

# Identification of Electronic Business Model Resources by using Fuzzy Delphi Panel

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## ABSTRACT

Nowadays, electronic business is one of the most important issues. The importance of E-business has caused more attention to this topic and various studies have tried to clarify features of e-business models. Several studies have been conducted to identify e-business models but a few discussions are in the field of electronic business model resources, but in the field of resourced of electronic business models have not been discussed. This study considers one of the famous classifications of electronic business models and checks that each model has which of three resources, including relationship, data and transaction. For this study, interview with experts and fuzzy Delphi method is used.

## General Terms

E-Commerce, Business models, web mining

## Keywords

E-business models, E-commerce, relationship, data, transaction, Delphi panel

## 1. INTRODUCTION

E-commerce can be defined as doing business electronically. E-commerce includes electronic trading of physical and intangible goods such as information, which includes all phases of the business such as online marketing, ordering, payment and delivery support. E-commerce includes the provision of electronic services, such as after-sales support or online legal advice and will eventually include electronic support for cooperation between firms, such as collaborative design [1].

The term e-business means doing business electronically which includes e-commerce, e-markets and Internet-based business and refers to companies whose business transactions with their business partners and consumers are performed through the Internet [2]. Business model is the architecture of the product, service and flow of information including a description of the different actors in business and their roles, the potential benefits for business actors and their income sources [1].

In fact, business models tell the story about how the company works [3]. A business model considers logic, data and other documents to support a value proposition for the customer and a viable structure of income and expenses for the company that provides that value [4]. It can be said that a business model is a conceptual tool including a collection of objects, concepts and other business relationships to discuss the business logic of a particular company [5]. Business model is seen as a tool for portraying and evaluating business logic, especially in the IT industry businesses [6].

Traditional Delphi method developed in [7] are widely used by the results of the questionnaire to obtain a constant flow of solutions. In the Delphi method, subjective data of experts using statistical analysis becomes almost objective data. When this approach is used to multidimensional and multi-objective issues and complex decision making problems, repeated many time-consuming steps of questions and answers to reach a partial consensus of views is considered a big problem. In general, this method has many drawbacks, including high costs and great time to collect data [8, 9]. In order to overcome these weaknesses, fuzzy Delphi method (FDM) developed in [10] can be useful. Using fuzzy numbers in fuzzy Delphi method is because each subject is in a range. Application of fuzzy method for decision-making and consensus on issues that goals and parameters are not explicitly specified will lead to very good results. Also in addition to comments are necessarily conclusive in the Delphi method, questionnaire return rate decreases because of the high frequency, but comments are inconclusive in fuzzy Delphi method and questionnaire return rate does not reduce because of the low frequency [9].

In previous researches, various aspects of e-business models have been investigated but have not been discussed about resources of e-business models according to definition of the resources in [13]. The structure of this paper is that in the next section the literature of electronic commerce models is evaluated. In the third section, the methodology of research is presented. The fourth section has analyzed result of the interview and implementation of fuzzy Delphi method. Section five has covered conclusion.

## 2. RESEARCH BACKGROUND

Many researchers have proposed different classification of business models. In this section, e-business models will be introduced according to turban classification. Then, resources for e-business models declared in [13] are expressed.

Turban considers E-retailing equivalent to business-to-consumer trade and has considered it as a business that is driven by sales. In fact, [11] classifies the models according to their distribution channel used in them into five categories of direct marketing by mail-order retailers that goes online, direct marketing by manufacturers, Pure-play e-tailers, Click-and-mortar retailers and Internet (online) malls. Also Turban introduces other models for business-to-consumer models including Transaction broker, Information portals, Community portal and social networks, Content creators or disseminators, Viral marketing, Market makers, Make (build) -to-order, B2B2C and Service providers. In [12], electronic business models are classified into Seventeen categories including Online direct marketing, Electronic tendering systems, Name-your-own-price model, Find the best price,

Affiliate marketing, Viral marketing, Group purchasing, membership, Online auctions, Product and service customization, Electronic marketplaces and exchanges, Information brokers, Bartering, Deep discounting, Value-chain integrators, Value-chain service providers, Supply chain improvers.

