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Evaluation of the Product with Cognitive Mapping Method, One of the Elements of Internet Marketing Mix

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Abstract: Internet marketing mix is a road map used in 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 analyze the views and events that are carried on a subject with quantitative methods. This method can also be used in 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 products consists of two main groups according to the study: digital products and services. Their procuring and consuming can be made on internet.

Key words: Internet products, digital products, eProduct, internet services, fuzzy cognitive mapping, FCM

INTRODUCTION

It was guessed until 40 years ago that internet could be an important means in military and education fields. However, in those years, it was hardly envisaged that internet could grow in such a short time and be a competing weapon more in the field of business administration than its quality of military-education means. 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 accord with this view carry on their investigation on internet marketing on one hand, the marketing department authorities of business administrations develop their internet strategies. In both cases, firstly it is necessary to recognize internet marketing mix. Because these mix, as in the traditional marketing mix, is a road map which is used in determining and realizing the marketing. Anyway, 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.

The present study, which is prepared in this context, is intended to evaluate the product which is on element of internet marketing mix and product sub-mix with a quantitative study. For instance, web-sites, reservation and banking services, music and films are accepted as an internet product. The present study is intended to evaluate the approaches in a methodological classification in this study. Cognitive mapping method is a suitable quantitative method which will help us reach this aim.

In the world, which is in the process of being an information society, several changes have been witnessed in the understanding of customer and marketing. Customer, in this process, is more conscious and competition is more violent. Customer has wrapped himself in a role that is sensitive, does not like easily, chooses self-centered production, looks for difference and demands his rights to the utmost. On the other hand, an understanding of the best customer relationship is established 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. However, it is compulsory to act strategically in order to transform this into advantage.

Today internet has an important state in which information technologies are used in the field of business enterprise. It is an obligation in the age to use the internet while marketing through the web. In short, the day's

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primary means of online marketing (White, 1997), digital marketing (Kierzkowski *et al.*, 1996), cyber-marketing (Settles, 1995) and network marketing (Achrol and Kotler, 1999) which take part in literature 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 present study (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 affectively than the other marketing means of business enterprises (Stewart and Zhao, 2000). Internet has an effect on 3 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 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 Roma burns, Hamel and Prahalat (1996) stated how prior strategical idea is to production-based idea. Really, today, competition has become more and more violent and pleasing the consumer has got 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 strategical marketing. In the known traditional world, capturing the diversity and gaining privilege can be difficult. However, today, the imaginary world is in a limitless universe. This world abounds in deficits and faults are experienced in this world. It is more possible to reach creative strategy than traditional applications in case of acting to the strategical idea in internet.

On the other hand, it may not be adequate to use traditional marketing applications and to make use of its strategies, while realizing the internet marketing. Similar, expressing the concept of internet marketing by making use of marketing terms used in traditional world may not be adequate. Therefore, it would be suitable for business administrations to give priority to internet marketing mix in order to prove themselves on internet and develop strategies. For internet marketing mix is one of the controllable factors which business administrations may bring together according to their strategy with the aim of securing customer's satisfaction. In other words, marketing mix elements are strategical powers and supplies that enable business administrations to reach the aims and targets which take place in marketing plans.

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 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 place sub-mix, however, there are digital product transfer, direct processes and imaginary stores.

Many products are taken as models in the investigations on internet about marketing. There are also lots of views about what the product on internet is. Settles (1995) dwelled on the digital data such as program, music and video while explaining cyber market. In Liang and Huang (1998)'s study, which is one of the first papers in literature about the subject, the marketing and cost of the products of book, shoe, toothpaste, microwave oven and flower on internet are investigated. In other studies, product and services are classified in internet and the sectors of products and services are classified in internet and the sectors of finance, software-hardware tourism, media and souvenir are accepted as the major services on internet (Kiang *et al.*, 2000; Peterson *et al.*, 1997). Duffy *et al.* (2004) however, divided internet product and services into 6 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 are dwelled on.

