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The Roles of Different Electronic Data Interchange Methods in Business to Business Marketing

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Abstract

This study aims to highlight the roles of different electronic data interchange methods (inter-organizational systems of electronic data interchange) in B2B marketing of food distribution companies which are located in West Azerbaijan Province. In terms of its aim, the present study is applied and in regard to adopted data collection method, this study is categorized into SEM-based descriptive surveys. The statistical population of the present study includes all managers and experts working in sales and marketing departments of food distribution companies of West Azerbaijan Province (n=111). The size of statistical sample was determined (n=87) by using Cochran's sample size formula. After distribution of 100 questionnaires, 93 returned questionnaires were found to be suitable for further analysis and the rest of questionnaire forms were excluded. The validity of applied tools was confirmed through confirmatory factor analysis and their reliability was supported by Cronbach's alpha coefficient. In addition, test of hypotheses was done through structural equations model run in PLS Software. The findings suggest that each electronic data interchange method (i.e. electronic interchange of combined data, mutual electronic interchange and internet based electronic data interchange) plays an effective role in development of B2B marketing.

Keywords: Inter-organizational Systems of Electronic Data Interchange, B2B Marketing, Electronic Exchange of Combined Data, Mutual Electronic Exchange, Internet-based Electronic Exchange

Introduction:

Rapid IT development and increase of Internet penetration have contributed to the growth of e-commerce in global scale. This new type of business has changed business relationships and has created diverse virtual relationships (e.g. relationships between business and supplier, business and clients, and business and customers). The organizations are well aware of potential power of Internet and therefore, they use Internet as a powerful media for guiding their workflow. In the past decade, business-to-business e-commerce has developed significantly and as an effective and cost-effective mechanism it has played a significant role in the economy. However, the growth rate of e-commerce is relatively slow in some countries, especially Asian ones. B2B e-commerce could be called a process for development of information and communication technology which supports the whole value chain too (Kaynak et al, 2005). B2B e-markets create a platform which enables interchange of information and services between sellers and buyers. B2B markets could act as a double-edged sword for sellers. On one hand, the sellers could empty their inventory more frequently than before, eliminate warehousing costs and earn additional income through their deals. On the other hand, business in such markets exposes the sellers to environmental variations (e.g. pricing variation). In these markets, organizations require new strategies for dealing with the new business environment. However, many organizations lack proper understanding of the evolving business environment and this could significantly limit their participation in B2B markets. Therefore, implementation of such mechanisms requires precise design and strategy at all organizational levels. Making decision on implementation of B2B is a challenge for many organizations. The critical decision may lead to rise or fall or an organization. As a result, all aspects of implementation should be considered before an intra-organizational agreement is achieved (Xing et al, 2012).

Today, numerous business programs are being ran on computers. In the past, each business had its own applications for dealing with different business tasks such as orders, invoices, payments, and receipts among others. However, it was soon revealed that the computers of a business company cannot connect with computers of a business partner and therefore, it is necessary to enter the received or forwarded data in the system of the other party; this process is called data entry. The solution to this problem is standardization of structure of the data interchanged between business partners so that the data could be read by all other business systems. In fact, standard is a method for data coding which facilitates electronic data transfer. Every standard has its own rules which might be different from another standard (Motiollah Haqiqi et al, 2015).

Significant changes in the economic relationships between people, companies and governments have occurred. Business transactions between different people and companies and between individuals and companies or governments have rapidly shifted from a traditional case which is mostly based on interchange of information through paper documents to transactions through electronic systems. Therefore, countries and international entities have sought to eliminate paper-based methods by adopting new methods which are premised on developments of computer and telecommunication sciences. The latter methods have provided the conditions for e-commerce, paper-less transfer of business information and doing direct business activities through computers. To achieve such objectives, EDI provides the basis for electronic commerce. EDI is an abbreviation for electronic data interchange. It refers to interchange of business data between computers based on a standardized model (Lee et al, 1990). In the

