

The role of electronic data interchange in electronic commerce

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Abstract

At the beginning of the third millennium, the world has experienced a new era. Rapid and extensive changes in all aspects have developed communications wider and faster. Commerce is not an exception in this regard and has widely and quickly changed as well. With the growth of internet and popularization of electronic commerce and lack of need to invest much in implementing electronic commerce for small and medium-sized enterprises and organizations, EDI users have been prompted to direct their business process flow towards electronic commerce and make use of it as a tool for changing organizations operating methods. In this process, not only are paper-based transactions eliminated, but also changes are emphasized to be made in the way organizations conduct transactions with their commercial parties which in turn will restructure processes within the organizations. Indeed, the optimal productivity and efficiency are achieved when this technology is implemented after complete investigation and analysis of intra-organizational processes and even after the implementation such processes should be constantly reviewed and restructured. This paper has introduced electronic data interchange and has studied its role in electronic commerce and its implementation restrictions.

Keywords: electronic commerce, electronic data interchange (EDI), internet, (value added network (van) double space.

Introduction

Many changes have been made in economic

relations among people, firms, and governments. Trade exchanges among individuals themselves, enterprises, individuals and enterprises and governments have quickly changed their traditional norm, which mainly relies on communicating information based on paper documents, which are moving towards exchanges through the use of electronic systems. Therefore, new methods have been invented nationally and internationally with regard to the development of computer science in order to eliminate paper-based methods so that electronic commerce, exchanging paperless business information and complementing commercial activities directly by means of computers are some of their accomplishments. To achieve above mentioned goals, EDI is the main axis or in other words the backbone of e-commerce. EDI is an acronym for Electronic Data Interchange. EDI is the exchange of commercial data in a standardized pattern among the computers. In electronic data interchange, information is organized based on a certain pattern which is identified by both exchangers so that they allow the computers to exchange data without requiring any human interventions or re-entering information in two ends of the path. In fact, EDI is an electronic gadget which enables enterprises to exchange their commercial documents in an electronic context. In international trade, electronic commerce and electronic data interchange are considered as “the secrets to survival” and nowadays countries seriously try to equip themselves with such tools. Electronic data interchange is not a unilateral closed system and taking advantage of it requires collective and voluntary participation of all relevant business partners. It is important to encourage small and large business enterprises and firms which have various financial resources to participate in taking advan-

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tage of this technology and not to be isolated. This technology aims to promote the firms efficiency through improving information flow. This paper tries to introduce electronic data interchange and also to investigate its role in electronic commerce.

Statement of the problem and significance of the study

To get a quick, easy, and secure access to commercial information and investment opportunities, to do business transactions in minimum possible time with minimum cost and also to achieve sustained economic growth and development and to get a greater share of world trade, it is necessary to be equipped provided with modern technologies ,tools instruments and important facilities and infrastructures which are required for taking advantage of modern trade methods. Electronic commerce and electronic data interchange (EDI) are the methods which could make great changes in economic structure of a country if they are realized. Firms and organizations are very sensitive to developments and changes in outside environment and selecting the best alternatives in the best time to achieve better benefit and situation in competition with others which leads to generating a big gap between them and other organizations that lack a proper understanding of environmental changes particularly new technologies. Business enterprises' benefiting from information-technology and entering the world of electronic commerce in recent decade have been considered not only as a motivational approach and quality but also as a basic approach which is necessary of great importance for survival and continuity of activity in industry in the field of intellectual competition available in all areas of production and services. Moreover, electronic commerce growth is the most important consequence of economic globalization of the countries whose elements are electronic market, electronic data interchange, and electric commerce which indicates the close relationship between information and communication technology and management and market processes. Therefore, in order for the managers to survive in the field of economic competition, various informative and communicative tools should be provided and run with a clear perspective and according to the organization needs. Finally, what is greatly important to managers in the field of electronic commerce is opti-

mal sub-structuring for developing information and communication technology in corporate structure together with sufficient cognition and positive attitude of managers towards the necessity of the presence of this phenomenon in activities of the organization. International trade is deeply and amazingly changing and developing .the countries which don't achieve electronic commerce technology and electronic data interchange will be isolated and eliminated from global trade environment.

Literature Review

The use of electronic technologies in business affairs has a nearly long history. The first attempts in this regard refer back to 1965. The possibility of getting money through auto teller machines and shopping by credit cards are among the first activities which have been done in this regard (Molla, & Like, 2001).

According to (Senn, 2000) this trend was followed by generating inter-organizational systems which made it possible to exchange information among organizations and to direct businesses electronically (Senn, 2000).

