USAGE OF EDI (ELECTRONIC DATA INTERCHANGE) IN THE CZECH REPUBLIC

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Abstract: The growing interest in the use of Electronic Data Interchange (EDI) has brought many companies into using this form of inter-organizational electronic commerce in past years. However, there are approaches and opinions discussing efficiency, usage of EDI and mostly, whether EDI is still up-to-date or needed to substitute with another platform instead. Based on these kinds of discussions, we conducted a survey to study the current status of EDI usage in the Czech Republic. Findings from our survey helped us to understand whether companies find EDI adoption as useful and efficient or whether they are in the process of substitution. In addition, according to results of the survey, there was found out percentage of companies actively using EDI and if so, then for what purpose is this platform used mainly – which EDI messages are mostly exchanged and many others. This paper is based mainly on the research of Czech and foreign literature, survey filled by companies of particular areas of business in the Czech Republic. Main goal of this paper is to find out the current situation of EDI usage in the Czech Republic and propose some more ideas regarding EDI usage or its substitution.

Key words: Electronic Data Interchange, Information technology, Web-based EDI, data exchange

JEL Classification: E21, E23, R41

Introduction

Electronic Data Interchange (EDI) technology is a type of inter-organizational Information Technology (IT) that enables trading partners to exchange data automatically between their information systems (Agi, Ballot, Molet, 2005). Electronic data interchange (EDI) is a form of inter - organizational electronic commerce where one trading partner (a buyer or seller) establishes individual links with one or more trading partners through a computer-to-computer electronic communication method (Brancheau, Janz, Wetherbe, 1996; Lee and Lim 2005).

Structured exchanged messages are meant to be transmitted in a predetermined format and content as well as semantically normalized. In terms of information technology, which operates at the transition from the corporate or industry standards to international standards so that the information flows as well as business operations as the geographic borders would mean always less and less obstacles. There can be found many benefits in EDI adoption such as - administrative costs savings (strictly electronic documents exchange, text and content shortening in documents, reducing the risk of standard definitions different interpretation, easier the creation of data bases in automated processing, multiple use only one recorded input data for both partners and thus a substantial reduction risks of data errors, significant savings related to time elimination, personnel and space-consuming while using and archiving pure paper documents), the higher efficiency of the distribution chain according to modern management systems such as VMI (Vendor Managed Inventory), QR (Quick Response), JIT (Just in Time), ECR (Efficient Consumer response), etc.

1. USAGE OF EDI (Electronic Data Interchange)

Electronic data interchange (EDI) is the description used for the exchange of structured trade data between the computer systems of trading partners. EDI is not a new idea; it was started in the 1960's in the USA. It is now replacing the traditional paperwork systems that have been used by organisations for controlling the purchasing and movement of materials and components. The development of EDI has enabled organisations to improve traditional relationships and at the same time to reduce their costs and lead times (Mcgowan, 2012). Put simply it is the transmission and receipt of trading documentation such as purchase orders and invoices electronically. This eliminates the rekeying of data, the additional checking that this involves and the elimination of the delays caused by the preparation of documentation and the postal services (Mcgowan, 2012). EDI is a strategy of cooperation between suppliers, distributors and retailers so that they can respond to consumer demand more rapidly the use of EDI can result in increased sales, reduced stocks and improved profits (Banerjee, Kumar, 2002).

There are four elements required for EDI to work, these are - electronic mail for rapid interpersonal communication, on-line networks to provide rapid communication, electronically based business documentation, standard protocols for file transfers.

The benefits of EDI can be summarised under two main headings; these are:

- STRATEGIC

Under this heading are included a faster trading cycle and the use of just-in-time manufacturing. JIT manufacturing results in lower stock levels.

- OPERATIONAL

  The benefits here are reduced costs due to the elimination of rekeying of data, the reduction of paperwork and postage costs. Improvements in paperwork lead to a better cash flow.

A more careful definition of EDI is "the exchange of documents in standardised electronic form, between organizations, in an automated manner, directly from a computer application in one organization to an application in another. To gain knowledge about these processes have been proposed recently, two different approaches to facilitate the application of sub-processes and techniques for inter-organizational business processes based on EDI messages:

- Message Flow Mining (MFM),
- Physics Activity Mining (PAM) (Engel, Bose, 2014).

