Various Electronic Data Interchange (EDI) Usage Options and Possible Substitution

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Summary

Recently, there were many approaches and opinions discussing efficiency and usage of EDI and, additionally, whether EDI is still up-to-date or companies require substituting it with another platform instead. Based on these papers and findings, we conducted a survey to study the current status of EDI usage in the Czech Republic. Findings from our survey helped us to understand the relation between EDI adoption and eventual EDI substitution with regard to the size of companies in the Czech Republic. This paper is based mainly on the research of Czech and foreign literature and survey conducted in the particular areas of business in the Czech Republic. The main goal of this paper is to find out the current situation of EDI usage according to company sizes and a potential for EDI substitution in the Czech Republic. This paper is considered an extension of a research about EDI adoption according to industries and logistics model implementation in the Czech Republic.

1. INTRODUCTION

Electronic data interchange (EDI) is a form of inter-organizational electronic commerce where one trading partner (a buyer or a seller) establishes individual links with one or more trading partners through a computer-to-computer electronic communication method [1]. EDI is a strategy of cooperation between suppliers, distributors and retailers so that they can respond to consumer demand more rapidly and thus the use of EDI can result in increased sales, reduced stocks and improved profits. It has been estimated that 60 to 80 percent of the costs of making sales relate to the cost of holding stocks. The value of EDI has been shown at Rover where stockholding has been reduced from one week's supply to two days through the introduction of EDI methods [2]. 'Developing and managing EDI" has become a key management issue among IS executives [3].

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 [2]. Put simply, it is the electronical transmission and receipt of trading documentation such as purchase orders and invoices. 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 [2].

2. ESSENTIAL ELEMENTS OF EDI

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 the agreed-upon standards (such that messages can be translated, interpreted and checked for compliance with an explicit set of rules); 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 [4].

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 [5].

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 the 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 [5].

Literature indicates that EDI provides both operational and strategic benefits. Operational benefits usually consist of cost reduction due to the automation and acceleration of activities related to data handling, storage and transmission; enhancement of data accuracy; reduction of the number of errors and help in accounting and billing [6]. EDI documents are intended to be sent, received and interpreted by computers. For the interpretation to be successful, the data must be in a format that both computers can understand. Use of standards minimises the difficulties and expenses that would result if each trading partner were to impose its own formats on every partner with whom it does business [7].

3. EDI IMPLEMENTATION AND INTEGRATION

EDI adoption is the process during which a firm becomes capable of transacting via EDI, usually through a front – end, PC-based EDI server. This is the first step of EDI integration that can be undertaken simultaneously. EDI integration is the process during which a firm alters its business practices and applications so that they interface with EDI applications. Internal integration refers to the variety applications interconnected through EDI, such as order-entry, invoicing, billing, and payment transfer. External integration refers to the number of trading partners, such as suppliers, customers, governmental units, and financial institutions with which the firm can transact business through EDI [8].

The number of electronic transactions and transfer of electronic documents is increasing and growing rapidly. Transactions include, for example, the direct exchange of business documents with structured documents and electronic data interchange. The transaction is completed either directly or through an intermediary. [9] 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 implementation of EDI are the following:

- 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 brings to your company, what to 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. Provider will discuss the details of the process, the optimal procedures, steps and deadlines. Integration with enterprise information systems is necessary to prepare an interface for communication with EDI system (possibility of implementation of import and export files in-house, or vice versa draft translation templates for the existing imports and exports). Ensuring communication with EDI mailbox (EDI provider). Nowadays we use the internet and it is therefore necessary to have an Internet connection, adequate dialup Internet Service Provider – (in large parts of the country for free). Ensuring the company's identification number GLN (EAN code). This number is assigned by the GS1 Czech Republic association (formerly EAN Czech Republic). Producers whose goods indicate EAN codes already have this number. In some rare cases it is not necessary to apply for an EAN code. Testing EDI interface. Before deploying the enterprise information system some adjustments should be made to test the format and content accuracy and completeness. The actual implementation or deployment of EDI solutions. Simultaneously with the deployment of EDI solutions begin the test operation with the customer / supplier. The trial operation of EDI message exchange. Evaluation of the verification operation. Starting sharp exchange of EDI messages [10].

Organizational innovation by EDI is subject to many factors in different categories, including characteristics of industry, organization, task, and partner relations. The development and standardization of EDI messages demand support from industry, associations, and government. Industry-specific conditions, such as external pressure and existence of standards, have been reported to affect the implementation of EDI. Organizational factors, such as size and managerial attitude, are important for EDI implementation, because they affect the willingness of management to incur the high expenses of initial investment and structural changes in business practices. IS should be sophisticated and sufficiently computerized to allow for integrated EDI; this helps increase the impact of technology.

