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EFFECTIVENESS OF INTERNET PRODUCT MARKETING :
A COGNITIVE MAPPING EVALUATION METHOD

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Abstract

In this research, Internet Marketing Mix, an offshoot of traditional 4Ps of marketing mix, is proposed as a road map for determining and realizing the marketing strategies of business administration. With the aim of identifying and evaluating the product, one of the internet marketing mix elements, Fuzzy Cognitive Mapping Method is used. Fuzzy Cognitive Mapping Method helps analyse the views and events that are carried on a subject with quantitative methods. This method can also be used to measure immeasurable or subjective fields. Therefore, many disciplines make use of this method. The usefulness of Fuzzy Cognitive Mapping Method in marketing science is seen through this study. Thus, this study is expected to be a guide to the research about internet marketing. Internet product consists of two main groups according to the study: digital product and services. Their procuring and consuming can be made on internet.

Key Words : Internet Product, Digital Products, eProduct, Internet Services, Fuzzy Cognitive Mapping - FCM.

Introduction

Thirty years ago, internet was considered an important means only in military and education fields. It was hardly envisaged in those years that internet could grow in such a short time and be a competing weapon more in the field of business administration than in military and education. Today, common and dominant view is that the power of internet in the field of business administration will increase more and more as a result of the fact that internet has developed rapidly and the number of its users has increased considerably. While the scientists who concur with this view carry on their investigation on internet marketing on one hand, the marketing department authorities of business administrations develop their internet strategies on the other. The present paper, which was prepared in this context, was intended to evaluate the product which is an element of internet marketing mix and product sub-mix, with a quantitative study. The product on internet is classified separately for each customer. For instance, web-sites, reservation and banking services, music and films are each accepted as an internet product. The present study is intended to evaluate the effectiveness of product marketing through Cognitive Mapping Method.

Theoretical Background

The current society, being an information society, has witnessed sea change in the way it understands customer and marketing. Customer, in this process, is more conscious as competition is more intense. Customer has wrapped himself up in a role that is sensitive, does not like easily, chooses self-centred production, looks for difference and demands his rights to the utmost. On the other hand, an understanding of "the best customer relationship" is now the established norm rather than the understanding of "producing the best" because of demand difference and growing

competition in the market which changes continuously parallel to the technology. Even if it is accepted as difficult for business enterprises to prove themselves in such an atmosphere, it is possible to transform this negativity into opportunity. Naturally, using information technologies in proving oneself in information society is an important advantage, and that is what is exactly demonstrated through Internet Marketing.

Statement of the Problem

Today internet has reached an important stage in which information technologies are used in the field of business enterprise. It is an obligation in our age to use the internet while marketing through the web. In short, the day's primary means of online marketing (White, 1997), digital marketing (Kierzkowski et al., 1996), cyber-marketing (Settles, 1995), and network marketing (Achrol and Kotler, 1999), the is Internet. Today, it is not possible to carry out these concepts without Internet. To that end, the concept of Internet Marketing, as it takes part in literature, is stressed in our paper (Paul, 1996; Wang et al., 1998).

Internet marketing activities, an umbrella term for all the marketing activities realized on Internet, are carried out more cheaply, more practically and more effectively than other marketing means of business enterprises (Stewart and Zhao, 2000) because internet has an effect on three channels at industrial and consumer markets. First one of these is the Communication Channels between the rings on marketing chain, the second one is the Work Channels between customer and seller and the last one is the Delivery Channels (Peterson, 1997). In our world, which records an information-based development, acting to a strategy has become an obligation. With their expression that your concern about your methods of increasing operational activity while your rivals are trying to recreate your sector is something like playing the violin while Rome

burns. Hamel and Prahalad (1996) state how prior strategic idea is production-based idea. Today, competition has become more and more violent and pleasing the consumer has become harder. It is not possible to compete with the understanding of traditional competition in such an atmosphere. Therefore, business enterprises have to capture the privilege and diversity with the understanding of Strategic Marketing.

Review of Literature

Waring and Martinez (2002) suggested that there had been a change in marketing models in the transition from the traditional marketing to the Internet Marketing. In this process of alteration, there are personalized orders, electronic paying, legal and financial subjects in price sub-mix while new products, adaptation and online services take place in the product sub-mix. There are new advertising places, multimedia, spherical villages and strategies in promotion sub-mix, which is another "P" of marketing mix. In the place or spatial sub-mix, however, there are digital product transfer, direct processes and virtual stores (Waring and Martinez, 2002).

