

## Intuitive Fuzzy Assessment (IFSs) Customers Green Perception Acceptance Based on the Visual Themes of Green Advertising in Social Media

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(Received: 05.02.2022 Accepted: 24.06.2022)

### ارزیابی سطح پذیرش ادراک سبز مشتریان بر اساس مضامین بصری تبلیغات سبز در رسانه‌های اجتماعی

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- (دریافت: ۱۴۰۰/۱۱/۱۶ پذیرش: ۱۴۰۱/۰۴/۰۳)

#### Abstract

Advertising is considered as one of the most important components of a business unit's sustainability, which plays a decisive role in promoting green product awareness. The purpose of this study was to evaluate the level of acceptance of green perception of customers based on the visual themes of green advertising on social media. This study is a developmental research in terms of purpose, because due to the lack of a basis for assessing the level of acceptance of green perception of customers based on visual themes of green advertising in previous research, based on meta-synthesis in the first step tried to identify components as analytical basis. And use propositions as reference variables. In order to explain the identified components, Intuitive Fuzzy Sets analysis (IFSs) was used to determine the most effective basis for evaluating the level of green perception of customers based on the visual themes of green advertising. In this study, the target population consisted of two parts: qualitative. In the qualitative part, with the help of 16 marketing experts at the university level, an attempt was made to identify the research components, components in the form of scoring forms. In the small section, 50 managers at different levels of knowledge-based companies participated. The results showed that the proposition of brand identity is considered as the most effective visual theme of green advertising in the companies under study, which strengthens the perception based on social convergence as a component of accepting the green perception of customers. This result shows that the content of green brand identity in the form of a comprehensive norm will form the perception of social convergence in customers, because this perception is considered as an external stimulus due to the existence of environmental values, which causes customers to realize the importance.

**Keywords:** Accepting the Green Perception of Customers; Visual themes of Green Advertising; Identify the Brand.

#### چکیده

تبلیغات به عنوان بخشی از مهم‌ترین اجزای پایداری یک واحد تجاری محسوب می‌شود که نقش تعیین‌کننده در پیشبرد آگاهی‌رسانی محصولات سبز ایفا می‌نماید. مضامین بصری اما به عنوان یک فرآیند اثربخش تبلیغات در رسانه‌های اجتماعی محسوب می‌شود که در بهبود آگاهی و ترجیح برند در اذهان مخاطبان جایگاه مهمی را دارد. هدف این پژوهش ارزیابی سطح پذیرش ادراک سبز مشتریان بر اساس مضامین بصری تبلیغات سبز در رسانه‌های اجتماعی بود. پژوهش از نظر هدف، جزء پژوهش‌های توسعه‌ای است، زیرا به دلیل فقدان مبنایی برای ارزیابی سطح پذیرش ادراک سبز مشتریان بر اساس مضامین بصری تبلیغات سبز در پژوهش‌های قبلی، بر اساس تحلیل فراترکیب در گام اول تلاش شد تا نسبت به شناسایی مؤلفه‌ها به عنوان مبنای تحلیلی پژوهش و گزاره‌ها به عنوان متغیرهای مرجع، اقدام شود. سپس باهدف تبیین مؤلفه‌ها، در بخش کمی از تحلیل ارزیابی فازی شهودی (IFSs) باهدف تعیین تأثیرگذارترین مبنای ارزیابی سطح پذیرش ادراک سبز مشتریان استفاده شد. در این پژوهش، جامعه هدف شامل دو بخش کیفی و کمی بود، در بخش کیفی با کمک ۱۶ نفر از متخصصان و خبرگان رشته بازاریابی، در سطح دانشگاه تلاش گردید تا در قالب برگه‌های امتیازی، گزاره‌های پژوهش شناسایی شوند. در بخش کمی ۵۰ نفر از مدیران در سطح مختلف شرکت‌های دانش‌بنیان مشارکت داشتند. نتایج نشان داد، گزاره‌ی هویت بخشیدن به برند به عنوان تأثیرگذارترین مضامین بصری شرکت‌های مورد بررسی محسوب می‌شود که باعث تقویت ادراک مبتنی بر همگرایی اجتماعی به عنوان مؤلفه‌ی پذیرش ادراک سبز مشتریان می‌شود. این نتیجه نشان می‌دهد مضمون هویت برند سبز در قالب یک هنجار فراگیر باعث شکل‌گیری ادراک می‌شود.

