

# Investigation of major factors influencing green purchasing behavior: Interactive approach

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## Abstract

This study aims to identify and prioritize factors which influence on consumers' green purchasing behavior. According to the literature review and exploratory interviews with experts in the field of green purchasing behavior and intentions, components and indicators influencing consumers' green purchasing behavior were identified and based on that the conceptual model was designed. Then, the validation of the proposed model was confirmed with a high degree of agreement between the experts by using Fuzzy- Delphi method and developing a questionnaire. In the next step, the components which have been identified by quantitative methods break down into effective and influenced components and eventually the severity of the impact was ranked by utilizing DEMATEL method and developing a questionnaire. The main components influencing consumers' green purchasing behavior which has been identified in this research include consumers' environmental ideas, environmental factors, awareness of green products and consumer's values. The results of the components prioritization which is based on weights derived from the technique include environmental factors, consumer's environmental beliefs, consumer's values and consumer awareness of green products, respectively. The model presented in this study, has been proposed to overcome the shortcomings of previous studies and continuous improvement in the factors influencing consumers' green purchasing behavior.

**Keywords:** Green Marketing, Green Purchasing Behavior, DEMATEL method.

## Introduction

Nowadays, environmental problems have attracted citizens', companies' and institutions' attentions from around the world. The international researches have demonstrated that customers are more concerned about environmental changes than it was in the past and have changed their behaviors (Papadopoulos *et al.*, 2010), so that the environmental concerns have greater priority and importance for making decisions about selecting products from the perspective of consumers. Over the past decades, consumers' environmental awareness has increased considerably in the world and this group demands commodities that are called "eco-friendly" (Kalafatis *et al.*, 1999). In America there was a research which has been determined 76% of people are willing to sanction companies and organizations that produce products damaging environment (Hawkins *et al.*, 2002). According to another study in America, 49% of respondents have changed their purchasing patterns due to environmental issues (Bovee & Thill, 1992). Another study in the Australian bureau of statistics over 16 thousand people illustrated that 75% of people are concerned about environmental issues (Baker, 1996). Also, another study in Australia (1994) indicated that 84% of people consider themselves responsible for environment and these people stated that they make a special effort to purchase from companies which are environmentally friendly (Polonsky, 2001). Ac-

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cording to previous studies, we found that the daily behavior of consumers has been changed due to worsening environmental pollutions. Consumers who are concerned about environment purchase those products and services that assume they have a positive effect (or less negative effect) on the environment (James, 1996). Today changing to become green is not only a basic need but it is also an opportunity for companies (Dangelico & Pontrandolfo, 2010). So be aware of the severity of the impact and interaction of the factors influencing consumers' step toward increasing the knowledge of managers to gain a competitive advantage.

Therefore, in this study, with a comprehensive review of research, the components and based on that the conceptual model was proposed. Henceforth, the proposed model was validated by using Fuzzy-Delphi method and survey of experts in this field and by developing a questionnaire. In the next step, the severity of the impact and interaction of the effective factors in proposed model was analyzed and ranked quantitatively by using DEMATEL method.

## Literature review

### Green Marketing

Unfortunately, most people believe that green marketing refers solely to the promotion or advertising of products with environmental characteristics. Words such as phosphate-free, ozone-friendly, recyclable are those that most consumers know they are associated with green marketing, while these words are only the signs of green marketing (Mathur *et al.*, 2000). Green marketing refers to developing and improving the pricing system, promotion and distribution of the products, which do not harm the environment (Pride & Ferrell, 1995). Green Marketing is an integrated management process that is responsible for defining, anticipating and satisfying the needs of customers and society, which is profitable and sustainable (Peattie, 1995).

### Green purchasing behavior

Green purchasing behavior includes efforts to conserve energy and to avoid buying products with inappropriate packaging (James, 1996). Chan (1996) has considered behaviors such as purchasing standard sprays and beverages in recyclable containers as a green purchasing behavior (Joonas, 2004). Other researchers have considered purchasing and consumption of products which have been produced from plastic and recyclable paper, CFL light bulbs and detergents include recyclable materials to nature

as a green purchasing behavior (Mainieri *et al.*, 1997). Beth (1993) stated that green products are those which are biodegradable and recyclable and in addition to their organic production, they have minimal packaging (Chaiyawat, 1998). Purchasing products which have been made from or packaged in recyclable materials are the other examples of green purchasing behavior (Mainieri *et al.*, 1997).