MATERIALS AND METHODS

The purpose of the present study is 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, an imaginary environment, by the cognitive mapping method.

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, analyzing and constructing the problems that are inserted into real life (Kwahk and Kim, 1999). Cognitive mapping method, whose origin is based on Graph Theory formulated by the
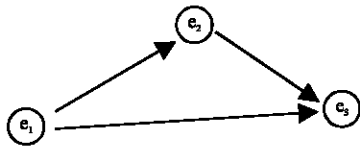
Fig. 1: Structure of the scheme by which basic cognitive map affects

Fig. 2: Structure of the scheme by which fuzzy cognitive map affects

$$E = \begin{bmatrix} 0 & -e_{21} & -e_{31} & \cdots & -e_{n1} \\ e_{21} & 0 & -e_{32} & \cdots & -e_{n2} \\ e_{31} & a_{32} & 0 & \cdots & -e_{n3} \\ \vdots & \vdots & \vdots & & \vdots \\ e_{n1} & e_{n2} & e_{n3} & \cdots & 0 \end{bmatrix}_{n \times n} \quad (1)$$

mathematician Euler in 1736 was thought of by Axelrod (1976) as a structure that examines the complex social relationship. This is a method which is used in modeling the complex system and identifying the cause-effect relationships between its components. Therefore, it has been used in many social and technical sciences so far (Ozesmi and Ozesmi, 2004). However, it is also a method used in showing 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 by the help of cognitive maps that cover the inter-related elements (Lee *et al.*, 1992).

Cognitive maps consist of knots and ways. Knots express variables. The ways, however, which connect the knots to each other define causal relationships. Therefore, Axelrod (1976) thought that cognitive maps consist of variables and causal relationships. Each variable is connected to each other with positive or negative signs in map. These arrow-shaped signs express the relationship between variables connected according to the arrow's direction. It would be suitable to recognize this interaction on the cognitive map on Fig. 1. According to the Fig. 1, 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 matrix is compared with each other according to the causal relationship (Eden, 1988). If the causal relationship between variables is positive, value+ is given and if it is negative, -1 is given in basic cognitive maps. If there is no relationship, the value of matrix element is zero. The signs of symmetrical elements of matrix used in basic cognitive maps are quite the opposite. Moreover, as the comparison of the variables with themselves is neutral, 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 Eq. 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. So, fuzzy cognitive mapping method is referred.

Fuzzy cognitive maps, however, have a more complex structure. As in basic cognitive maps, buttons and arrows
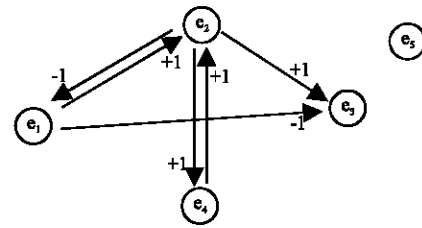
are used in fuzzy cognitive maps, too. Unlike them, values in [-1, 1] spaces are used according to the power of interaction between the variables. These values, at the same time, express the affecting direction between two variables. In Fig. 2, there is an example of fuzzy cognitive map affecting scheme 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 Fig. 2, is given in Eq. 2.

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

Centrality and counting of index values: In the method, which is used in social sciences, especially in developing strategy, mathematical modeling 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.

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

Where, D 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, there has been made use of the vector which has been obtained from the total line elements of E square matrix in Eq. 4 and of the one from column elements. There occurs c_i vector which shows centrality of variables from the total of these two vectors (Eq. 7).

$$E = \begin{bmatrix} e_{11} & e_{12} & e_{13} & \cdots & e_{1n} \\ e_{21} & e_{22} & e_{23} & \cdots & e_{2n} \\ e_{31} & a_{32} & e_{33} & \cdots & e_{3n} \\ \vdots & \vdots & \vdots & & \vdots \\ e_{n1} & e_{n2} & e_{n3} & \cdots & e_{nn} \end{bmatrix} = \left[e_{ij} \right]_{nxn} i = 1,..,n; j = 1,...,n \quad (4)$$

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

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

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

In order to examine the hierarchical quality of cognitive map, it is necessary for hierarchy index in Eq. 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).