**واژه‌های کلیدی:** پذیرش ادراک سبز مشتریان، مضامین بصری تبلیغات سبز، هویت بخشیدن به برند.

## Introduction

In today's global economy, customers are the basis for the survival of the market and companies operating at its level. We can no longer be indifferent to the expectations and demands of customers and the social environment, and companies must formulate part of their strategies based on the development of customer perception and another part of their strategies based on social expectations and market environment such as reducing environmental pollution, that these two parts can complement each other (Lemke & Luzio, 2014). In other words, the principle in today's business world is to create customer-friendly values, and only by paying attention to the quality of services can the values desired by customers be created, and this will not be possible without knowing the demands and preferences of customers (Talari & Dehghani ghahnavieh, 2019). One of these processes is advertising, because by changing advertising approaches from traditional to modern methods, social media as a channel of communication with customers, can play an effective role in attracting audiences and creating a profitable marketing relationship (Kamboj et al., 2018).

Various ways to market through social media such as e-WOM; There is customer relationship management and branding that has generated significant interest in marketing and advertising on social media, and firms can use these methods to attract customers (Alalwan et al., 2017). There is customer relationship management and branding that has generated significant interest in marketing and advertising on social media, and firms can use these methods to attract customers (Alalwan et al., 2017). In fact, due to the perceived usefulness of social media advertising, many companies today, especially knowledge-based companies, are trying to use this method of advertising to introduce products and attract new audiences and retain their current audience (Kim et al., 2021). In this way, customers can buy the goods and products they need directly from sellers and reduce the purchase cost (Bakhtiari bastaki et al., 2021). Hunt et al. (2014) stated that advertising activity based on social media can bring a lot of benefits to users due to its ease of use. Also, due to the characteristics of social

media, advertising can reach sellers to achieve many marketing goals; including creating customer awareness; creating customer knowledge; Shaping helps them understand and motivate them to buy products (Kapoor et al., 2018), while creating an integrated approach to the audience, it can include a more coherent form of product performance that can be provided to customers (Negm & Tantawi, 2015).

In other words, the visualization of advertisements, considering the effect they have compared to other types of advertisements, can play an important and significant role in improving the brand image and creating brand preference in the minds of customers (Jiang, 2019). Therefore, focusing on visual themes in advertising can be considered as a tool for implementing modern marketing strategies that help companies in social media to increase the visibility of a product or service

On the other hand, Rossiter and Percy (2013) stated that brand awareness ensures the formation and strengthening of social media advertising links with a mental image of the brand among customers and by using conceptualization and content orientation in an advertisement along with pictorial symbols influencing the customers' mentality, companies can hope for more committed and loyal customer behaviors while raising their awareness and knowledge of the company's products. In fact, visual themes in social media advertising create a higher level of brand awareness among customers in a homogeneous and harmonious way and place the brand name on the threshold of customers' minds. This issue creates a more coherent perception of the nature of the product in the form of attitude and buying practice in customers and the positive brand preference leads to gaining a competitive advantage of the company among other competing companies (Bakhshizadeh et al., 2016). One of the products that can be considered in this field is green products. Advertising in the field of green products is more sensitive than other products of other companies due to social and environmental support, especially in recent years. Therefore, today, consumers are more inclined to choose and buy green products to protect the

environment (Wei et al., 2018). Leading companies in this field, by considering the awareness of consumers about environmental pollution and understanding their concerns about irreparable damage in this field, are trying to designing their own advertising processes, they create in customers an attitude towards other competitors that will give them a competitive advantage.