4. RELATION BETWEEN EDI AND RFID (RADIO FREQUENCY IDENTIFICATION)

In both intercontinental and continental transports, consignment warehouses are increasingly being used in logistic supply chains. However, in the process of consolidation of goods in these consignment stores, a missing control mechanism often results in serious faults. Such problems appear primarily in the case of the consolidation of bulk goods or liquids. Such consignment stores are available in several ports.

A responsible worker manipulates with the goods to unload them, however, due to the insufficient control system, it might happen that the goods are mixed with other goods or are transported in another container with completely different goods. Additionally, it is very difficult to prove who caused such

a fault. To avoid such problems, barcodes or RFID (Radio Frequency Identification) codes can be used to label goods transported in a vehicle (truck, railway wagon) and during the process of unloading goods into a consignment warehouse [11]. RFID, as well as barcodes, are used for contactless short-distance communication. By matching the codes and particular information it is possible to start unloading or loading the goods.

EDI will ensure that all the members of the supply chain follow the set technological procedures for safe unloading or loading of goods from/to the correct part of a consignment warehouse [8], [12-14].

5. METHODS, METHODOLOGICAL APPROACHES

As our previous papers were already dealing with EDI in a very general way, our main intention was to present a deeper look into the adoption of EDI. Therefore, we used both quantitative and qualitative surveys obtained in the Czech Republic held between January and February 2016. We randomly sampled our respondents/companies from various industries, sizes and annual sales. A field survey was used to investigate the research questions; therefore, the main data collection was based ona structured questionnaire [15], [16].

Questionnaires were given to thepersons who decide on the EDI adoption or its key users. We sampled 220 companies in various industries and locations of the Czech Republic and asked them to fill out our questionnaire. Out of this sample, 86 companies did not respond or refused to participate. Thereby, we were able to compile 134 feedbacks; 48 participants of these were small size, 40 medium size and 46 large size companies. This paper is actually an extension of our previous paper – [12] Vrbová, Alina, Cempírek, 2016 - dealing with EDI adoption in the Czech Republic with regards to different industries, sizes of companies, particular logistic models´ implementation etc.

6. KEY RESULTS
6.1. EDI adoption according to company size

For the purpose of this paper, we took into consideration the size of companies as a key factor for EDI adoption. There are therefore 3 types of company sizes as below: small, middle and large size companies. We were able to clarify the approximate percentage of EDI adopters out of our sample with a closer detail to the company size. Table 1 sums our first findings – out of 134 replies/companies just 60 actually adopted EDI. Out of these 60 adopters, there are almost half of them Large size companies. 42% of respondents are medium size companies that adopted EDI.

There were representatives of the following industries with the number of the companies of each Auto parts industry, Building industry, Ceramic industry, Chemical products manufacturing, Drug manufacturing, Electronic industry, Food manufacturing, Paper industry, Plastics industry, Retail industry, Services industry, Steal/metal manufacturing, Textile manufacturing, Transport industry and Wood industry.

Table 1 Overview of EDI adoption in the Czech Republic according to company size

Size of company	No. of answers	% of answers
Small	7	11%
Medium	25	42%
Large	28	47%
Σ =	60	100%

Source: authors

(A) Small size companies – industry distribution

Table 2 shows that, out of the sample, almost third of all small size companies actually adopted EDI and these all are representatives of the following industries – Food (29%) and Metal manufacturing industry (14%), Plastic (29%) and Retail industry (29%).

Table 2 Small size companies EDI usage - according to industry distribution

Small companies	No. of answers	% of answers
Food manufacturing	2	29%
Metal manufacturing	1	14%
Plastic industry	2	29%
Retail industry	2	29%
Σ =	7	100%

Source: authors

(B) Medium size companies – industry distribution

Out of our sample there were 25 respondents of medium size companies adopting EDI. As mentioned in the Table 3 below, these were mainly Engineering (16%), Electronic industry (12%) and also Food manufacturing (12). Furthermore, it is also very important to mention the following industries as EDI adopters – Auto part (8%), Retail (8%), Service, Wood Industry (8%) and Textile manufacturing (8%).