case of electronic data interchange, data is organized based on a definite model that the exchanging parties have pre-determined and this enables computers to do the interchange without intervention of human agents and re-entry of data at both sides of the path. In fact, EDI is an electronic tool for organizations to exchange their business documents in an electronic platform. In the field of global business, e-commerce and electronic interchange of data have been raised as keys to survival and many companies are striving to get equipped with the system. Electronic data interchange is not a unilateral and closed system since its application requires collective and voluntary participation of all relevant business partners. The steps should be taken in a manner that large and medium business firms with diverse financial resources can use the technology and not to remain isolated. The purpose of using this technology is promoting the efficiency of companies through improvement of dataflow (Li Shi et al, 2006). This study aims to introduce the notion of electronic data interchange and highlight its role in B2B e-commerce.

Literature Review

The suggested model of present study includes two variables of EDI (as independent variable) and B2B e-commerce (as dependent variable). In this section, the two research variables are introduced and a summary of background and main uses of each variable will be provided.

B2B Commerce

Most organizations predict that B2B markets will have a big role in future. However, development of B2B markets is not always easy. In the past few years, popularity and development of B2B markets have contributed to extensive studies on the matter. However, e-commerce lacks a general model and framework for evaluation of the extent to which e-commerce has succeeded. Most studies on this subject are limited to developed and industrial countries. This implies that developing countries have not significantly enjoyed this process. Although some countries have tried to use the findings of previous studies, their efforts have not been really beneficial. One of the significant reasons behind failure of the latter counties is their negligence of cultural differences (Khan-Beigi& Khan-Beigi, 2016).

Yoon suggested that cultural difference is a significant factor when lack of applications and development of e-commerce are concerned. He defined culture as a set of mental plans that differentiate the members of a group from others (Yoon & Cheolho, 2009).

In their study, Kaynak et al (2005) confirmed the focus of previous surveys conducted in western countries and suggested that slow development of e-commerce in developing countries might be due to lack of necessary physical infrastructures (e.g. low penetration rate of compute, weak communication infrastructures, and inefficient management of communication systems) as well as lack of proper organizational support for facilitation of structure of transactions.

Zhao et al (2008) suggested that the barriers against development of e-commerce in China are lack of EC-supporting infrastructures and lack of proper social and organizational culture.

Turban et al (2004) introduced certain factors as critical success factors of e-commerce. They include support of top managers, technical infrastructures, customer acceptance, and easy user interface of websites among others.

Chunjuan Zhai et al (2009) used technology-organization-environment framework (TOE)to study a Chinese company. The framework classified 10 key factors affecting consistent use of B2B e-markets into three groups. The three groups include technological context, organizational context (e.g. IT capabilities, support of top managers), and environmental context (readiness of e-government).

Electronic Data Interchange

Electronic exchange of data between two companies is done based on an agreed format. The data is interpreted by machines without intervention of human beings. EDI requires preapproved hardware and software which are sometimes provided by a third party company. The provision of such a service leads to certain advantages such as speed of transaction, lower cost of transaction, lower error, timely support and competitive edge over other competitors. In addition, interests of suppliers of customer are highly dependent on balance between the two variables. In this regard, certain problems could be raised such as perception of experts, separate technology, maintenance of hardware and software, need for a distinct program in each B2B connection and low flexibility. In addition, EDI commands are not programmable and web-based which make them unattractive to small and medium firms since they require high investment and create high risk exposure (Samuel, 2014),

The use of electronic technologies in business affairs has a relatively long background. The first attempts at this field dates back to 1965. Taking cash out of ATMs and purchase with credit cards are among first instances of using this technology. This was followed by possibility of developing inter-organizational systems which could exchange data between organizations and guide the business electronically (Kiggira et al, 2015).