As the essential elements of EDI are following elements. The use of an electronic transmission medium (originally a value-added network, but increasingly the open, public Internet) rather than the dispatch of physical storage media such as magnetic tapes and disks; the use of structured, formatted messages based on agreed-upon standards (such that messages can be translated, interpreted and checked for compliance with an explicit set of rules). Another element is relatively fast delivery of electronic documents from sender to receiver (generally implying receipt within hours, or even minutes); and direct communication between applications (rather than merely between computers).

EDI depends on a moderately sophisticated information technology infrastructure. This must include data processing, data management and networking capabilities to enable the efficient capture of data into electronic form, the processing and retention of data, controlled access to it, and efficient and reliable data transmission between remote sites. A common connection point is needed for all participants, together with a set of electronic mailboxes (so that the organizations' computers are not interrupted by one another), and security and communications management features. It is entirely feasible for organizations to implement EDI directly with one another, but it generally proves advantageous to use a third-party network service provider (Newman, Bruce, 2015).

Main benefit of EDI is fact that EDIs save unnecessary recapture of data. This leads to faster transfer of data, far fewer errors, less time wasted on exception-handling, and hence a more

streamlined business process. Benefits can be achieved in such areas as inventory management, transport and distribution, administration and cash management. EDI offers the prospect of easy and cheap communication of structured information throughout the government community and between government agencies and their suppliers and clients.

EDI can be used to automate existing processes. In addition, the opportunity can be taken to rationalise procedures, and thereby reduce costs, and improve the speed and quality of services. Because EDI necessarily involves business partners, it can be used as a catalyst for gaining efficiencies across organizational boundaries. This strategic potential inherent in EDI is expected to be, in the medium-term, even more significant that the short-term cost, speed and quality benefits (Veselá, Radiměřský, 2014). Introduction of EDI communication consists of several major steps. They can be generalized to most companies. The content and the individual steps may vary, depending on the circumstances of implementation (used information system, method of work in society, selected EDI solutions provider).

The main points of the implement of EDI:

- selection of EDI solutions provider,
- ensure communication,
- providing identification,
- ensuring integration.

Implementation can be divided into the following steps:

Introduction to EDI. It is useful to get an idea of what EDI allows you can bring your company, what can we expect and what to request. After introducing EDI is based on lessons learned selection of the appropriate EDI solutions provider. In large companies, this point is sometimes associated with the tender, etc. Provider will discuss the details of the process, the optimal procedures, steps and deadlines.

2. Consignment, Buffer and Safety stock

Consignment stock MIN a MAX concept. CS is a logistic technique in which the vendor, instead of the buyer, is in charge of managing the buyer's inventory and triggering replenishment orders. In particular, the buyer virtually removes the procurement lead-time, since the responsibility of the replenishment lies completely with the vendor, who keeps a stock of its property at buyer's plant: the buyer uses the stock materials according to his daily production requirements (Sriram,

Arunachalam, Ivancevich, 2000). Consequently, it is possible to minimize both the ordering and the stock holding costs of the buyer, because materials formally owned by the vendor can be collected (that is, purchased) by the buyer only upon demand. As a counterpart, in doing so he is responsible for keeping the buyer's inventory between a maximum (S) and a minimum level (s) and he also supports any additional cost due to stock-outs if his stock management strategy is not suitable to assure the required service level (Braglia, Gabbrielli, Zammori 2013).

Buffer stock MIN MAX concept. The major idea of the Buffer stock is its placement at a particular critical stage of supply chain. Therefore, it might consist of materials in a different step or phase of its production. It means that it might comprise of raw materials, finished and semi-finished goods. As Sitompul, Aghezzaf, Dullaert, Landeghem (2008) explains, very efficient way to tackle the effect of demand variability in a supply chain composed of locating safety stock at a number of upstream stages. The problem then is to determine the right location (i.e. the right stage) and the right amount of stock that must be kept to ensure the required overall service level at the lowest cost.