Many products are taken as models in the investigations on Internet Marketing. There are also lots of views about the product on Internet. Settles (1995) dwelled on the digital data such as program, music and video while explaining cyber market. In Liang and Huang's study (1998), which is one of the first papers in literature about the subject, the marketing and cost of products like book, shoe, toothpaste, microwave oven and flower on Internet are investigated. In other studies, product and services are classified in Internet. Sectors of finance, software-hardware tourism, media and souvenir are accepted as the major services on Internet (Kiang et al., 2000; Peterson 1997), Duffy et al. (2004). Internet product and services are classified into six categories, such as computer products, books/travel information, airline reservations, entertainment/culture,

published information and transaction facility. In another study, music, computer hardware and airline tickets are accepted as the products which online consumers use up (Zhang et al., 2006). In short, some research has been made on all products about Internet Marketing, especially digital products and services.

Methodology

Research Objective

The objective of the present study was to recognize and evaluate the product, being one of the Internet Marketing Mix Elements. It would be proper to conduct such a study on Internet, environment, by the Cognitive Mapping Method.

Data Collection

In Fuzzy Cognitive Mapping Method, whether the next map will be created or not, is decided according to the number of variables and connections in each map formed in the process of collecting data. In other words, the similarities of the collected cognitive maps with each other are examined, taking into consideration the variables and connections. Markov Chain Monte Carlo Methods (Christen and Nakamura, 2000), Accumulation Curve Analysis, are made use of in this process of decision (Ozesmi and Ozesmi, 2004).

Analytical Tool: Cognitive Mapping Method

Cognitive Maps are formed by the relationship between the ideas and events that are both measurable and immeasurable and that serve as a guide to one's or a group's manners (Chandra and Newburry, 1997). Cognitive Maps can also be thought of as a method for understanding, analysing and constructing the problems that are inserted into real life (Kwahk and Kim, 1999). Cognitive Mapping Method, whose origin could be traced to the Graph Theory, was formulated by the mathematician

Euler in 1736. Axelrod (1976) considered as a structure that examines the complex social relationship. This is a method which is used in modelling the complex system and identifying the cause-effect relationships between its components. Therefore, it has been used in many social and technical sciences (Ozesmi and Ozesmi, 2004), However, it is also a method used in illustrating the views of the people with the help of maps about deciding strategically (Hodkinson et al., 2004). The ways in which people or groups understand and perceive a problem can be presented with the help of Cognitive Maps that cover the inter-related elements (Lee et al., 1992).

It would be suitable to recognize this interaction on the Cognitive Map from **Figure-1.** According to the Figure, e_2 affects e_3 while e_1 affects e_2. On the other hand, e_3 is affected both by e_2 and e_1.

Another step of the Cognitive Mapping Process is preparing the double comparison-matrix. At this level, each variable that forms the matrix is compared with each other according to the causal relationship (Eden, 1988). If the causal relationship between variables is positive, value +1 is given and if it is negative, -1 is given in basic cognitive maps. If there is not a relationship, the value of matrix element is zero. The signs of symmetrical elements of the matrix used in basic cognitive maps are quite the opposite. Moreover, the comparison of the variables with themselves is neutral and the diagonal elements of matrix are zero. The projection of this expression, used in basic cognitive map, onto E square matrix in nxn dimension is given in equation 1. However, as the total of the outdegree and indegree values is zero in basic cognitive maps, no comment can be made about the centrality between variables. Hence Fuzzy Cognitive Mapping Method.

$$E = \begin{bmatrix} 0 & -e_{21} & -e_{31} & \dots & -e_{n1} \\ e_{21} & 0 & -e_{32} & \dots & -e_{n2} \\ e_{31} & a_{32} & 0 & \dots & -e_{n3} \\ M & M & M & & M \\ e_{n1} & e_{n2} & e_{n3} & \dots & 0 \end{bmatrix}_{nxn} \quad \dots (1)$$

Fuzzy Cognitive Maps, however, have a more complex structure. As in basic cognitive maps, buttons and arrows are used in Fuzzy Cognitive Maps, too. Unlike them, values in [-1,1] spaces are used according to the power of interaction between the variables. These values, at the same time, express the affecting direction between two variables. In **Figure- 2,** there is an example of Fuzzy Cognitive Map Affecting Scheme in which there are only -1, 0 and 1 values. Here, e_1 affects e_2 negatively. Moreover, e_3 affects none of the variables, whereas e_2 affects e_3 and e_4 positively. On the other hand, there seems no variable which affects e_5 or by which e_5 is affected. Matrix E, which is formed with dependence on the example in the **Figure -2**, is given in equation No.2.

$$E = \begin{bmatrix} 0 & 1 & -1 & 0 & 0 \\ -1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}_{5x5} \quad \dots (2)$$

Centrality and Counting of Index Values

In the method, which is used in social sciences, especially in developing strategy, mathematical modelling in graph theory are made use of. It is necessary that connectivity index – density (D), outdegree (od_i), indegree (id_i), centrality (c_i) and hierarchy index (h) be calculated by using the following parameters (Coban and Secme, 2005; Kandasamy and

Smarandache, 2003; Ozesmi and Ozesmi, 2004).