## Methodology

DEMATEL method was used in this paper as to determine the level of interdependences existing between selected indicators of consumers' green purchasing behavior as well as to construct a network relationship map. The statistical population in this study consists of experienced experts in the industry and professors in the field of green purchasing, consumer behavior and the same fields who have had registered studies, scientific articles or books. According to the society which has been selected for presenting questionnaire, the considerable sample for surveying on experts is about 35 persons. But according to the probability for responding and accessing to individuals, about 24 people were selected by judgment sampling and survey was conducted from them that 19 questionnaires were eventually returned and after removing those which have signs of alteration due to the orientations, just 15 questionnaires were used for analyzing. In order to achieve the objectives of this study the following algorithm was used.

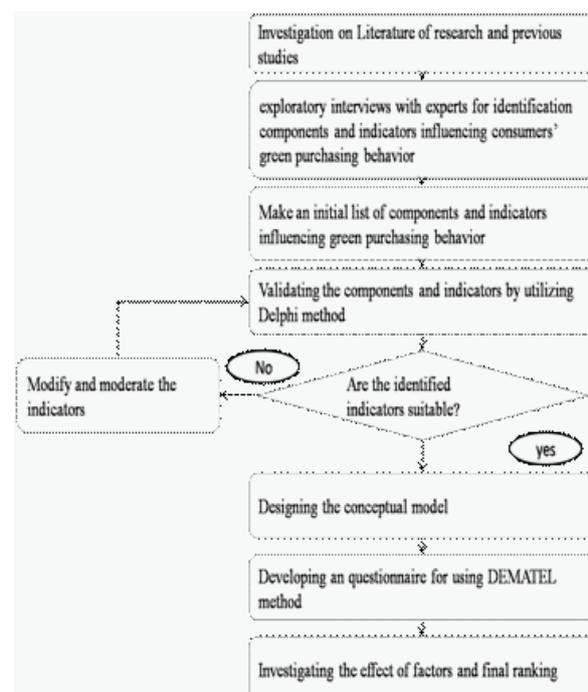


Figure 1. Research procedure and data analysis

### DEMATEL method

DEMATEL (Decision-Making Trial and Evaluation Laboratory) is a comprehensive method for designing and analyzing structural models of causal relationships between complex factors (Wu & Lee, 2007). Unlike the Analytical Hierarchy Process (AHP) method which considers factors that are independent of each other, DEMATEL method takes into account interdependent factors and determines the level of interdependence between them. The observed method is based on graph theory, allowing visual planning and problem solving so that the relevant factors can be divided into causal and consequential for a better understanding of mutual relations. This scientific research method could improve understanding of the complex structure of the specific problem and contribute to the identification of relationships between factors, workable solutions by a hierarchical structure (Vujanovic *et al.*, 2012).

The DEMATEL method can be summarized in the following steps:

*Step 1:* Suppose we have H experts in this study and n factors to consider. Each stakeholder is asked to indicate the degree to which he or she believes a factor i affects factor j. These pairwise comparisons between any two factors are denoted by  $a_{ij}$  and are given an integer score ranging from 0, 1, 2, 3, and 4, representing 'No influence (0),' 'Low influence (1),' 'Medium influence (2),' 'High influence (3),' and 'Very high influence (4),' respectively (Zandhessami *et al.*, 2012). The comparisons made are based on expert opinion.

*Step 2:* Generate a direct relation matrix depicting these relationships. Based on the above criteria, a matrix X is generated, which is a n x n matrix. The matrix obtained is the direct relation matrix. Here  $X_{ij}$  is the degree of the criterion i which affects criterion j (Baruah *et al.*, 2012).

$$X = \begin{bmatrix} 0 & x_{12} & \dots & x_{1n} \\ x_{21} & 0 & \vdots & x_{2n} \\ \vdots & \dots & 0 & \vdots \\ x_{n1} & x_{n2} & \dots & 0 \end{bmatrix}$$

*Step 3:* the normalized direct-relation matrix is calculated. According to research of Wu and Lee (2007), Lin and Wu (2008), Kim and Choi (2005), Seyed-Hosseini, Safaei, and Asgharpour (2006) the largest of the vectors are listed as the standard for the normalization:

$$\lambda = \frac{1}{\text{Max}_{1 \leq i \leq n} (\sum_{j=1}^n X_{ij})} \quad (2)$$