Table 3 Medium size companies EDI usage - according to industry distribution

Medium companies	No. of answers	% of answers
Auto parts industry	2	8%
Building industry	1	4%
Electronic industry	3	12%
Engineering industry	4	16%
Food manufacturing	3	12%
Metal manufacturing	1	4%
Paper industry	1	4%
Plastic industry	1	4%
Retail industry	2	8%
Service industry	2	8%
Steal manufacturing	1	4%
Textile manufacturing	2	8%
Wood industry	2	8%
Σ =	25	100%

Source: authors

(C) Large size companies – industry distribution

At the last part of company size and industry survey, our aim was to provide a deeper look into large size companies

adopting EDI. Table 4 below shows a share of EDI adopters according to the industry. There are mainly respondents out of Engineering (18%), Auto parts (14%), Plastic Industry (14%) and Steal manufacturing (14%) as adopted EDI. Additionally, also Electronic (11%), Service Industry (11%) and Metal manufacturing (11%) which means a very huge share of EDI adopters replied to our survey.

Table 4 Large size companies EDI usage - according to industry distribution

Large companies	No. of answers	% of answers
Auto parts industry	4	14%
Electronic industry	3	11%
Engineering industry	5	18%
Metal manufacturing	3	11%
Plastic industry	4	14%
Service industry	3	11%
Steal manufacturing	4	14%
Textile manufacturing	2	7%
Σ =	28	100%

Source: authors

6.2. Substitution of EDI

At the end of our survey, our goal was to find an answer to the following question; whether our respondents take a substitution of EDI into consideration. With regard to small size companies, most of our respondents were not sure about the future or keeping of EDI. Would they decide for a substitution, then they prefer the option of Manual checking website platforms of Emails exchanging [8], [17], [18].

(D) Small size companies – EDI substitution

Small companies´ respondents mostly either do not know about an EDI future in their organisations or would not substitute the EDI for any other platform. If they would choose some EDI substitution, there might be an option of Manual Checking website platforms (14%) or Email (14%) substitution, according to our respondents as demonstrates Table 5 below.

Table 5 EDI substitution possibilities - small size companies

EDI substitution	Small size company	Percentage
Web Service API	0	0%
Manual Checking website platforms	1	14%
Phone	0	0%
Email	1	14%
Fax	0	0%
None	2	29%
Don´t know	3	43%
Σ =	7	100%

Source: authors

(E) Medium size companies – EDI substitution

A quarter of medium size companies´ respondents are not sure about the future of EDI in their companies and more than third of respondents are currently not planning any substitution. More than a quarter of respondents would substitute EDI mainly by a kind of a Manual Checking website platform (28%).

Table 6 EDI substitution possibilities- medium size companies

EDI substitution	Medium size company	Percentage
Web Service API	2	8%
Manual Checking website platforms	7	28%
Phone	0	0%
Email	0	0%
Fax	1	4%
None	9	36%
Don´t know	6	24%
Σ =	25	100%

Source: authors

(F) Large size companies – EDI substitution

With regards to large size companies, most of the respondents do not plan on any substitution. If the rest decides for any kind of substitution, then they would choose to implement a Manual Checking website platform (14%), Email (7%) or Web Service API (7%).

Table 7 EDI substitution possibilities- large size companies

EDI substitution	Large size company	Percentage
Web Service API	2	7%
Manual Checking website platforms	4	14%
Phone	0	0%
Email	2	7%
Fax	0	0%
None	15	54%
Don´t know	5	18%
Σ =	28	100%

Source: authors

7. CONCLUSION

It is necessary to point out that there are two versions of EDI adopting. There is Classic EDI and the Web EDI version. There are many differences in both versions in terms of functions, functionality, implementation, usage and mainly in the price. When our respondents decided to substitute the EDI, this might have meant that they were either using the Web version, which can easily be abandoned, or they can afford to abandon the Classic EDI despite all the efforts and costs of implementation. For some respondents it saves much more money to use email, phone, Fax or any other manual checking kind of a platform. In order to use the EDI in a way that pays off, there should be a specific number of EDI messages exchanged in a month or another gven period.

A kind of EDI substitution might also mean that our respondents stopped working with a company that required an EDI solution and do not have enough customers or suppliers to exchange such an amount of EDI messages as before. Another reason might be huge costs for EDI. This might explain small and middle size companies' number of EDI substitution options. It might seem very expensive for such companies or not efficient anymore and would appreciate simpler solutions such as a manual checking website.

This work helped identify what size of companies actually adopted EDI and if there was a possibility for an EDI substitution.

Future work might focus on finding out what difficulties, obstacles and risksmight appear during EDI adoption and which companies actually use or prefer the EDI web version which is better cost-wise.

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