Safety stock concept. Traditionally, safety stock is exclusively stored in the final stage of the supply chain, i.e. at the retailers dealing with customer demand. As a result, the effect of variation in demand is only addressed at this final stage. In reality, this variability cannot be fully addressed at the retailer stage: its effect breaks into the upstream stages of the supply chain through to the production stages up to raw material supply stages. Therefore, it makes sense to consider placing safety stock at some critical stage of the supply chain. The problem then is to determine the right location (i.e. the right stage) and the right amount of stock that must be kept to ensure the required overall service level at the lowest cost. (Sitompul, Aghezzaf, Dullaert, Landeghem 2008)

3. Methodology and Key results

For the purpose of this paper, we used both quantitative and qualitative surveys held in the Czech Republic between January and February 2016. We randomly selected 220 companies and asked them to fill our questionnaire. We sampled the respondents/organizations from various industries, sizes and annual sales. A field of survey used to investigate the research questions, therefore the main data collection, utilized structured questionnaire whereby questionnaires were conducted with the persons mainly in charge of the logistics department related to the decision about EDI adoption and its use in the supplier's organization.

As there were, in total, 220 companies contacted in different industries and locations of the Czech Republic, 86 companies did not respond or refused to participate. Thereby we were able to compile 134 feedbacks. The response rate was therefore 61%. In addition, 48 participants were small size, 40 medium size and 46 large size companies. Out of the research we ascertained, 55% companies are not adopting EDI, 45% companies have already adopted EDI.

Tab. 1: Usage of EDI in the Czech Republic

EDI usage	No. of answers	% of answers
Yes	60	45%
No	74	55%
Total	134	100%

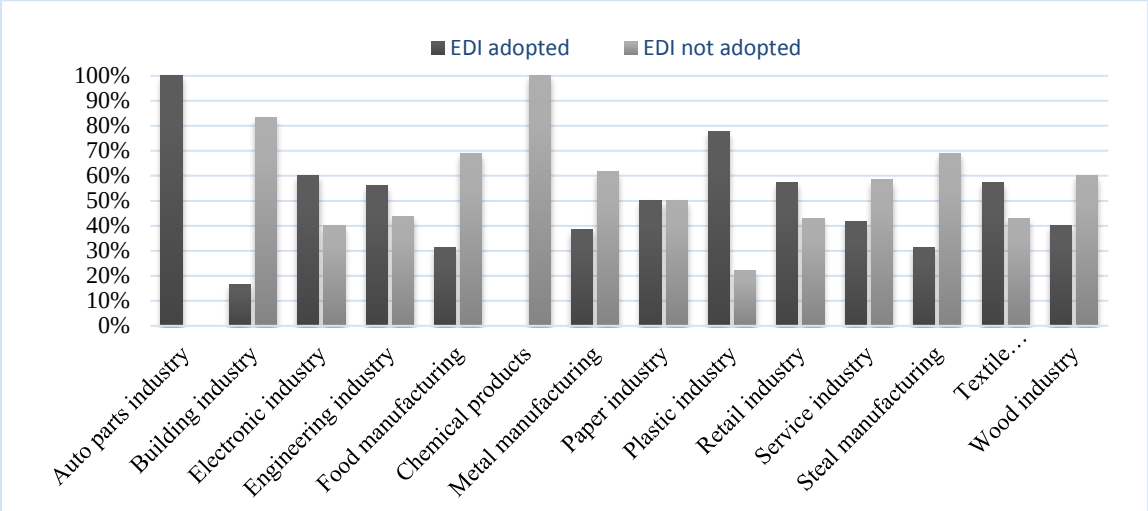
Source: authors

3.1 Industry distribution

Deeper into the sample, we were able to identify the industry distribution concerning EDI adoption in the Czech Republic. In addition, focusing on the specifications of companies that adopted EDI, we investigated the distribution of EDI users according to the size of companies and their area of industry. As we did not receive balanced number of replies, the industries are not compared with each other. Therefore, as shown in Figure 1, the EDI usage was compared just according to each industry separately.