*Step 4:* Through the calculation of formulas (2) and (3) we can plug the direct-relation matrix X into the "λ" value, and get the normalized direct-relation matrix N:

$$N = \lambda X \quad (3)$$

*Step 5 :* Afterwards the normalized direct-relation matrix N is used to calculate the direct/indirect-relation matrix which is shown in the formula (4).

$$T = \lim_{k \rightarrow \infty} (N + N^2 + \dots + N^k) = N(I - N)^{-1} \quad (4)$$

*Step 6:*  $t_{ij}$  is the quality characteristic in the direct/indirect-relation matrix T, and within this formula  $i, j = 1, 2, \dots, n$ . Using formulas (5) and (6) we can determine the total sum of the middle row and column of direct/indirect-relation matrix T and use  $D_i$  as the total for the I column to represent the quality characteristic i as the reason and that it influences the total sum of other quality characteristics.  $R_j$  is the total sum of the j row and it represents the sum of quality characteristic i having been influenced by the other quality characteristics. The values of  $D_i$  and  $R_j$  determined by using the direct/indirect-relation matrix T include the direct and indirect influence of other quality characteristics:

$$D_i = (i = 1, 2, 3, \dots, n) \quad (5)$$

$$R_j = (j = 1, 2, 3, \dots, n) \quad (6)$$

Define  $(D_k + R_k)$  as the prominence and  $k = i = j = 1, 2, \dots, n$  shows the total level of influence and being influenced of this quality characteristic. With this value we can see the core value of quality characteristic k within every instance.  $(D_k - R_k)$  is defined as the relation and represents the level of influence and being influenced of this specific quality characteristic.

The horizontal axis of the cause-effect diagram is  $(D + R)$  and the vertical axis is  $(D - R)$ . After the two-dimensional matrix that is formed is used to calculate the coordinate values of the quality characteristics  $(D_k + R_k, D_k - R_k)$  they can be marked onto the cause-effect diagram. When  $D_k - R_k$  is a positive value quality characteristic k can be determined as belonging to the "cause class". If  $D_k - R_k$  is a negative value than quality characteristic k can be put into the "effect class". The smaller the val-

ue of  $D_k + R_k$  is when  $D_k - R_k$  is a negative value the more independent that quality characteristic  $k$  is, which means that there are less factors which influence this quality characteristic. The smaller  $D_k + R_k$  is when  $D_k - R_k$  has a positive value represents that quality characteristic  $k$  is an important core problem that needs to be solved right away, however direct improvements should not be made to the quality characteristic. The larger the value of  $D_k + R_k$  is when  $D_k - R_k$  is positive represents that characteristic  $k$  is a driving factor of the core problem and should be a priority of taking care of (Yuan Hu *et al.*, 2011).

### **Model designing**

The conceptual model of research is an analytical tool that research variables and relations between them change with the aid of that model (Edwards *et al.*, 1998). In fact, the conceptual model of research consists of concepts and hypotheses that have close relation with each other and altogether, constitute a coherent analytical framework (Penhood & Kiwi, 2009). After reviewing the literature and studies in the field of green purchasing behavior, we found that in some researches the actual behavior was measured, in some other the intention or the behavior intention and in others each of the two variables. The results of the researches demonstrate that the behavioral intention is a very good predictor of behavior (Maloney & Ward, 1973; Chan & Yam, 1995; Chan & Lau, 2000). Many studies indicate that there is a positive and meaningful relation between intention and environmental behavior (Ouellete & Wood, 1998; Sheeran & Orbell, 1999). Some deficiencies such as being native model, lack of proper system structure, lack of dynamism that is required for adapting with cultural-environmental variables and factors and ignore some effective criteria were observed by overlooking previous researchers' model and patterns such as Cheah & Phau (2011), Kaufmann and Panni (2011), Sinnappan and Abd Rahman (2001), Chan (2001), Lee (2008), Lin and Huang (2012) in the field of green products purchasing behavior and intention. In fact, investigating the effect of different criteria sparsely on the behavior of green products purchasing is one of the most obvious weaknesses of previous studies. In this study, after reflecting on the sources and texts that have been read, various aspects of the problem as well as the relations between them were determined and then by considering the convergent and divergent

of various aspects of the issue, the indicators influencing customers' green purchasing behavior were identified and extracted which have been mentioned below.