Therefore, this study seeks to analyze the visual themes of green food products advertisements of knowledge-based companies on social media. An issue that, although in recent years with increasing domestic and international concerns regarding environmental protection; Increasing the level of dust and pollutants in large and industrial cities; Regulatory organizations and institutions such as the Department of Environmental Protection and ... has been accompanied by the development of common guidelines such as guidelines for selecting green industrial units, guidelines for green emblems, etc., for the development of a sustainable and effective presence in future markets and the promotion of community health.

## Literature Review

In this section, an attempt has been made to provide theoretical approaches related to the field of research in order to help functional coherence in the relationship between research variables while developing the understanding of the concepts of research.

### A) Effective Advertising of Ads on Social Media

The social network in the social sciences examines the relationships between human beings, human groups, and organizations. It should be noted that the topic of social media is very close but different and can be discussed in the field of sociology and information technology "IT" and many sciences (Haghighi Nasab et al., 2020). Social media plays a key role in business success and career advancement. One of the functions of social media is the advertising of these media, which has grown significantly in recent years. Nowadays, advertising plays an important role in increasing the sales volume of any industry. Hence, there has always been an interest in

examining social media advertising in predicting customer perception and response, and marketing researchers such as Boateng and Okue (2015); Lee and Hong (2016); Shareef et al. (2018); Shiau et al. (2017) have conducted various researches on topics related to social media marketing, however, due to the novelty of this media and its relatively low familiarity, the masses have various worries about doing business through social media, which prevents them from buying them, because advertising in these media has not been able to affect its audience (Bakhtiari Bastaki et al., 2021). Advertising visualization involves a multidimensional process to impress the audience through the advertising visualization, so that the audience can be impressed by the image and be persuaded to buy the product (Margariti et al., 2019). In previous studies, factors such as color and shape; Text size and brand recognition have been mentioned as dimensions of visualization (Minissale, 2017), while other researchers have read; Place; Message resolution; Social environment was mentioned as one of the important factors in this field (Kotler & Keller, 2007). Therefore, it can be seen that visual dimensions are always very important from the audience's point of view, and on the other hand, the special ability of human memory to memorize and recall images doubles the importance of this issue. In one of the categories of this field, Roose et al. (2018) mentioned the five dimensions presented in the following framework as the visual dimensions of advertising:

According to this framework, it should be stated that the brand is considered as the name and symbol of a design or idea that expresses the ownership of a product or service that has the ability to identify and create personality among the audience and based on an elements; The shape or symbol that seeks to capture the mindset of the audience has a significant impact on advertising in the form of illustration (Toncar & Fetscherin, 2012). A logo, on the other hand, is a graphic element of a symbol or label that is set in the style of a particular letter or font and is written specifically based on geometric shapes or engravings. The shape; Font style and other graphic dimensions can also express the effectiveness of the logo in advertising visualization. Which causes a more favorable promotion of the level of brand-

related variables such as brand awareness and preference (Bakhshizadeh et al., 2016). Color as a communication and communication base in symbolic propaganda of the expression of emotions; Emotions; Culture; Orientation, etc. Slogans are a key element in a brand's identity and value (Kusumasondjaja & Tjiptono, 2019). Slogan through the image in the form of an advertisement enriches the identity of the product and causes it to find a place in the minds of customers. The effectiveness of a slogan in the visual context of advertising is

when it is easily understood by the audience and is so embedded and institutionalized in their minds that when they hear it, they begin to repeat or conform to it. Finally, typography is the art for displaying brand-based language (Tomazic et al., 2014). Typography is a technique in graphics that has been created with the presence of printing in the field of publishing and with the formation of social media, it will have a double impact on the perception of advertising in this field (Birch, 2010).