On the one hand, 100% of the Auto part industry adopted EDI, 78% of the Plastic industry uses EDI as well as 57% of the Retail and Textile industries. On the other hand, no one from the Chemical products industry utilizes EDI; the majority of the sample within the Building, Steel manufacturing, Wood and Service industries do not do so either. In addition, a very high share (over 50% of each particular industry) of EDI adoption is mostly related to the Electronic, Engineering, Plastic and Textile manufacturing industries.

Fig 1: Usage of EDI according to industry



Source: authors

3.2 Company size distribution

Table 2 below demonstrates that mainly large and medium size companies adopted EDI. Large companies denote almost half of all the companies adopting EDI. There is a very high share linked to the medium size companies as well (42%). Concerning the companies not adopting EDI, these are mainly small size companies (55%) for which it is not worth adopting this electronic data interchange tool.

Tab. 2: Usage of EDI according to the company size

	EDI adopted	% of answers	EDI not adopted	% of answers
Small	7	12%	41	55%
Medium	25	42%	15	20%
Large	28	47%	18	24%
Total	60	100%	74	100%

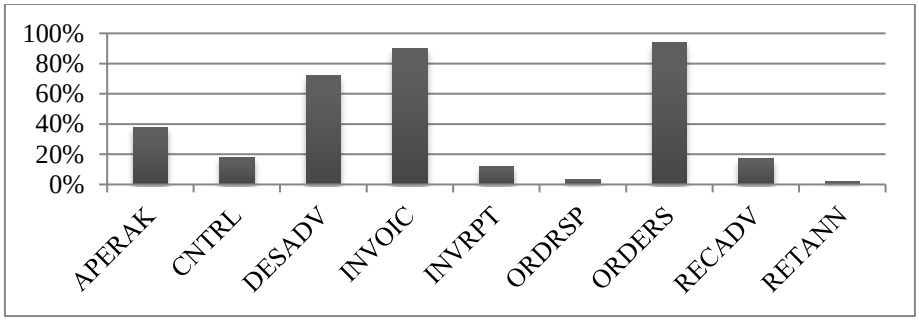
Source: authors

3.3 EDI messages/functions used

According to the results of our research, some of the respondents were contacted again with the persons responsible for the EDI adoption in order to discuss their experiences with EDI in general. Thereby, another part of our survey specification of the EDI functions/messages. For the purpose of our survey, we contacted 60 particular respondents that use EDI as shown in Table 2. We were able to conduct an interview with 42 companies/respondents; 18 respondents refused to keep on participating. During our phone interviews, we paid attention to the comments and arguments related to the EDI usage and mainly to EDI messages exchanged by those companies.

Out of this questionnaire, we learnt that the most used messages were the following - ORDERS for purchase orders, then INVOICE for invoices, DESADV for dispatch advices and APERAK for application error and acknowledgement message.

Fig 2: EDI messages distribution



Source: authors

Due to the fact, that our respondents use, from the very wide range of functions, just a few basic ones (such as for orders, invoices, dispatch advices and application error and acknowledgement message) we alluded to a very important issue the needs for closer examination in a future work.

3.4 EDI adoption according to particular logistic model usage

Moreover, as we mainly focus on the logistic models implementation – primarily on the Consignment, Buffer and Safety stock concept – this topic brought us deeper into a relation between EDI utilization and logistic models adoption. For the purpose of this paper, we used the quantitative research as another way of data collection. First, we found out the logistic models´ adoption share in the Czech Republic. According to this survey, we were able to specify that 33% of respondents did not adopt any of selected logistic models. On the other hand, 67% of the companies adopted one or even a combination of any of particular more models. The most spread model is the Consignment stock (19%) and the Safety stock (19%). In addition, the combination of Consignment and Safety stock (11%) denotes to be preferred as the combination of all the particular models (10%) as well.