In early 1990s, the need to exchange commercial information among big firms was so vital that they themselves began to generate computer networks with limited access before the development of internet-based technologies. At that time, the method of exchanging information was called electronic data interchange or EDI. Web invention and development provided an appropriate context for high-volume data transferring among countries, organizations, and individuals. It was this context which made electronic commerce possible as stated by(Vadapalli, 1998). Communication scientists consider electronic commerce development on one hand related to the development of information technology capabilities and on the other hand associated with the reduction in costs due to the use of this technology. From this perspective, information technology is in an era which is called Internet Era. This era is considered as the third era of information technology mutation (Seddon, 1997).

This process is divided into three 20-year-old periods as the following:

- 1955-1974: Electronic Data Processing (EDP) era;
- 1975-1994: Management Information Systems (MIS) era;
- 1995-2014: Internet era;

Each mentioned period has provided electronic commerce facilities proportionate to technological capabilities of that period. In the first era, auto teller machines and credit cards were invented, and in the second era, the possibility to make use of electronic data interchange (EDI), SWIFT international banking system, and electronic funds transfer (EFT) was provided. But the greatest developments occurred within the third era that is in the age of internet development and its commercial uses. These changes were so dramatic that they made a distinction between conventional and online e-commerce (Molla and Licker, 2001).

One of the distinguishing features of the third age of electronic commerce is the huge mass of data available through the internet. Nowadays, the internet with a series of servers and communicative switches and small and large webs has created a connected world. Web is one of the most popular ways to access the internet by means of Browser technology. Millions of internet sites which are daily increasing are accessible in this way. Electronic commerce has connected the commercial software of partners to each other by means of internet and web technologies.

However, due to its consistent and standardized nature, electronic data interchange is still one of the most useful and leading applications of modern electronic commerce. With the advent of internet and XML a new chapter season was opened in electronic data interchange and its conventional use was replaced by electronic data interchange under WEB. Moreover, this technology could be used to reconstruct companies with a more effective approach and an entirely different attitude.

Components of Electronic Data

Three main components of electronic data interchange are:

1. Standards for electronic data interchange
2. Software for electronic data interchange
3. Third party networks for communication

Standards for Electronic Data Interchange

The standard is in fact a method for encoding data in order to facilitate its electronic transfer. Electronic document interchange is done in a pre-fabricated form which is agreed by two transaction parties and extensive efforts have been made to formulate such standards at the international level. The standards for electronic exchanges are mainly based

on digital data because they determine the structure and the concept of exchanging data. Standards for electronic data interchange are numerous and even various industries in different countries own their own standards. Some of these standards include:

A: ASCX12 Standard: it is the main standard for electronic data interchange which is formulated and developed by the U.S. Standards Committee.

ANSI or American National Standards Institute is an institute which has established and monitored the U.S. standards since 1918. ANSI has several committees such as X12 standard committee which is also called ANSI/ASCX12. This committee also has some sub-committees each of which is responsible to establish the standards of one certain industry. Through general consensus they set or modify a standard. Such standards make the electronic data interchange possible.

B: EDIFACT Standards: EDIFACTS means Electronic Data Interchange for Administration, Commerce, and transport. EDIFACT is an EDI standard developed by the United Nations in 1987 and was recommended to be applied for electronic commerce. It includes a series of rules and instructions which could be used to convert the information of a commercial document to EDIFACT electronic messages by means of translator software and then these messages could be transmitted to client's computer via International Telecommunications Network.

EDIFACT provides international standards for EDI; it also provides a set of syntax rules, data elements, segments, codes, and messages.

C: HL7 Standard: This documentation standard is designed by the American National Standards Institute and is used in hospital systems.

EDI Structure

Considering the technology trend and the epidemic use of electronic commerce and with regard to the history of EDI, at present, there is a group called CEFACST Steering Group (CSG) in the structure of UN-CEFACT under the United Nations Center for trade facilitation and electronic business which has 15 members so that Asia has two representatives there and one of its Asian members is the Islamic Republic of Iran. CEFACST steering Group (CSG) established six working groups to carry out its functions:

- International Trade Procedures Working group (ITPWG)
- Business process analysis working group (BPAWG)

- Techniques and Methodologies Working Group (TMWG)
- Law Working Group (LWG)
- Edifact Working Group (EWG)
- Code Working Group (CWG)

Electronic Software

One of the most important contexts in electronic commerce realization is the software context. EDI software is comprised of computer instructions which convert specific prefabricated data of the firms to prefabricated form of electronic exchange and then sends the message. Therefore, the main role of EDI software is to convert and format data and to send the messages. One of the most important and basic infrastructures for electronic commerce is making a practical program. Capability and efficiency of applied programs require accurate analysis of needs and recognition of current situation of operational programs and restrictions and improvement of methods. Even though in successful design of an applied program, accurate analysis of operational process and improvement of methods are needed, the success of an applied program highly depends on capability and efficiency of the software which is used in producing the applied program. Capabilities and efficiencies of operating system and database are known as the main elements of applied programs.