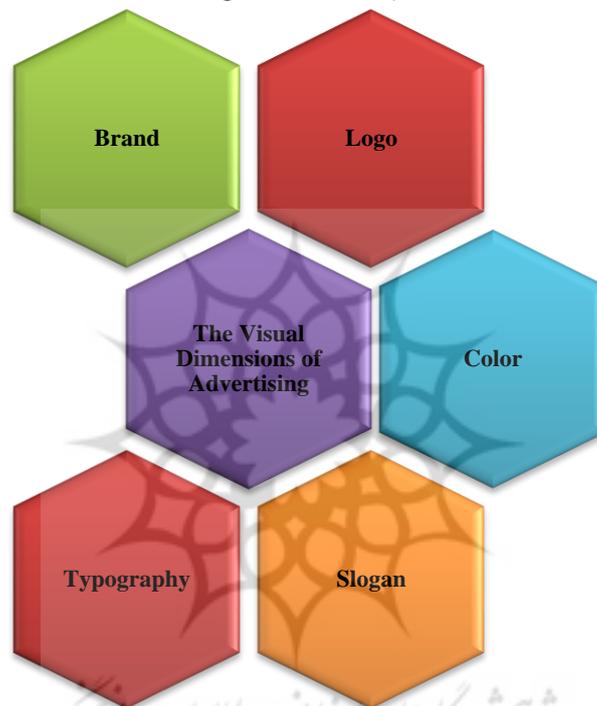
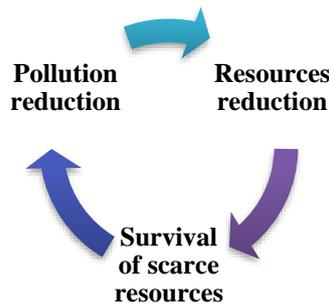


Figure 1. Visual Dimensions of Advertising (Rosse et al, 2018)

### B) Development of Green Products

Environmental changes and increasing levels of pollution have led to a change in the consumerist approaches of customers, which aims to maintain greater environmental sustainability as a social responsibility to the future. There are several definitions of green product. For example, Dangelico and Pontrandolfo (2009) in a comprehensive definition of green product, defined it as a product based on reproductive capabilities and environmentally friendly, both in terms of energy efficiency and in terms of environmental pollution compared to other similar products

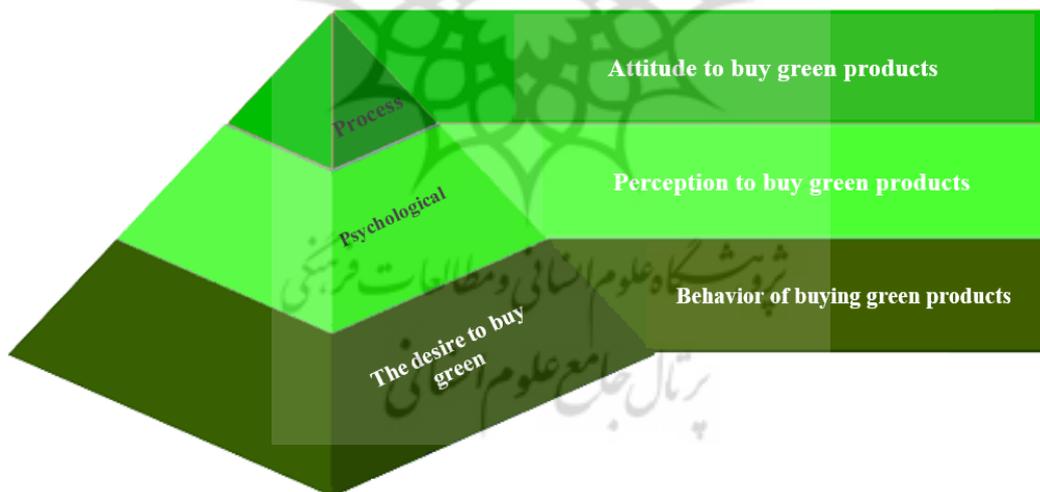
inflict the least amount of damage to the environment. In another definition, Rizwan et al. (2013) describe the separation of a green product from other products on the basis that the green product produced provides more environmental benefits or imposes lower environmental costs than other similar products. Both of these definitions show that green products are not just products with less harmful effects on the environment, but that they have more benefits than traditional products. Tiwari et al. (2011) also explain the existence of an ecological goal in product design in the form of the following model.