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

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

Collecting data: In fuzzy cognitive mapping method, it is decided whether the next map will be created or not 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).

The value which is obtained from accumulation analysis gives sampling size of the study. According to this analysis, the sampling size decreases if the similarity of cognitive maps is high and it increases if it does not resemble.

In order for data to be collected, attendants were requested to draw cognitive maps that tell what the products are on internet. Because of the content of the research subject, cognitive maps were drawn by a group of marketing academicians. In the accumulation analysis made on ten collected cognitive maps, it was seen that it reached the accumulation as of the ninth map and the number of the newly-added variables was close to one. This situation can be accepted as the proof of the fact that the number of the interviews are sufficient.

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 1, 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 Fig. 3. As can be seen from the map, 7 variables and 17 connections are defined. Matrix which represents this map is given in 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 in between democratic and hierarchical.

$$E = \begin{bmatrix} 0 & 0.8 & 0.8 & 0.8 & 0.7 & 0.9 & 0.3 \\ 0.2 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0.3 & 0 & 0 & 0 & 0 & 0 & 0,2 \\ 0.4 & 0.5 & 0 & 0 & 0 & 0.2 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.3 & 0.2 \\ 0 & 0 & 0 & 0 & 0.3 & 0 & 0.2 \\ 0.2 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}_{7 \times 7}$$
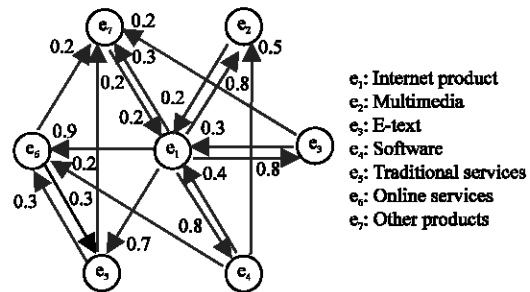
$$\sigma_{od}^2 = 1.845 \quad h = 0.46$$

$$(10)$$

Fig. 3: Decision cognitive map

e₁: Internet product — 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

Table 1: Density of the cognitive maps

Statistics	Variable (N)	Connection (C)	Density (D)
Individual			
Valid-number	10.00	10.00	
Cogn.maps			
Mean	6.40	13.00	0.39
SEM	0.73	1.14	
SD	2.31	3.61	
Decision cognitive map	7.00	17.00	0.34

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 Eq. 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.

$$c_i = \begin{bmatrix} 5,4 \\ 1,5 \\ 1,3 \\ 1,9 \\ 1,5 \\ 1,9 \\ 1,1 \end{bmatrix}_{7\times4} \qquad (11)$$

DISCUSSION

It would be appropriate to group the variables obtained by fuzzy cognitive mapping method in order to recognize the product on 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 the other traditional products. However, these products are not possible to procure or consume on internet (Fig. 4).

As can be seen in Fig. 4, digital products are collected under 3 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

Fig. 4: Internet product scheme

even consumed on internet. Second one is software. All of 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 of 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.

Another product group whose procuring and consuming is possible on internet is services. Services are divided into 2 titles in themselves: traditional services and online services. Banking and reservation services are the most preferable of the traditional services class. In many service sectors which are accepted by the consumers as boring, internet is used. Thus, internet offices have replaced traditional banking offices. In this way, personal computer of the consumer has become his own office. On the other hand, banking process has increased on internet. Therefore, many financial organizations invest big amounts in this field. Similarly, this is the same for education sector. Today, many educational organizations have carried all of their works to the distant education or carry on internet-based educational programs.