In early 1990s, the need for exchange of business data between large companies was so serious that before development of Internet-based technologies the companies themselves started to design computer networks with limited access levels. At the time, the method was called electronic data exchange (EDI). Development of internet enables the transfer of large volume of data between countries, organizations and people. This was what enabled e-commerce. The communication scientists related e-commerce development to development of IT capabilities on one hand and to reduction of costs of this technology on the other. From this viewpoint, information technology is within an era called “Age of the Internet” (Korir et al, 2013).

Types of Electronic Data Interchange

Electronic interchange of combined data: This method of electronic interchange enables all types of business transactions and therefore, everybody can benefit from electronic data interchange. In the case of using combined electric interchange, certain messages are sent by fax or mail to those who are unable to use electronic interchange. In some cases, software solutions are provided which translate non-EC

messages of those involved in business sector into electronically interchangeable messages and transfer them.

Mutual electronic interchange: In most of the cases, EDI messages are processed in a categorized manner but sometimes, there are conditions which require mutual approach to e-commerce. As an instance, one could point to reservation of flight or hotel rooms which require further confirmation.

Internet-based electronic exchange: The electronic interchange of data through new standards and integration with other Internet-based technologies are developing and they might result in Internet-based electronic exchange (Zhang et al, 2002).

Previous Domestic Studies

Haqiqi et al (2015) conducted a study called "*The role and limitations of electronic data interchange in e-commerce*". In the study, they reviewed the history of EDI, B2B, elements of electronic data interchange, EDI standard, EDI technologies and different types of EDIs. In their paper, EDIs are divided into three types of electronic interchange of combined data, mutual electronic interchange and Internet-based electronic interchange.

Khan Beigi and Khan Beigi (2016) used ANP to identify and rank the significance levels of key success factors of B2B e-commerce. Their study was concerned with review of critical environmental factors affecting successful implementation of B2B e-commerce. The identification of factors was done through review of relevant literature and asking for opinions of IT experts. Then, case study and ANP method contributed to determination of significance levels of intended factors and their ranks. The factors identified in their study include culture, governmental support, support of top management and technical infrastructure. The results suggest that support of top management is prioritized over other factors.

Elahi and Hassanzade (2009) conducted a study called, "*A framework for evaluation of acceptance of e-commerce in Iranian companies*" and drew upon previous studies to identify the technological, organizational and inter-organizational factors which enable evaluation of e-commerce acceptance by companies. Based on pre-defined indices and criteria, they developed a framework for evaluation of e-commerce acceptance by Iranian companies and tested the framework in relation to 27 companies. The results suggested that when dealing with inter-organizational aspect the proper criteria for evaluating the acceptance of e-commerce by companies include the factors associated with customers, companies and suppliers. In regard to technological aspect, the factors of adaptability, Internet security, and sufficient hardware, speed of Internet network, remote access services and ability to associate with other companies constitute proper criteria for evaluation of acceptance of e-commerce by companies.

Research Hypotheses

H.1- Electronic interchange of combined data affects development of B2B marketing.

H.2-Mutual electronic interchange affects development of B2B marketing.

H.3-Internet-based electronic interchange affects development of B2B marketing.

Methodology

Statistical Population and Sampling Method

In terms of its aim, the present study is applied and in regard to adopted data collection method, this study is categorized into SEM-based descriptive surveys. The statistical population of present study includes all managers and experts working in sales and marketing departments of food distribution companies of West Azerbaijan Province (n=111). The size of statistical sample was determined (n=87) by using Cochran's sample size formula. After distribution of 100 questionnaires, 93 returned questionnaires were found to be suitable for further analysis and the rest of questionnaire forms were excluded. The validity of applied tools was confirmed through confirmatory factor analysis and their reliability was supported by Cronbach's alpha coefficient. In addition, test of hypotheses was done through structural equations model run in PLS Software. Table 1 shows the demographic characteristics of respondents.

Table 1- Demographic Characteristics of Respondents.