### **Individual's ecological beliefs**

#### **Environmental awareness**

Environmental awareness of the individual is known as understanding the impact of human behavior on the environment (Kollmuss & Agyeman, 2002). Panni (2006) understood that in his researches most of the consumers, who are aware of environmental issues, are adherent of their environment and society and they make an effort to buy products that are less damaging to their environment and community while purchasing them.

#### **Environmental attitudes**

Environmental attitudes and desires are complex and multi-dimensional. Some researchers have endeavored to classify consumers based on their environmental beliefs and attitudes. Schultz stated that there are three separate environmental attitudes: Altruistic attitudes (including concerns over others), self-centered attitudes (including their concerns) and eco-centric attitudes (including concern for the environment). Based on Schultz's researches, self-centered attitudes are causing consumers' behavior (Schultz, 2000). Attitudes have been defined as sustained positive or negative feelings of people, objects or issues (Newhouse, 1991). There is conflicting empirical evidence about the impact of environmental beliefs, attitudes on green purchasing behavior. Beckford and et al (2010), Cornelissen and et al (2008) and Lynne and Rola (1988) stated that environmental attitudes have a significant impact on green purchasing behavior intention. Mostafa (2009) illustrated that environmental attitudes have a positive effect on consumers' green product purchasing behavior. However, some studies suggest moderate or weak relationship between environmental attitude and green purchasing behavior (Axelrod and Lehman, 1993 and Smith *et al.*, 1994, Berger & Corbin, 1992).

#### **Perceived seriousness of environmental**

Amyx and et al (1994) have been defined the considerable importance to the environment as a degree of personal concern about ecological issues. The difficulty is known as the amount of trouble or inconveniences that people deal with

them while encountering environmental issues and the behavior they should have towards them. For example, a consumer may know the new single packaged food is harmful for the environment, but s/he will still purchase them because they are easy for consumption. Green consumers believe that the current environmental situation indicates that there are serious environmental problems and on the contrary those consumers that don't have environmentally friendly behavior believe that environmental problems can be solved by themselves. Therefore, the perception of the individual toward the intensity, hazardous and seriousness of environmental problems could affect his/her green purchasing behavior and intention (Banerjee & Mckeage, 1994). Lee (2009), Banerjee and Mckeage (1994) and Sinnapan and Abdrahman (2011) found out that perception of environmental problems has a significant effect on consumers' green purchasing behavior. Moser and Uzzell (2003) stated that the mass media play an essential role for in educating consumers to understand the importance of environmental problems.

#### **Perceived consumer effectiveness**

The effectiveness which is perceived by the consumer is determined by direct and indirect knowledge and experience that the level of it varies from person to person (Yeonshin, 2005). The effectiveness which is perceived by consumer is defined as a consumer's confidence in their ability to improve the environment (Kenneth & Sanjay, 1998). Lee (2008), in recognition of the important factors which influence young consumers' green purchasing behavior, indicated that the effectiveness which is perceived by the consumer has a great impact on consumers' green purchasing behavior.

#### **Environmental concerns**

Environmental concerns can be defined as an attitude towards environmental consequences. This attitude is influenced by direct personal experience, the experience of other people and media's news. Environmental concern affects the behavior which is compatible with environment. Environmental concern is a strong attitude towards protecting the environment (Crosby & Taylor & Gill, 1981). Kim and Choi (2005) found that environmental concern directly affects green purchasing behavior. Environmental concern is a main and determinant factor in purchasing green and organic food in a number of

studies (Grunert, 1993). Hines et al (1987) understood that environmental concern has a direct correlation with the behavior of environmental adherents. Lee (2008) found that the second factor influencing the young Hong Kong green purchasing behavior is environmental concerns. It is predictable that the level of people's environmental concern is associated with their interest and desire to purchase green products (Biswas, Liecata, McKee, Pullig & Daughtridge, 2000; Mainieri, Barnett, Unipan & Oskamp, 1997; & Schwepker & Cornwell, 1991).

#### **Perceived environmental responsibility**

According to the findings of Sukhdial and Venice (1990), one of the main reasons that stop people from being involved in environmental protection, is the level of their perception of self-employment in protecting the environment. Many people may have ecological concerns, but they feel that the environmental protection is the responsibility of the government or huge corporations. Thus, it is possible that the imagination affects their green product purchasing behavior. In the study which has been focused on young consumers in Hong Kong, Lee (2008) indicated that the perceived social responsibility is the fourth effective factor in green purchasing behavior. Chan and Lau (2000) found that the consumers are searching for a better policy to solve environmental problems meanwhile the individuals' understanding of social responsibility has an important place.