The density of a cognitive map which is called D is on index of connectivity.

$$D = \frac{C}{N^2} \quad \dots (3)$$

D in equation 3 is known as the density equation. In this formula, C represents the number of connections between N variables.

In the calculation of the centrality degree of variables, vector, which has been obtained from the total line elements of E square matrix in equation 4 and of the one from column elements, is used. There occurs c_i vector which shows centrality of variables from the total of these two vectors (equation 7).

$$E = \begin{bmatrix} e_{11} & e_{12} & e_{13} & \dots & e_{1n} \\ e_{21} & e_{22} & e_{23} & \dots & e_{2n} \\ e_{31} & a_{32} & e_{33} & \dots & e_{3n} \\ M & M & M & & M \\ e_{n1} & e_{n2} & e_{n3} & \dots & e_{nn} \end{bmatrix} = [e_{ij}]_{nxn}$$

$$i=1,..,n \; ; \; j=1,...,n \quad \dots (4)$$

$$od_i = \sum_{j=1}^{N} \overline{e}_{ij} \quad i=1,..,n \quad \dots (5)$$

$$id_i = \sum_{j=1}^{N} \overline{e}_{ji} \quad i=1,..,n \quad \dots (6)$$

$$c_i = od_i + id_i \quad i=1,..,n \quad \dots (7)$$

In order to examine the hierarchical quality of Cognitive Map, it is necessary for hierarchy index in equation 9 to be calculated. This value is in the [0,1] space. Cognitive Map is named as "fully democratic" if h=0 and as "fully hierarchical" if h=1 (Ozesmi and Ozesmi, 2004; MacDonald, 1983).

$$\mu_{od} = \frac{\sum_{i=1}^{N} od_i}{N} \quad \sigma_{od}^2 = \frac{\sum_{i=1}^{N} (od_i - \mu_{od})^2}{N} \quad \dots (8)$$

$$h = \frac{12\sigma_{od}^2}{N^2 - 1} \quad \dots (9)$$

FINDINGS

Quantitative Results

Table- 1 contains the numbers of variables and connections and the connectivity index value of the Decision Cognitive Map that is prepared by the combination of the individual cognitive maps named for each cognitive map. As can be seen from the Table, mean connectivity index (D) as the density degree of individual cognitive maps was found as 0,39 and the decisions cognitive map connectivity index as 0,34.

Formed Decision Cognitive Map is given in **Figure -3**. As can be seen from the map, seven variables and seventeen connections are defined. Matrix, which represents this map, is given in Figure - 10. As a result of the calculations made for examining the hierarchical value of cognitive map, h=0,46 is found. This finding shows that Cognitive Map is between democratic and hierarchical.

$$\begin{bmatrix} 0 & 0,8 & 0,8 & 0,8 & 0,7 & 0,9 & 0,3 \\ 0,2 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0,3 & 0 & 0 & 0 & 0 & 0 & 0,2 \\ 0,4 & 0,5 & 0 & 0 & 0 & 0,2 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0,3 & 0,2 \\ 0 & 0 & 0 & 0 & 0,3 & 0 & 0,2 \\ 0,2 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}_{7x7} \quad \sigma_{od}^2 = 1{,}845 \quad h = 0{,}46 \dots (10)$$

Matrix E in the expression of number 10 is the product of the double comparison values of variables. Centrality Vector (c_i), which is the product of the sum of the line and column vector of matrix, is given in Figure - 11. According to these findings, internet products are software (1,9), online services (1,9), multimedia (1,5), traditional services (1,5), e- text (1,3) and other products (1,1), respectively.

$$c_i = \begin{bmatrix} 5,4 \\ 1,5 \\ 1,3 \\ 1,9 \\ 1,5 \\ 1,9 \\ 1,1 \end{bmatrix}_{7X1} \quad \dots (11)$$