Contracted Networks

One of the contracted networks in electronic interchange is the value added network (VAN). This network is a telecommunications network which is mainly designed for data transmission and somehow processes data; therefore, the network offers services which are more than simple transmission of data. Developing value added networks increases strategic goals and reduces overhead costs.

Types of Electronic Data Interchange

A: Electronic Interchange of Combined Data: This kind of electronic interchange allows all trade exchanges to be done in such a way that all parties seem to benefit from electronic data interchange. By the use of combined electronic data interchange, messages which are sent to the parties which are not able to use electronic interchange are sent as the fax on pieces of paper or as postal letters. Furthermore, in some cases some software solutions have been offered which translate non-electronic data interchange messages of active parts of commerce

to electronic data interchange messages and transmit them.

B: Interactive Electronic Data Interchange: In most cases, electronic data interchange messages are processes as classified and marked ones. However, an interactive view is sometimes necessary for electronic commerce. An example of such conditions is flight or hotel reservation which must be confirmed.

C: Electronic Data Interchange Via Web: Electronic data interchange via new standards and integration with other online technologies is developing leading to internet electronic data interchange.

Technologies Associated with Electronic Data Interchange

Electronic Funds Transfer: This technology is mainly used to transfer funds between banks and enterprises. It is older and safer than payment technologies.

Financial Electronic Data Interchange: Financial electronic data interchange includes computer to computer transfer of payment order and details and the total of items by means of international messages.

Electronic Commerce and Electronic Data Interchange

Economics and trade corporation with information and communications technology results in “electronic commerce” which is known as “second industrial revolution”. All normal trends of commerce including searching and choosing products and services, providing funds and paying cost, delivering and services which were physically done and were tangible for the customers, could be carried out electronically in electronic commerce.

Electronic commerce could also be defined as buying and selling information, products, and services via computer networks. New items could be added to this definition so that it is defined as :

“Supporting all forms of commercial transactions via digital structures whose elements are electronic market, electronic data interchange, and electronic commerce” (Sarafzade, 2004).

Clarke (1997) believes that electronic commerce is any kind of data interchange related to commercial affairs via electronic tools.

In the past, competition among firms was summarized in two factors of quality and price, so

that every firm which was offering goods with better quality and lower price could get greater share of the market in hand. Due to the development of information technology and the break of monopolies related to trade information and their transparency, the competition has dramatically increased among the firms. Therefore, in order to survive in the market, in addition to price and quality, electronic commerce is also considered as a competitive advantage nowadays.

One of the most important goals of electronic commerce is the ease and speed of offering whatever a consumer needs. EDI with the highest speed increases accuracy as well and prevents human intervention and its related errors. Moreover, EDI reduces the costs because by eliminating manpower and related faults and delays, overhead costs arising from this matter will be dropped and other costs such as storage, etc. will significantly reduce. This matter encourages organizations and firms to use electronic commerce.

One of the benefits of electronic commerce is the reduction of interchange costs. According to EIU report the current value of global exports of goods and services is about 7000 billion dollars and 500 million dollars out of this amount is spent to prepare and exchange the related documents; in other words about 17% of the value of global transactions is the cost of preparing and exchanging documents. The cost of exchanging documents will dramatically reduce via electronic interchange. It is estimated that the use of electronic data interchange instead of conventional paper-based methods will reduce 21-70% of the costs of various commercial activities.

Electronic commerce generally and electronic data transfer particularly have been predicted and designed as tools for making changes in operational methods of organizations. In this process, in addition to the elimination of paper-based transactions, changes are also emphasized to be made in the way organizations conduct transactions with their commercial parties and also in their response to electronic data interchange which in turn will restructure processes within the organizations. Indeed, the optimal productivity and efficiency are achieved when this technology is implemented after complete investigation and analysis of intra-organizational processes and even after the implementation such processes should be constantly reviewed and restructured.

Electronic data interchange could be used and exploited in all other kinds of commercial exchange-

es. Electronic data interchange expands the range of electronic commerce models from large financial institutions to wider dimensions.

According to Information Technology Association of America, electronic commerce revolution gave hope to small companies to trade beside big corporations. Small companies should join the electronic commerce system; otherwise, they could not survive in business competition. Electronic data interchange is one of the oldest and the most basic tools for integrating commercial activities. Due to its consistent and standardized nature, electronic data interchange is still one of the most useful and leading applications of modern electronic commerce. Therefore, this golden opportunity is provided for all enterprises especially small and medium-sized enterprises (SME) to be able to work in an international level like a multinational enterprise while their exchanging costs are much less than before.

Worldwide web development, related standards and protocols and the use of information technology tools attracted more and more users to internet and electronic and developed electronic commerce.