Tab. 3: Particular logistic models adoption in the Czech Republic

		No. of answers	% of answers
Model adoption	Buffer stock	7	5%
	Consignment stock	26	19%
	Consignment and Buffer stock	1	1%
	Consignment and Safety stock	15	11%
	Safety stock	26	19%

	Consignment, Buffer and Safety stock	13	10%
	Buffer and Safety stock	2	1%
No model		44	33%
In total		134	100%

Source: authors

In a deeper look into the EDI adoption in relation to logistic models` utilization, we conceived the following conclusions. Table 4 demonstrates, almost half out of 74 companies not adopting EDI do not utilize any of the logistic models. It is obvious that more than half of companies do not use EDI notwithstanding the logistic models´ adoption. It is astounding that not even individual suppliers utilizing all the three particular logistic models did not take up EDI yet. As we had the chance to ask some of our respondents what makes them not adopt the EDI, we learnt, that this was because of the many obstacles from their point of view, such as not enough wide production portfolio of their, or a range of, suppliers, expensive electronic data exchange tool, no sufficient number of suppliers/customers/partners using this tool etc.

Tab. 4: <u>EDI not adopted</u> according to particular logistic models usage in the CR

EDI not adopted		No. of answers	% of answers
Model adoption	Buffer and Safety stock	1	1%
	Buffer stock	5	7%
	Consignment and Buffer stock	1	1%
	Consignment and Safety stock	5	7%
	Consignment stock	10	14%
	Consignment, Buffer and safety stock	3	4%
	Safety stock	15	20%
No model		34	46%
Total		74	100%

Source: authors

In accordance to our survey, just 17% of respondents adopted EDI but not utilized any of the particular logistic models. The most spread EDI usage is obvious as with just Consignment stock utilization (27%) and Safety stock (18%), nevertheless it might denote a connection between amount of logistic models utilization and/or their combinations, though.

Tab. 5: <u>EDI adopted</u> according to particular logistic models usage in the CR

EDI adopted		No. of answers	% of answers
Model adoption	Buffer and Safety stock	1	2%
	Buffer stock	2	3%
	Consignment and Safety stock	10	17%
	Consignment stock	16	27%
	Consignment, Buffer and Safety stock	10	17%

Safety stock	11	18%
No model	10	17%
Total	60	100%

Source: authors

Table 5 might be considered as proof that EDI adoption is preferred also with the combination of Consignment and Safety stock (17%) and all the three logistic models adoption (17%). Thereby, as the logistic models` utilization usually brings suppliers to deliver the material much more often, there might be a crucial need of EDI somewhat than stick to paper/email/fax documentation etc.

Conclusion

Due to the fact that a few recent papers and researches dealt with particular opinions as to whether EDI is "dead", its possible substitutes, its pros and cons and many others, thereby we investigated a research in the Czech Republic. As we mainly focus on the particular logistic models` implementation, we were able to find out a couple of basic pieces of information with following focus on the logistic models as well.

Firstly, we ascertained that just 45% out of our sample utilize EDI. At a deeper look to the size of companies, mainly large and medium size companies adopted EDI. Concerning the companies not adopting EDI, they are mainly small size companies for which it is not worth adopting this electronic data interchange tool. Concerning respondents´ opinion helped us to discover which messages are mostly used with the EDI utilization - ORDERS for purchase orders, then INVOICE for invoices, DESADV for dispatch advices and APERAK for application error and acknowledgement message.

In addition, we mainly focused on the logistic models implementation – primarily on the Consignment, Buffer and Safety stock concept – and our further intention was to specify the percentage of EDI users/companies adopting any of logistic models as well. Out of this research, we found out that one thirds of respondents did not adopt any of the selected logistic models, On the other hand, two thirds of companies adopted one or even a combination of more models. The most spread model denote the Consignment stock and the Safety stock concept in the Czech Republic.

However, concerning a relation to the logistic models and EDI utilization at once, almost half out of 74 companies not adopting EDI do not utilize any of the logistic models. More than

half of companies do not use EDI notwithstanding the logistic models´ adoption. On the other hand, out of the companies adopting EDI, just 17% of respondents adopted EDI but did not utilize any of the particular logistic models.

In conclusion, a future work might focus on a deeper look into possibilities of EDI substitute/substitutes, its/their advantages and disadvantages and possibility of its/their substitution. Due to the fact that our respondents use from the very wide range of functions just a few basic ones such as for orders, invoices, dispatch advices and application error and acknowledgement message, we alluded to a very important issue of a substitution that needs closer examination in a future work as well.

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