Item	Description	Percentage	Number
Sex	Female	19%	18
	Male	81%	75
Age	Younger than 30 Years	31%	29
	31-40 Years	39%	36
	41-50 Years	22%	21
	51 Years and higher	8%	7
Education	Diploma	16%	15
	Associate Degree	11%	10
	Bachelor's Degree	64%	60
	Master's and Doctorate Degrees	0.9%	8

Tools

In this study, collection of necessary data was done through B2B questionnaire which had been developed by Rostami et al (2015). Another questionnaire developed by the author was used for measuring EDI. It should be noted that the questionnaire items were scored through five-point Likert scale. The questionnaire is made up of two parts. The first part includes three questions on demographic characteristics of respondents. The second part consists of 19 items which measure the two variables of this study.

Fit of Suggested Model

In order to verify the fit of the whole model, the three indices of rms Theta, NFI and SRMR (mean difference between data) were used. SRMR index determines the extent to which the conceptual model is consistent with experimental data. SRMR determines whether acceptable data supports the set of hypotheses (i.e. influence of latent variables on each other) or not. The values of SRMR vary between zero and one. Lower significant factor loading are correlated with higher index. The threshold for this index is 0.08. If the index is larger than 0.8, the model will be characterized by major disadvantages and the whole model should be revised. This means that the whole model does not offer suitable fit. In addition, rms Theta signifies the effective value of residual covariance matrix of the external model. The measurement of fit is solely useful for evaluation of reflective model since residual of the external model is not significant for the combined measurement model. Therefore, desirability of the model was supposed to be less than 0.12.

In this study, the index is equal with 0.118. In addition, the desirable value of NFI index should be higher than 0.9. The calculations suggest that the index is equal with 0.94 which points to its desirability.

Table 2- Fit Indices of Model.

Fit Indices	Value	Desirable Value
SRMR	0.071	Less than 0.08
rms Theta	0.118	Less than 0.12
NFI	0.94	More than 0.9

Validity (Convergent)

Convergent validity means that to what extent questions that are related to a variable measure the variable. There are two main prerequisites for convergent validity:
1. The first condition is that the factor loading of the questions must be more than 0.5 or ideally greater than 0.7. Of course, there are several sources for factor loadings. In the present research, the standard factor loading is considered to be 0.5; that is, if the factor loading of a question is less than 0.5, the question is eliminated. The results of the convergent validity of factor loading are as follows. As shown in the figure below, the results of the factor loadings of the questionnaire were verified.

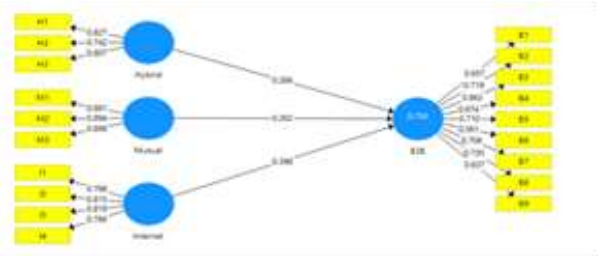


Figure 1- The results of factor loadings

2. The second condition is that the AVE of each component must also be greater than 0.5. AVE is the mean of extraction variances. The average extraction variances are obtained from the mean sum of the squares of each factor loading.

Table 3- Average Variance Extracted (AVE)

	Average Variance Extracted (AVE)
B2B	0.518
Internet-based electronic exchange	0.794
Mutual electronic exchange	0.647
Electronic exchange of combined data	0.628

As shown in the table, all the mean values of extraction variances are approximately 0.5, so the second convergent validity condition is also confirmed.

Reliability

To determine the reliability of the questionnaire, Cronbach's alpha has been used. According to Table 3, Cronbach's alpha more than 0.7 indicates the reliability of the questionnaire.

Table 4- Cronbach's alpha (reliability)

	Cronbach's alpha
B2B	0.86
Internet-based electronic exchange	0.81
Mutual electronic exchange	0.87
Electronic exchange of combined data	0.705

5. Research findings

The purpose of this study is to examine the role of EDI (inter-organizational systems for electronic data exchange) in B2B marketing of food distribution companies in West Azerbaijan province. The relationship between the above variables was investigated by the structural equation modeling technique, which is discussed below.