#### **Environmental Factors**

##### **Social influence**

The social influence refers to the effects of the social environment on consumers green purchasing behavior. That is, how much the person gain knowledge about green products through his/her family, how much s/he discusses in the field of environmental products with his/her friends and how much he / she shares the information about green products with family (Finisterrado Paço & Raposo, 2004). Lee (2009) understood that the social impact is a significant stimulus for Hong Kong youth's green purchasing behavior during his investigation to access important factors influencing Hong Kong youth's green purchasing behavior.

##### **Government's role**

Many people believe that the government is responsible for protecting the environment even

if they indicate the highest level of their concerns about the environment (Tsen and *et al.*, 2006). A ministry of the environment (2007) reported that the government has a key role in supporting green purchasing in Japan

(Sinnapan & Abd rahman, 2011). Since the government is the largest purchaser of the goods and services, so if the government purchasing policies focus on environmental performances, the environmental pressures reduce dramatically. Thus, in some studies, researchers have considered the government role as one of the effective criteria in green purchasing behavior.

### **Consumer values**

Consumer values are desirable goals that identify the principle of human movements in life (Schwartz, 1994). Based on Triandis findings (1993) two core values influencing consumers behavior consists of individualism and collectivism. Individualism indicates to what extend a person is focusing on his own. But in contrast, collectivism refers to cooperation and sympathy, assistance and considering the group's goals and preferring them to personal goals. Also, MacCarty and Shrum (1994) have examined two other variables from the value variable's class in their studies: recreation or pleasure and security. In their study they found that the fun or joy is positively associated with the importance of recycling and recycling behavior but security does not have a significant correlation. In the other research, based on the theory of consumer's values, Lin and Huang (2011) have measured the role of human values in their willingness to purchasing green. In fact, the difference between this study and previous studies was that these two researchers were testing the problem from more general aspects. According to the presented contents, in this study the role of consumer's values in green purchasing behavior has been measured based on the theory of consumer's values. According to the theory of consumer's values, consumer behavior is influenced by functional, social, emotional, conditional and cognitive values.

#### **Functional Value**

Functional value refers to consumer's perception of price and quality of product. The perceived utility acquired from an alternative's capacity for functional, utilitarian, or physical performance. An alternative acquires functional value through

the possession of salient functional, utilitarian, or physical attributes. Functional value is measured on a profile of choice attributes (Sheth *et al.*, 1991). Bei and Simpson (1995) found that consumers consider the price and quality of recycled products. In fact, the price and the quality of products are one of the most significant factors that consumers consider them while purchasing products.

#### **Conditional Value**

The perceived utility acquired by an alternative as the result of the specific situation or set of circumstances facing the choice maker. An alternative acquires conditional value in the presence of antecedent physical or social contingencies that enhance its functional or social value. Conditional value is measured on a profile of choice (Sheth *et al.*, 1991). Studies of soft drinks, fast foods, beer have indicated that purchasing and selling products are usually in response to specific circumstances and conditions (Lin & Huang, 2012).

#### **Social Value**

The perceived utility acquired from an alternative's association with one or more specific social group. An alternative acquires social value through association with positively or negatively stereotyped demographic, socioeconomic, and cultural-ethnic groups. Social value is measured on a profile of choice imagery (Sheth *et al.*, 1991). Indeed, social values are not just an economic measure and include several concepts such as prestige, status and the common sense of belonging.

#### **Emotional Value**

The perceived utility acquired from an alternative's capacity to arouse feelings or affective states. An alternative acquires emotional value when associated with specific feelings or when precipitating or perpetuating those feelings. Emotional value is measured on a profile of feelings associated with the alternative (Sheth *et al.*, 1991). Goods and services are often associated with emotional reactions (Sweeney & Soutar, 2001). Mackey (1999) stated that the appeal of a product or a service returns with a set of moral and emotional factors (Lin & Huang, 2012).

#### **Epistemic Value**

The perceived utility acquired from an alternative's capacity to arouse curiosity, provide novelty, and/or satisfy a desire for knowledge.

An alternative acquires the epistemic value of questionnaire items referring to curiosity, novelty, and knowledge (Sheth *et al.*, 1991). In addition to the requirements of purchasing status, the consumer's knowledge of the product has an important role in the selection of a new product. When consumers encounter with a new product, they should evaluate it for making decisions about purchasing that product and this work was recognized by the combination of the product's background and the information which is gained, is associated with new product (Lin & Huang, 2012).