In Online direct marketing, manufacturers or retailers sell products directly to customers. It is very efficient for digital products and services and provides possibility of customization. Electronic tendering systems mean online business for tendering. Tender is a model that customer requests are sent to vendors and the lowest offer wins. In Name-your-own-price model customers decide and declare how much they are willing to pay for a product or service. A broker tries to find a provider. In Find the best price model, customers specify their needs. An intermediary compares suppliers and shows lowest prices. Customers must accept the offer in a short time otherwise opportunity will be loosed [12]. Affiliate marketing model is a coordination which a marketing partner guides consumers to vendor website. In this model, the sellers pay the commission to the partner website. Viral marketing is a model in which customers promote a product or service to friends or other people. Group purchasing provides possibility to group buying for a number of buyers to obtain discounts on purchased products. Small purchase requests to create a highly volume purchase will be coordinated. Then tender or negotiating for a lower price will be done[12].

Online auctions models include different types of auctions on the Internet. Online auctions are very common in Consumer to consumer commerce but exist in other areas of e-commerce as well. Product customization means use the Internet for self-configure products and services, prices and then order to implement them quickly. Electronic marketplaces and exchanges is referring to build virtual markets (public or private) where transactions can be done in an effective manner (more information on the buyer and seller, less transaction costs). Value-chain integrators model means data integrity and packaging for customers, vendors and others in the supply chain. Value-chain service model covers providing specific services in supply chain operations, such as providing logistic services or payment[12].

Also Information brokers model include providing related services to e-commerce such as trust, content, matching sellers and buyers, evaluate vendors and products. Online bartering model complete online process of exchange of surplus goods and/or services via an intermediary. Companies receive points for their participation and points can be used to buy needed items. Deep discounting model is sense to gain market share with cheap wholesale. For customers who decide to buy only by considering the price is appropriate. In Membership model only members can utilize the provided services, which include access to centralized information, transaction and so on. Supply chain improvers model means restructuring the supply chain to hubs or other configurations that increase participation, reduce delays, and slow and soft the flow of the supply chain[12].

[13] have focused on the components building the business model and introduced 8 business model structures called atom and believe that the business models in the real world are more complex, but in fact they are a molecule consisting of this atoms. The 8 atoms proposed by them include: Content Provider, Direct-to-Consumer, Full Service Provider, Intermediary, Shared Infrastructure, Value Net Integrator,

Virtual Community and Single Point of Contact. The resource-based theory of the firm argues that a firm competes more effectively if it commandeers and exploits resources that are keys to competitive advantage in its industry. Three resources for each electronic business model includes: Relationship, Data and Transaction.

### 3. METHODOLOGY

The purpose of using the Delphi method is access to the most reliable consensus of group of experts on a certain topic that is done by questionnaire and the opinions of experts repeatedly and according to the feedback from them. Although the intention of both Delphi and fuzzy Delphi methods is to collect the group decision of expert opinions, but fuzzy Delphi method has many advantages over traditional Delphi method. For example, traditional Delphi method requires several investigations to reach a consensus of expert opinions, while the fuzzy Delphi method needs only one investigation and also traditional Delphi method requires high time and cost [14]. Fuzzy Delphi method has been introduced by [9]and built by the composition of the Delphi method and fuzzy set. The fuzzy Delphi method can solve the ambiguity in understanding the common views of experts [15]. Previous studies have used different fuzzy membership functions. This study applies triangular membership functions. This study uses fuzzy Delphi method to determine the resources of electronic business models. Fuzzy Delphi method (FDM) steps are as follows:

Step One: Preparing the questionnaire and identifying experts and sending questionnaire to them.

In a questionnaire (including very appropriate, appropriate, a little appropriate, indifferent, a little inappropriate, inappropriate and highly inappropriate words), experts are asked to express their opinions. Using variables with definite values troubled experts in the opinion, so qualitative variables are defined as triangular fuzzy numbers to cover different mentalities of experts to the alternatives that  $a_{ij}$  shows lowest degree,  $b_{ij}$  shows moderate degree and  $c_{ij}$  shows the highest degree of membership [16]. Table 1 shows the qualitative variables and their fuzzy value.