**Figure 2.** The Ecological Purpose of Green Products (Tiwari et al., 2011)

Based on these three dimensions, Tiwari et al. (2011) reduce the existence of ecological pivotal in the green product production process; explains the increase in the survival of scarce resources and the reduction of environmental pollution in the form of green products. But green products need support from the market. In other words, both large-scale institutions and small-scale customers must have supportive attitudes toward green products. These attitudes represent the set of emotional inclinations and functional beliefs of individuals in a community

towards the development of sustainability in order to support the environment. Cheah and Phau (2011) believe that by changing the values and beliefs and the importance of some product characteristics, such as being green and environmentally friendly compared to other products, we can lead people's attitudes toward green. On the other hand, Wang et al. (2020) examined the tendency to buy green purely from a psychological perspective and introduced its dimensions in the form of Figure (3).



**Figure 3.** The Psychological Process of the Desire to Buy Green (Wang et al, 2020)

In fact, behavioral intent in green shopping was described as dependent on perception and attitude, and its severity depended on the belief and mental process of people in relation to green products (Seif et al., 2016). In fact, the core attitude is more fundamental in behavior, which expresses the level of desirability of a phenomenon such as green products in the individual, and it can be effective in creating perception and belief in expressing the

customer's approach to buying the product. In fact, this psychological process shows the level of willingness of customers to support green products, which depending on the nature and content and quality of the green product, the intensity of these processes can be more or less. Therefore, they concluded that behavior is influenced by attitude and then perception (Khare, 2019). According to the theoretical foundations, in this section, research questions

in line with the research analysis process are presented in the following order to be a basis for analysis:

- The first research question) what are the visual themes of green food products advertising by knowledge-based companies on social media?
- The second research question) what are the most influential visual themes of green food products advertising by knowledge-based companies on social media?

### Research Background

Boscolo et al. (2021) conducted a study entitled "Gender Differences: Visual Attitudes and Attitudes toward Advertising." In this study, 411 users of social networks participated based on the "Kruskal-Wallis" test in the form of emotions; Emotions; Prejudice; Loyalty and indifference were examined. The results showed that the use of visual elements in advertising on social networks can lead to special attention and attitude towards it based on gender differences, so that women's gender was more irritated against emotional advertising and feelings and men reacted more proportionately to loyalty to a brand and product. Guo et al. (2020) conducted a study entitled "Development of Green Products under Competitive Conditions: A Study of the Fashion and Clothing Industry". In this study, 278 designers of this industry and managers of manufacturing companies in European countries were studied. Partial least Squares (PLS) analysis was used to analyze and test the model hypotheses and the results showed that investing in infrastructure of production, culture, advertising and design inspired by the environment as the most effective success factors in the development of green products in the fashion and clothing industry under competitive conditions, and the results showed that investing in infrastructure of production, culture, advertising and design inspired by the environment as the most effective success factors in the development of green products in the fashion and clothing industry under competitive conditions. He et al. (2019) conducted a study entitled Factors Affecting Consumers' Intention to Buy Green Food Products in China. The target population in this

study was customers of organic food products, of which 239 participated in this study. Based on content analysis of 4 components of knowledge skills about green products; Psychological characteristics in the desire to buy green products; Income level in purchasing green products were selected as the most important factors influencing the development of purchasing green food products and were examined based on structural equations. The results showed that the level of knowledge and understanding of the impact of choosing green products on the environment is the most important and influential factor in choosing these products. It was also found that personal perception of customers as a psychological feature had a greater impact on the choice of green products, but the level of income did not have a significant effect on the purchase of green products. Haghghi Nasab et al. (2020) conducted a study entitled "The Impact of Social Links on Consumers' Response to Advertising on Social Networks". Bakhtiari Bastaki et al. (2021) conducted a study entitled Modeling Factors Affecting Perceived Deception of Advertising in Social Networks with a Structural-Interpretive Approach.