### Awareness of green products

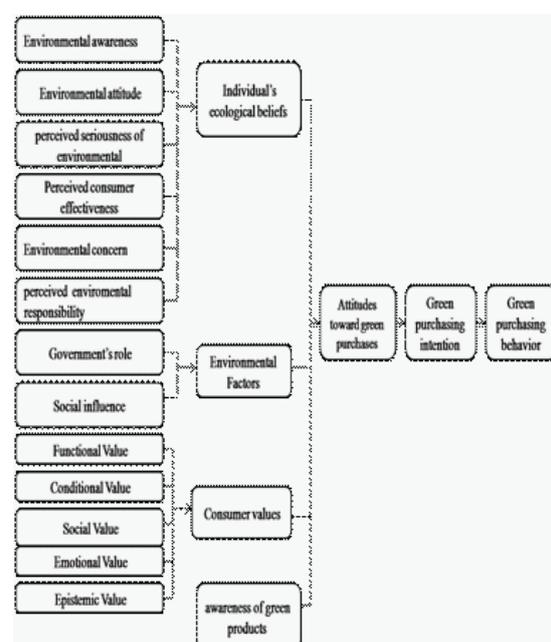
According to Johari and Sahasakmontri (1998) green marketing is facing with certain challenges such as poor consumer's perception and high costs. Perhaps one of the most important problems of consumers' green purchasing behavior deficiencies is the lack of their awareness of green products and their features which unfortunately there has not been any attention to that in previous studies. According to the presented contents; the main indicators which influence consumer's green purchasing behavior were extracted. Since the previous studies in this field have some deficiencies such as being a native model, lack of proper system structure, lack of dynamism that is required for adapting with cultural-environmental variables and factors and ignore some effective criteria, the presented model was proposed for overcoming the pervious studies' shortcomings and continuous improvement in the factors influencing consumers' green purchasing behavior.

In the next step, the primary indicators were validated by using Fuzzy-Delphi method and developing a questionnaire during two steps surveying which due to space limitations the calculations are retrained to present and merely the differences among experts in the first and second of surveying have been gathered at table 1.

It is obvious that the selected indicators above, which have been gathered in the general category, are from the result of several studies of different scholars. The model presented in this study, which has systematic structure, has been proposed to overcome the shortcomings of previous studies and continuous improvement in the factors influencing consumers' green purchasing behavior.

**Table 1. The difference of experts' view in the first and second stages of polling**

Indicators	First stages	Second stages	The difference of the first And second staged
Environmental awareness	0.1	0.11	0.01
Environmental concern	0.08	0.1	0.02
Environmental attitude	0.11	0.11	0
Perceived consumer effectiveness	0.08	0.11	0.02
Perceived seriousness of environmental	0.11	0.11	0
Perceived environmental responsibility	0.1	0.11	0.01
Social Influence	0.1	0.11	0.01
Governments' roles	0.1	0.11	0.01
Functional value	0.1	0.11	0.01
Social value	0.04	0.03	-0.01
Emotional value	0.1	0.1	0
Conditional value	0.1	0.11	0.01
Epstemic value	0.07	0.1	0.03
Awareness of green products	0.07	0.09	0.02



**Figure 2. Research conceptual model**

### The model evaluation

In the next step, the severity of the effect and interaction between the effective components in the proposed model were quantitatively analyzed and ranked by using DEMATEL method. Thus, after validation of effective components and indicators of the proposed conceptual model by using Fuzzy- Delphi method, assumed components are placed at the vertices of diagraph and the relations between components were determined and their diagraph was drawn based on the judgment of experts. Afterwards, the questionnaire with the aim of obtaining the experts' opinions about the direct effect of each component with the other components was designed and developed. Since the different characteristics of individuals have an influence on their subjective interpretations toward qualitative variables, thus by defining the range of qualitative variables, experts have answered the questions with the same mentality. So the experts have expressed their opinions through verbal variables such as high impact, medium impact and low impact. Then, according to table 2 the verbal variables were converted to absolute numbers.