Electronic commerce via internet is done in two ways: the first one is electronic data interchange in its current form via internet; that is internet is used for commercial communications as a free or low cost network instead of more expensive value added networks. The second one is the worldwide website which offers goods, services, and information. E-commerce has grafted the commercial software of business partners onto each other by means of web and internet technologies.

Large volume and number of transactions, high integrity of the systems, too many business partners and strong relationships between business partners, results transmission via electronic transaction and rich contents are the advantages of using electronic data interchange under web which is now considered as one of the most useful tools in electronic commerce.

The advantages of electronic data interchange in international trade and its general effects on countries' macroeconomic could be outlined as follows:

- Significantly lowering operating costs
- Doing sales (imports and exports), making international bids, controlling inventories, banking affairs and payments, doing customs activities, etc. more easily, quickly, and accurately
 - Increasing production level and quick investment return (exports promotion)
 - Implementing and coordinating working con-

ditions with other countries especially in terms of competition in global markets and also joining economic poles

- Minimizing human errors and providing better opportunities for planning and control
- Small and medium-sized enterprises entering international market, creating employment opportunities, removing poverty, and transferring technology

Considering the costs of electronic data interchange, more issues must be investigated in the form of overall benefits at countries' macroeconomic level and promotion of international communications with regard to increasing costs of applying old paper-based methods; therefore, accurate evaluation of technical and economic justification for using this mechanism will be somewhat difficult in spite of the fact that it is necessary to apply it. The costs of electronic data interchange could be generally summarized as the following:

- Costs related to public education, improving awareness, and creating legal environment
- Costs related to establishing hardware which usually exist in any mechanisms or costs related to coordinating available software
- Costs related research and studies; that is electronic data interchange should be done in the same way which is common in large mechanized projects so that costs related to primary research and studies, preparations of reports containing economic and technical justification by specialists and counselors should be accounted for.
- Costs related to required kinds of software
- Costs related to contextualizing communication and telecommunication systems which depend on selected tools.
- Costs related commercial restructuring, running electronic data interchange in segments related to foreign trade such as SWIFT project in central bank and ASYCUDA in Iran customs.
- Costs related to business data networks
- Operating and maintenance costs including the costs of developing systems and new kinds of software
- It should be noticed that from the viewpoint of economic technical justification and according to available reports and experiences, electronic data transfer and remarkable savings resulting from its application and also unique competitive effects and advantages of electronic data interchange for countries or organizations definitely outweighs its costs.

Limitations of Electronic Data Interchange

Some of the issues and problems of running electronic data interchange are as the following:

- Lack of computerized systems: one of the restrictions in working with various organizations is their computerized level. In cases that some administrations have not become computerized earlier and now suddenly deal with electronic data instead of conventional letters and signed papers, this problem gets more serious. In this case, it is difficult to make them accept common systems and methods; however, the urge of their participation and involvement even in the early stages could not be ignored because they are considered as an important link of the work chain.

- Legal issues: in applying electronic data interchange as a part of business activity, legal acceptance of electronic exchange is an important issue. Admitting electronic signatures and electronic media as evidence in judicial courts is the prerequisite for any commercial application of this technology. Therefore, effective laws are needed to be passed so that different plans could run their transactions electronically and rules and regulations should also be modified whenever necessary to be consistent with this method in order to validate electronic documents since at present by the term document means information which is written and signed on paper.

- Telecommunications Media: reliable telecommunications infrastructures are greatly important as supporting electronic documents. Recently, small satellite terminals for rental lines have been discussed, but it is practical if its implementation compensates for its related costs.

- Electronic Data Interchange Standards: admission and implementation of electronic data interchange standards and their consistency with commercial documents is another issue which requires much effort. Even though some of these documents such as air and land waybills are widely used all around the world and accepting their electronic equivalence in every country is easy, there are some other documents which are specific to the commerce of a certain country and their converting plan should be prepared as well. On the other hand, accepting documents by the industry is also very important because industries are an integral part of the implementation of electronic data transfer.

Conclusions

In recent decades, organizations have hurried towards the use of information and communications technology in business and commercial fields. Moreover, business consulting firms recommends commercial firms to invest and work in ar-

eas where it is possible to access internet and to run electronic commerce and also to enter transactions with companies which have established electronic commerce or have strategic plans to completely establish it. In electronic commerce, the main goal is to know new trade models and existing relationships within electronic environment. In addition, it should be noted that electronic commerce is a set of telecommunications technologies, processing, and storing data in relation to markets, organizations, customers, dealers, and electronic payment systems. Large centers of EDI are always trying to attract their smaller business partners to EDI world.

Nowadays, every commerce can enter the EDI world and take advantage of high speed and economy thrift which are hidden in electronic commerce. With regard to daily expansion of electronic commerce for increasing international market shares, it is necessary for all private and public sector managers to try to establish electronic data interchange in their own firm or organization.

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