As it can be seen, none of the past researches based on intuitionistic fuzzy analysis has been used to evaluate the acceptance of green products, and conducting this research can contribute to the development of literature review.

### Research Methodology

The present study is applied in terms of purpose, because the purpose of this study is to develop intuitive fuzzy sets (IFSs) knowledge to assess the level of acceptance of customers' green perception based on the visual themes of green advertising on social media. In terms of results, this research is considered as a development research, Because of the lack of theoretical coherence in the concepts and theories related to this field, this study has led to the development of an integrated approach to the analysis of evaluating the level of acceptance of green perception of customers based on visual themes of green advertising on social media. In terms of data collection logic, this research is also combined, because

according to the nature of intuitive fuzzy sets (IFSs), theoretical screening should be done through the qualitative part to determine the components and propositions of the research. In a small part, among the intuitive fuzzy sets, the analysis that has gained the most analytical validity can be used as a basis for choosing the best basis (acceptance of customers' green perception) based on the best reference proposition (visual themes of green advertising). Therefore, in the qualitative part, the systematic method of meta-synthesis and Delphi is used, and in the quantitative part, the most valid intuitive fuzzy sets is used after localization and finalization of research factors.

### Statistical Research Population

In the qualitative part, this study, through the basis of homogeneous sampling, selected 16 experts and marketing experts at the university level to determine the level of reliability (acceptance of green perception of customers) and propositions based on the theoretical approach to the research topic. Research (visual themes of green advertising) determined based on Delphi analysis. In the second phase, in order to perform the interpretive prioritization analysis, 50 knowledge-based companies active in the field of green food products were asked to respond to the identified components and propositions of the quality section as members of the focus group and respond to them. Matrix questionnaires have been developed. It should be noted that since intuitive fuzzy sets (IFSs) is an analysis based on matrix analysis and analysis of operations, it should be performed by participants based on a specific criterion such as experience or expertise, which is therefore limited in sample size, and is

consistent with studies such as Xu et al. (2012) and Yu (2013).

### Research Findings

In order to make a connection between the components of accepting customers' green perception and the propositions of the visual themes of green advertising, relying on theoretical foundations, an attempt was made to compile the research matrix checklists in the quantitative part by entering the components and propositions identified in previous researches to enter the interpretive analysis phase. Therefore, in the first step, based on the theoretical basis presented in the second part of the research, ie the theoretical basis, the definitions of the research components are expressed so that after determining its reliability by Delphi analysis in the next step, interpretive analysis is performed. Accordingly, theoretical definitions of each of them are first made in the form of research components and propositions.

#### A) Analytical Processes in the Qualitative Part

In this section, two meta-synthesis and Delphi analyzes have been used. First, in doing this section, it is necessary to review the valid scientific databases to select similar research in the period 2018 to 2021 in domestic and foreign research. This will help to obtain newer research on the research phenomenon. Therefore, in order to achieve research related to the field of research, in the next step, screening should be done in the first three stages, including title screening; Content and action analysis. From create a more specific perception, Figure (3) is used to perform the second step.

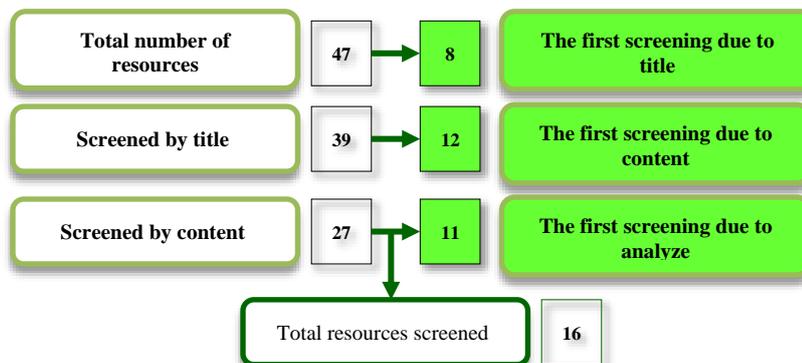


Figure 4. Screening of Initial Research (Research Findings)