**Table 2. Absolute numbers of verbal variables**

Verbal variables	Absolute numbers
Very high	4
High	3
Medium	2
Low	1
Very low	0

After that, based on the extraction of experts' judgments, the relations between the assumed components were determined and their diagraph was drawn. Afterwards, the matrix of final scores for existing relations from diagraph has been set and gathered in matrix  $\tilde{A}$ . In fact, the entry of each intersection in this matrix represents the influence of existing components of that row of the existing elements of that column. For example, the number 4 in the second row and the fifth column illustrates that environmental factors have a great influence on the individual's attitude toward green purchasing.

**Table 3. Direct relations matrix**

element	IEB	EF	CV	AGP	ATGP	GPI	GPB
IEB	0	2	0	2	4	3	3
EF	3	0	3	2	4	4	4
CV	2	1	0	1	2	3	4
AGP	1	1	1	0	2	2	2
ATGP	0	0	0	0	0	3	2
GPI	0	0	0	0	0	0	3
GPB	0	0	0	0	0	0	0

Note:

IEB = Individual's ecological beliefs, EF = Environmental factors, CV = Consumer values, AGP = Awareness of green products, ATGP = Attitudes toward green purchases, GPI = Green purchasing intention, GPB = Green purchasing behavior.

For normalizing  $\tilde{A}$  direct relation matrix, all the elements of the matrix  $\tilde{A}$  were multiplied by the reverse of the highest total row of that matrix. According to matrix  $\tilde{A}$  the highest total row belongs to the second row. Thus, the elements of matrix  $\tilde{A}$  were multiplied by 1/20 Or in the other words divided by 20 which results were obtained in the matrix A as it explained below.

**Table 4. The normalized direct-relation matrix**

element	IEB	EF	CV	AGP	ATGP	GPI	GPB
IEB	0	0.1	0	0.1	0.2	.15	.15
EF	.15	0	.15	0.1	0.2	0.2	0.2
CV	0.1	.05	0	.05	0.1	.15	0.2
AGP	.05	.05	.05	0	0.1	0.1	0.1
ATGP	0	0	0	0	0	.15	0.1
GPI	0	0	0	0	0	0	.15
GPB	0	0	0	0	0	0	0

Note:

IEB = Individual's ecological beliefs, EF = Environmental factors, CV = Consumer values, AGP = Awareness of green products, ATGP = Attitudes toward green purchases, GPI = Green purchasing intention, GPB = Green purchasing behavior.

In the next step, by having the direct relations matrix, the existed relative intensity of direct and indirect relations and the intensity of indirect relation were calculated which the results are like the following matrixes.

**Table 5. Dominant Intensity matrix on direct and indirect relations**

	element	IEB	EF	CV	AGP	ATGP	GPI	GPB
$(I-A)^{-1} =$	IEB	0.024	0.109	0.022	0.115	0.240	0.226	0.249
	EF	0.177	0.032	0.161	0.129	0.271	0.311	0.352
	CV	0.115	0.066	0.013	0.069	0.144	0.211	0.286
	AGP	0.066	0.060	0.06	0.016	0.133	0.152	0.172
	ATGP	0	0	0	0	0	0.188	0.123
	GPI	0	0	0	0	0	0	0.15
	GPB	0	0	0	0	0	0	0

Note:

IEB = Individual's ecological beliefs, EF = Environmental factors, CV = Consumer values, AGP = Awareness of green products, ATGP = Attitudes toward green purchases, GPI = Green purchasing intention, GPB = Green purchasing behavior.

The total of the row entries of each matrix element  $(A (I-A)^{-1})$ , indicates the influence of considerable component of other elements and the total of the column entries of each component represents the influence of considerable components of other elements. Indeed, the maximum total row indicates the order of the elements which strongly influence the other elements and the maximum total row represents the order of the elements which are influenced. Therefore, the order of the elements of the column (R) represents the hierarchy of influence components and the order of the elements of the column (J) indicates the hierarchy of the elements which will be influenced.

(R-J) values in table 6 represent influencing and influenced components. Based on these values, the components of the environmental factors, individual's values, environmental beliefs and

the awareness of green products have positive values which are impressive components and the components of attitude toward green purchasing and green purchasing intention are impressionable. On the other hand, the values of (R+J) indicate the interaction of each component with other elements among impressive factors. Thus, in the group of the effective components, whatever the value of (R+J) is greater, the importance of that component is higher in consumers' green purchasing and place in a higher priority. Therefore, the components of environmental factors, environmental beliefs, individual's values and awareness of green products have a greater impact on consumers' green purchasing intention respectively. The final sequence of the direct and indirect relationship to this discussion according to the values of (R-J) and (R+J) as shown in the following figure.

