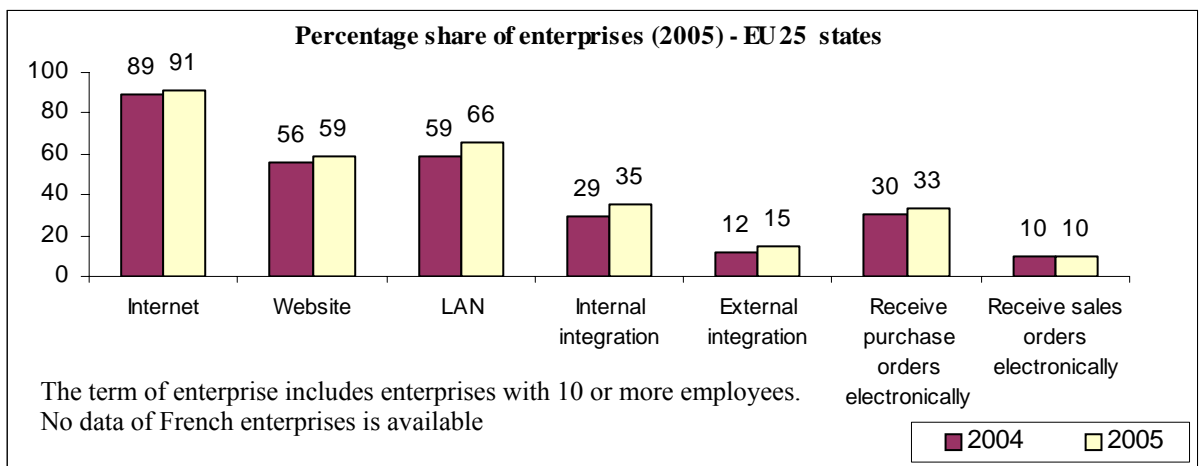


Fig. 1: Trends in ICT application and e-business in EU enterprises [6].

The application of e-business technologies in the EU:

- 29% enterprises in EU 25 states share the documents on order execution and shipment with business partners;
- e-business by applying the internet technologies is the most popular in Great Britain;

- 21% of enterprises in the EU 25 states think that because of the ICT they use e-business opportunities to a great extent [4; 6]. When analysing information about successful application of the ICT compiled in BEEP database it has been observed that IT enterprises try to communicate among themselves more by improving e-business solutions; enterprises integrate subsequent B2B solutions: they most actively integrate data exchange standards, and less actively – extranet solutions (such as orders and delivery, transport monitoring and control systems), and quite inactively the systems of electronic invoice exchange. Freight shipment enterprises increasingly apply the GPS for the integration of logistics processes [3].

## **5. CONCLUSIONS**

Under the globalization condition it is very important to establish the conditions for successful electronic business development. The study conducted enabled to conclude that the ICT are widely applicable in the European Union, yet enterprises do not apply them widely in the electronic business field. The trends in Lithuania remain similar, however, a smaller number of enterprises use the ICT for the electronic business.

Seeking to accelerate electronic business development, a uniform mechanism for their integration is necessary and uncomplicated mutual integration of technologies. The following trends in the electronic business development have been noticed:

- united usage of ICT and electronic business technologies exists in European Union and Lithuania;
- the integration of information and electronic business technologies will create effective integration of logistics processes and information, the usage of electronic business may be activated;
- IT enterprises take increasingly more initiatives for electronic business development. Besides IT enterprises establish separate organisational units for the development of electronic business solutions.

While developing electronic business it is also important that each enterprise actively participated in the electronic business changes that while managing the technologies and logistics processes and automating them, enterprises sought to exploit maximum possibilities for the internal and external information exchange and its usage.

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