Second one of the products based upon the service on internet is online services. New products were added to service sector with the coming of online services. Most of the business administrations in this sector get active on internet only. These imaginative organizations, which came out of the increase in the number of internet users, put pressure on commerce capacity of the traditional business administrations. The fields like web pages which deal mainly with pornography, searching motors, arguing forums, internet communication services, domain registration and hosting services are widespread examples that can be given for online services.

Moreover, the web, the most important internet means of today, has a great role on internet marketing. Web sites are accepted as the products of the business administrations which especially give traditional or online services. Therefore, the qualifications and the address, which will be accepted as the brand, of the created web site are extremely important. In the content of the page, every quality should be prepared with much attention from design to convenience, from color harmony to rapid communication. Moreover, the addresses of the web pages of business administrations which serve in this sector are each in the quality of a brand. Therefore,
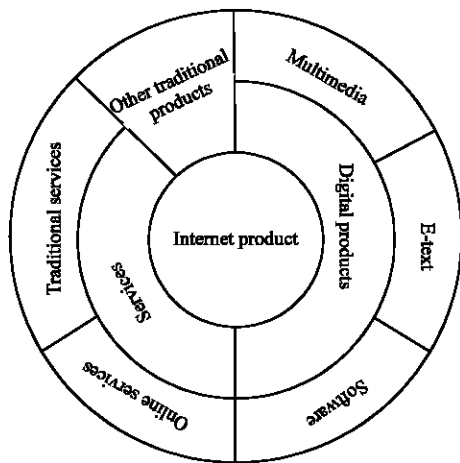
traditional strategies directed towards brand are also supposed to be used in defining these brands named as domain addresses. Domain addresses are on equal terms from the point of view of site that business administrations are in. Namely, for example, a situation like the difference between the business administration among streets and the one on corner, as in the traditional world, is out of question on internet. However, the probable domain registrations of business administrations are extremely important in that potential customers reach them by this way. Therefore, business administrations should have their domain names before their rivals as the addresses in the form of .com are easily obtained by everybody. On the other hand, domain name of a business administration is its address for its customers to reach it when seated in their place. Thus, potential customer is able to reach the business administration by his own computer and by means of internet channel he is connected to. Today, many business administrations, service sector in particular, fix two different prices for their products. First one is the product's price in the traditional markets and the other on the internet. Business administrations under consideration keep the price of the product lower in internet. For there is no need for any employment of sales staff, any selling store and any supplies such as rent, water, electricity in order to keep the selling store standing to sell a product on internet marketing both for decreasing the costs and making the reduced costs available to customers. For example, many financial organizations do not take commission fee for the EFT processes realized on internet and some travel businesses keep the ticket prices 5% lower at least.

Software, multi-media-based products, e-texts, traditional services and online services are the pioneers of the products which become the subject of internet marketing. Whole of the process from sale to delivery and even consuming is realized on internet. However, internet marketing products are not limited to this. Products which do not have delivery and consumption on internet can be included in this group. It is possible to market every kind of product on internet.

Another characteristic of internet in this field is the opportunity of communicating the price information on internet. This opportunity is an important field that economists stress upon. Although, perfect competition market is not observed in traditional world, it is more possible to catch such an atmosphere in the imaginative world. Internet represents an imaginative world in which millions of documents can be found and which has a store of countless knowledge. This imaginary world has such a technology that, if the address is known, it is possible

to reach some knowledge in a very short time and evaluate it effectively. This atmosphere mediates especially for buyers and sellers to have extended information Technologies make it possible to reach the price degree of the product over the world. This is, however, only possible by means of the internet. According to economic theories, the ability to reach the price information which the producers of a product on market determine the means equalizing the price of that product. It is difficult to hold on to the market with a high-priced product which does not have product differentiation.

CONCLUSION

Internet marketing mix, as in 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 internet. As the third one, besides them, other traditional products can also be included in internet marketing, though partly. 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 can also be used in marketing science.

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