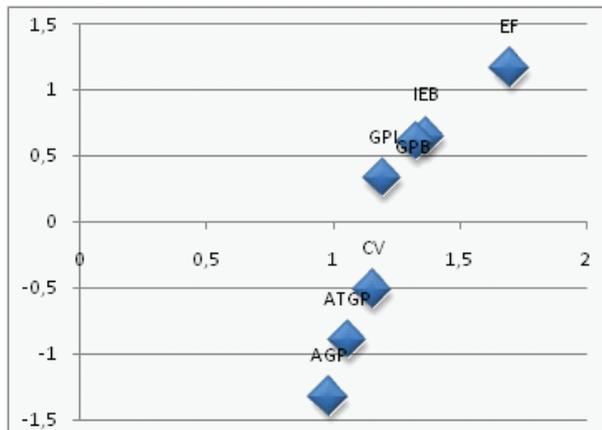
**Table 6. Results of DEMATEL technique**

Element	Impact intensity (R)	Elements	Impact intensity (J)	Elements	Impact intensity (R+J)	Elements	Impact intensity (R-J)
EF	1.4337	GPB	1.3313	EF	1.7013	EF	1.1661
IEB	0.9863	GPI	1.0503	IEB	1.3684	CV	0.6466
CV	0.9031	ATGP	0.7884	GPB	1.3313	IEB	0.6042
AGP	0.6584	IEB	0.3821	GPI	1.2003	AGP	0.3306
ATGP	0.2725	AGP	0.3278	CV	1.1596	ATGP	-0.5159
GPI	0.15	EF	0.2676	ATGP	1.0609	GPI	-0.9003
GPB	0	CV	0.2565	AGP	0.9862	GPB	-1.3313

Note:

IEB = Individual's ecological beliefs, EF = Environmental factors, CV = Consumer values, AGP = Awareness of green products, ATGP = Attitudes toward green purchases, GPI = Green purchasing intention, GPB = Green purchasing behavior.

As the positions of the elements in the hierarchy indicate, the components of environmental factors, individual values, environmental beliefs and awareness of green products are impressive components and relative, the components of attitude toward green purchasing and green purchasing intention are influenced.



**Figure 3. Cause and effect table of effective factors on consumers' green purchasing behavior. IEB = Individual's ecological beliefs, EF = Environmental factors, CV = Consumer values, AGP = Awareness of green products, ATGP = Attitudes toward green purchases, GPI = Green purchasing intention, GPB = Green purchasing behavior**

## Conclusions

In recent years, the identification and prioritization of factors on consumers' green purchasing behavior are considered as an important step for the survival corporations and organizations. Therefore, in this study, with a comprehensive review of previous researches, the factors influencing consumers' green purchasing behavior were extracted and based on that the conceptual model was proposed which the content of that was validated and examined by using Fuzzy-Delphi method and experts' view.

Then, the interaction of identifying factors was examined quantitatively according to algorithm in (Fig. 1) by using DEMATEL method and experts' view and eventually these factors were separated and ranked based on effectiveness and impression. It is noticeable that the presented model in this study (Fig. 2), which has systematic structure, has been proposed to overcome the shortcomings of previous studies and continuous improvement in the factors influencing consumers' green purchasing behavior.

The main features of the proposed model are its compatibility and adaptability with theory of rational choice. According to the results (Table 6 & Fig. 3) based on (Table 3, Table 4 & Table 5), the role of environmental factors in consumers' green purchasing behavior was more and has a higher priority than other components. Therefore, it is recommended that the government and politicians make people aware of issues such as environmental deterioration, air pollution, global warming, the increase in electronic waste, the consequences of using conventional products and the benefits of using green products by using advertisements and suitable strategic plans. Also, schools and universities have to educate entrepreneurs and managers for community that in addition to profitability and sales, pay great attention to consumers' health as well. Meanwhile, the government is the largest purchaser of products and services in any society and it is better that purchasing policies of government focus on products which are compatible with the environment in order to encourage more consumers directly and indirectly in green products and services.

## Recommendations for future researchers

Since the presented model has been designed with the attitude of continuing improvement in the field of green, it is recommended that the effectiveness and the importance of the model's components and indicators have been examined on consumers' green purchasing behavior by using inferential statistics, factor analysis, structural equation and multiple linear regression.

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