As shown in Figure (2), all the primary sources identified are 47. After several stages of the screening process in terms of content, title and analysis, finally 16 research relevant to the content, title and analytical processes of this research were chosen, eight studies were related to determining the components of accepting customers' green perception and eight studies were related to the visual propositions of green advertising. At this stage, based on the nature of the analysis in the quantitative part, ie the second part of the analysis, in this part, the components should be determined as a basis and the propositions as a reference. For this

purpose, first the first part of qualitative analysis based on the meta-combined method, which is a method of critical evaluation with the participation of research experts based on 10 criteria of 50 points, separates each component (acceptance of green customer perception) and propositions (visual themes of green advertising) separately specified.

### Components of Accepting Customers' Green Perception

As explained, through meta-synthesis, the components of accepting customers' green perception are determined.

**Table 1.** The Process of Critical Analysis of Screened Research (Source: Research Findings)

		Critical appraisal criteria										Total
		Research purpose	The logic of the research method	Research plan	Sampling	Data collecting	Reflexivity	Ethical considerations	Accuracy of analysis	Theoretical and clear expression of findings	Research value	
International Research	Martinez Sanchez et al. (2020)	3	5	4	3	3	3	4	5	4	4	38
	Yue et al. (2020)	3	3	3	3	3	4	3	3	3	5	33
	Deliana & Adiyatma Rum (2019)	3	4	4	4	3	4	4	4	3	4	37
	Ottbacher et al. (2019)	2	3	3	4	3	3	3	3	3	4	21
	Wei et al. (2018)	2	3	3	4	3	3	3	4	4	4	29
Researches	Hasangholipoor Yasvari et al. (2014)	2	3	3	3	4	3	3	3	4	4	32
	Abbasi et al. (2018)	4	5	4	4	3	4	4	3	5	4	39
	Andalib and Muqtaderi (2018)	1	3	3	2	2	3	3	2	3	2	24

The scores presented based on the fashion index showed that the three studies were excluded due to the fact that they received less than 30 out of 50 points and according to the guidelines of the adequacy score of this analysis, the studies that scored 30 and above were approved. For this reason, they were excluded from the investigation. Accordingly, in order to determine the components related to the acceptance of customers' green perception, the following scoring method is used. Based on

this method, all sub-criteria extracted from the text of the approved articles are written in the table column and then the names of the approved research researchers are given in the row of each table. Based on each researcher's use of the sub-criteria written in the table column, the symbol "☑" is inserted, then the scores of each ☑ are added together in the sub-criteria column and the scores above the Mean of the researches are selected as research components.

**Table 2.** The Process of Determining the Main Components of Research (Source: Research Findings)

		Main components			
		Culture-based perception	Perception based on sustainable development	Perceptions based on economic integration	Perception based on social convergence
International	Martinez Sanchez et al. (2020)	☑	☑	-	☑
	Yue et al. (2020)	☑	-	-	-
	Deliana & Adiyatma Rum (2019)	-	-	☑	☑
Internal	Hasangholipoor Yasvari et al. (2014)	☑	☑	-	☑
	Abbasi et al. (2018)	-	☑	-	☑
<b>Total</b>		<b>3</b>	<b>3</b>	<b>3</b>	<b>4</b>

Based on this analysis, three themes of culture-based perception were identified; Perceptions based on sustainable development and perceptions based on social convergence have the highest frequency that were selected as strategic components of customer perception acceptance.

**Visual propositions of green advertising**

As in the steps described for determining the components of research, in this section, according to Table (3), the visual propositions of green advertising are determined.