Figure 2 illustrates the results of the structural equation model analysis of the research, which examines the role of inter-organizational systems for the exchange of electronic data in B2B marketing.

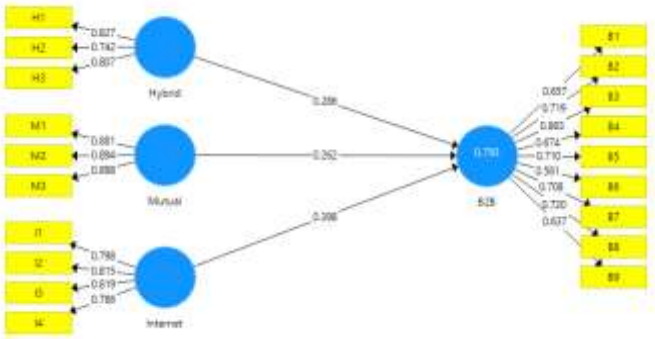


Figure 2- Structural Equation Model Analysis

In addition, the t-value analysis is shown in Fig. 3.

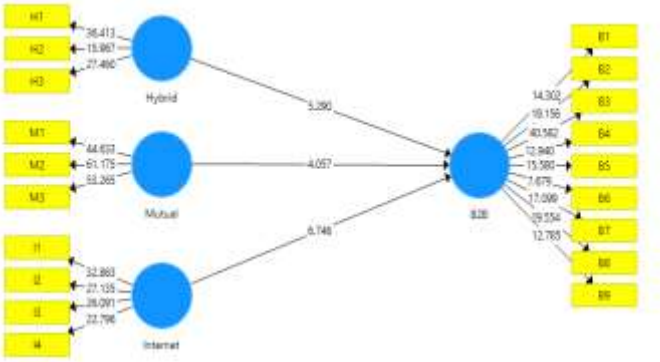


Figure 3- T-value test results

Table 5 shows the results of the test summarizing the research hypotheses with respect to the path coefficient and t-value.

Table 5- Test results of research hypotheses

No.	hypotheses	path coefficient	t-value	results
1	Internet-based electronic exchange← B2B	0.39	6.74	Approved
2	Mutual electronic exchange← B2B	0.26	4.05	Approved
3	Electronic exchange of combined data← B2B	0.28	5.29	Approved

Discussion and conclusion

The purpose of this study was to investigate the role of EDI (inter-organizational systems for electronic data interchange) in B2B marketing of food distribution companies in West Azerbaijan province. The results indicate that interactive systems for electronic data exchange play an important role in B2B marketing. The results also showed that e-commerce (0.39) had the most impact and interactive electronic exchange (0.26) had the least effect on the development of B2B marketing. The rapid development of information technology and increased Internet penetration has contributed to the growth of e-commerce around the world. This new type of business has led to a change in business relationships and the creation of virtual relationships (including business-supplier business-customer relationships, business-consumer, etc.). Organizations are aware of the potential of the Internet and use it as a powerful media to guide their workflow. In the last decade, the use of B2B e-commerce has increased dramatically and plays an important role in the economy as a cost-effective base. However, the growth of e-commerce is relatively slow in some countries, especially in Asia. In recent decades, many organizations are rushing to take advantage of ICT in business and commerce. Business advisory firms are also advising business companies to operate and invest in areas where internet access and e-commerce facilities are available, and to enter into deals that deploy e-commerce or have a strategic planning to fully deploy it. In the e-commerce discussion, the aim is to identify new patterns of business and communication in the electronic environment. It should also be noted that e-commerce is a set of telecommunication technologies, processing and storing data in relation to markets, organizations, customers, intermediaries, and electronic payment systems. The major centers and hubs of EDI are constantly trying to attract their smaller business partners to the EDI world.

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