**Table 1. Qualitative variables and their triangular fuzzy numbers [16]**

Qualitative Variable	Fuzzy Value( $a_{ij}, b_{ij}, c_{ij}$ )
Highly Inappropriate	(0,0,0.1)
Inappropriate	(0,0.1,0.3)
Low Inappropriate	(0.1,0.3,0.5)
Indifferent	(0.3,0.5,0.7)
Low Appropriate	(0.5, 0.7, 0.9)
Appropriate	(0.7, 0.9, 1)
Highly Appropriate	(0.9,1,1)

Step Two: Combining expert opinions using the equation (1) and calculating the average composition of expert opinion using the equation (2).

$$\begin{cases} a_j = \min\{a_{ij}\} \\ b_j = \frac{1}{n} \sum_{i=1}^n b_{ij} \\ c_j = \max\{c_{ij}\} \end{cases} \quad (1)$$

$$S_j = \frac{a_j + 4b_j + c_j}{6}, j = 1, 2, 3, \dots, m \quad (2)$$

Step Three: Selection of appraisal indicators

After performing steps 1 and 2 and using equations (1) and (2), if the value of  $S_j$  is greater than 0.8 (according to Pareto rule or 80/20 rule), the component is accepted [16]. This is because "This indicated that among the factors for selection, 20% of the factors account for an 80% degree of importance of all the factors" [14].

#### 4. RESULTS OF INTERVIEW AND FUZZY DELPHI PANEL

To determine the resources of electronic business models, Delphi panel was formed and questionnaire was provided. An interview was conducted through questionnaire with experts. The aim is finding resources that exist in each electronic business model. The appropriate number of experts is a point that should be considered in the Delphi panel. For selection of experts, people were considered that have valuable experience in e-commerce or were researcher in this field. 12 experts agreed to participate in this study. Expert opinions in FDM questionnaire convert to fuzzy triangular numbers and defuzzified values can be figured out after calculation.

This study accepts elements with a threshold higher than 0.8 and items with threshold below 0.8 are deleted. Table 2 shows the results of Delphi panel to determine resources of e-business models in brief. In table 2 value of  $S_j$  for each of the three resources (relationship, data and transaction) for each of the electronic business models has been determined.

Results of table 2 shows some models such as Online direct marketing, Product customization, Deep discounters and Membership have all of three sources of Relationship, data and transaction. This means that these models are used every three sources in their business. Also results show Electronic tendering systems, Name-your-own-price model, Find the best price, Group purchasing, Online auctions, Electronic marketplaces and exchanges, Value-chain integrators and Bartering business models have two sources of Relationship and data.

According to the results of the interviews and Delphi panel, Supply chain improvers model has only data resource in its business model and there is no model that have only the relationship or transaction resource but there are models that none of resources for them have been confirmed such as Affiliate marketing, Viral marketing and Information brokers.

#### 5. CONCLUSION

With the increasing use of the Internet and e-business development, a better understanding of the characteristics of e-business models is important. For a better understanding of e-business models, in this study e-business models were evaluated in terms of having Relationship, data and transaction resources. Fuzzy Delphi method was used for this study and it is recognized that according to expert opinion which of these three resources exists in each of the business models. The results show that some models have all of three resources but some models have only one or two resources

and there are models that do not have any of these resources. One of the differences in the business models is difference in their resources that cause different business processes in them. The molecular model of each business model according to identified resources can be included in future researches.

**Table 2. Results of e-business models resources determination questionnaire**

Resources	Relationship	Data	Transaction
Online direct marketing	0.9404	0.8881	0.8654
	✓	✓	✓
Electronic tendering systems	0.8542	0.9102	0.15
	✓	✓	
Name-your-own-price model	0.9261	0.845	0.7261
	✓	✓	
Find the best price	0.828	0.8991	0.3023
	✓	✓	
Affiliate marketing	0.3166	0.7338	0.2738
Viral marketing	0.3452	0.1881	0.3023
Group purchasing	0.9561	0.9201	0.239
	✓	✓	
Online auctions	0.9189	0.9596	0.7125
	✓	✓	
Product customization	0.8639	0.832	0.921
	✓	✓	✓
Electronic marketplaces and exchanges	0.9519	0.8961	0.26
	✓	✓	
Value-chain integrators	0.9861	0.9736	0.5601
	✓	✓	
Value-chain service providers	0.2903	0.37	0.3981
Information brokers	0.703	0.5441	0.612
Bartering	0.8203	0.8196	0.6721
	✓	✓	
Deep discounters	0.8203	0.967	0.8189
	✓	✓	✓
Membership	0.855	0.8994	0.8209
	✓	✓	✓
Supply chain improvers	0.3918	0.867	0.481
		✓	

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