Discussion

It would be appropriate to group the variables obtained by Fuzzy Cognitive Mapping Method in order to recognize the product on the internet. We can bring together the multimedia, e- text and software under the umbrella term of digital products. Likewise, it would be appropriate to collect traditional and online services under the umbrella term of services. The advertisement, order or reservation, selling, consuming and procuring of both groups on Internet are possible. The last group to be included in the products on Internet is other traditional products. However, these products are not possible to procure or consume on Internet. **(Figure- 4).**

As can be seen in **Figure- 4**, digital products are collected under three titles in themselves. First one of them is multimedia products. For instance, film and music files are each digital product. These products are distributed and even consumed on the Internet. Second one is software. All the systematic code groups such as package programs, administration system and programming languages which change the computer to be functional are expressed as software. As software is the products of digital atmospheres, marketing them on Internet is an ideal way. Generally, selling and handing to the costumer of these products is e- texts. For example, selling, handling in and consuming of the books named as e- books have increased rapidly in recent years. Adobe Acrobat software of Adobe Organisation (.pdf file) is known to be the most widespread product which mediates in marketing e- texts via Internet.

Conclusion

Internet Marketing Mix, akin to the traditional marketing mix, is a road map which is used in determining and realizing the marketing strategies of business administration.

However, the road map in Internet Marketing has shown changes in contrast to traditional marketing. Internet product is the most important of these changes and is expressed by different approaches. Through this study, internet product scheme is determined by using the Cognitive Mapping Method. Thus, this study is expected to be a guide to the research about Internet Marketing. Internet product consists of two main groups according to the scheme: digital product and services. Their procuring and consuming can be made on the Internet. As the third one, besides them, other traditional products can also be included in internet marketing, though partly. For it is not possible for such products to be procured and consumed on network. Moreover, it has been proven in this study that Fuzzy Cognitive Mapping Method is an effective method that can be deployed in the Marketing Science.

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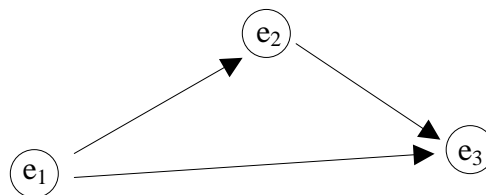**Figure 1. Structure of the Scheme by which Basic Cognitive Map affects**

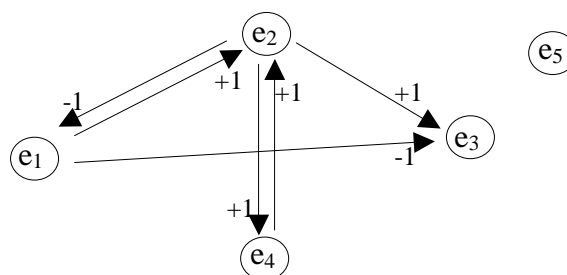**Figure 2. Structure of the Scheme by which Fuzzy Cognitive Map affects**

Table- 1 : Densities

Statistics		Variable (N)	Connection (C)	Density (D)
Individual Cogn.Maps	Valid-Number	10	10	
	Mean	6,40	13,00	0,39
	Std. Error of Mean	0,73	1,14	
	Std. Deviation	2,31	3,61	
Decision Cognitive Map		7	17	0,34

Figure 3 : Decision Cognitive Map

e_1 - Internet Product
e_2 - Multimedia
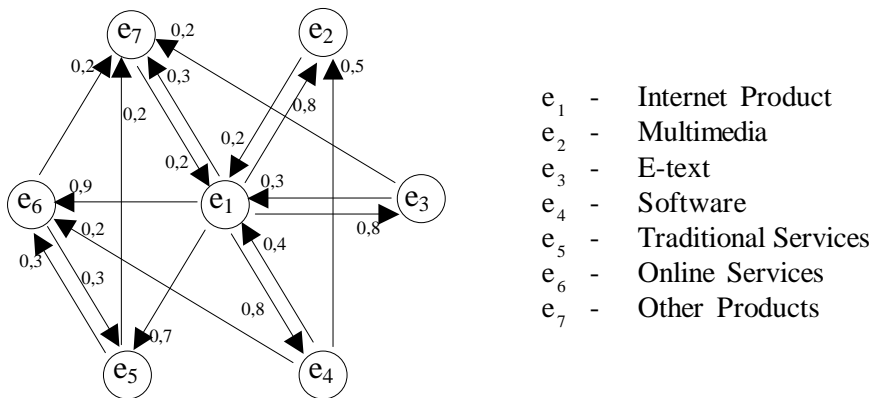e_3 - E-text
e_4 - Software
e_5 - Traditional Services
e_6 - Online Services
e_7 - Other Products

Figure 4 : Internet Product Scheme