**Table 3.** The Process of Evaluating Approved Research to Determine Propositional (Research Findings)

	International researches						Internal researches	
	1	2	3	4	5	6	7	8
	Sharma (2021)	Rita et al. (2021)	Kusumasondjaja (2020)	Kusumasondjaja & Tjiptono (2019)	Jiang (2019)	Leong et al. (2018)	Banar et al. (2019)	Abbaszadeh & Yazdani (2019)
Purpose	3	2	3	3	4	3	2	3
Method	3	1	4	3	4	2	2	4
Plan	4	2	3	3	3	3	1	3
Sampling	3	3	5	4	5	3	2	2
Data collecting	5	2	3	3	5	2	2	4
Generalization	4	3	5	4	3	1	3	3
Ethical	3	2	3	3	5	2	3	3
Analyze	4	2	3	3	4	2	2	4
Theoretical	5	3	3	3	4	2	3	3
Value	4	2	4	3	4	2	2	3
<b>Total</b>	38	22	36	31	41	22	21	32

Based on the results of this analysis, it was found that 3 studies that did not obtain the required score (more than 30 points) were excluded from the review. In order to determine

the visual themes of green advertisements of knowledge-based companies on social media, the following scoring method is used.

**Table 4.** Analysis of the Visual Themes of Green Food Advertising on Social Media (Research Findings)

	Researchers	Stimulate a sense of prejudice	Identify the brand	Feel the convergence of the Lego shape in creating green values	Strengthen the sense of participation in major customers	Creating interactive concepts in customers	Increase the competitiveness of green products	Stimulating the perception of customers' health in the advertising slogan	Stimulate brand mental association
<b>International</b>	Sharma (2021)	☑	☑		☑	☑	-	☑	
	Kusumasondjaja (2020)	-	☑	☑	-	-	☑	-	☑
	Kusumasondjaja & Tjiptono (2019)	-	☑		☑	-	-	☑	☑
	Jiang (2019)	☑	-	☑	-	☑	☑	-	
<b>Internal</b>	Abbaszadeh & Yazdani (2019)	-	-	☑	-	☑	-	☑	☑
<b>Total</b>		2	3	3	2	3	2	3	3

According to the approval of 5 researches in the critical appraisal process, the topics that have obtained more than half of the approved researches are approved as research

propositions. Therefore, as it turned out, 5 themes of propositions were approved.

**B) Delphi Analysis**

**Table 5.** The Process of the First and Second Steps of Delphi Analysis (Research Findings)

Components / Propositions	Assessment criteria	Symbols	First round of Delphi		Second round of Delphi		Result
			Mean	Coefficient of agreement	Mean	Coefficient of agreement	
Components of accepting customers' green perception	Culture-based perception	A1	6	0.80	6.20	0.85	Confirm
	Perception based on sustainable development	A2	5	0.50	5.10	0.55	Confirm
	Perception based on social convergence	A3	5.50	0.75	6.10	0.82	Confirm
Visual propositions of green advertising	Identify the brand	B1	5.20	0.65	5.50	0.75	Confirm
	Feel the convergence of the Logo shape in creating green values	B2	5	0.50	5.10	0.55	Confirm
	Creating interactive concepts in customers	B3	5.50	0.75	6.10	0.82	Confirm
	Stimulating the perception of customers' health in the advertising slogan	B4	5.30	0.65	5.50	0.75	Confirm
	Stimulate brand mental association	B5	5.20	0.65	5.50	0.75	Confirm

As can be seen, all the identified components and propositions about the research variables were confirmed during two stages of Delphi analysis.

**Quantitative Section Findings**

Intuitive fuzzy sets (IFSs) analysis is used in this section. Based on this analysis, one must first choose one of the three analytical methods of this evaluation, namely, FAHP; VIKOR and EDAS evaluated the most appropriate implementation method in terms of validity and finally performed the analysis based on it.

**A. Intuitive Fuzzy Sets Validation (IFSs)**

It can be effective in performing intuitive fuzzy analysis when the decision-making action is faced with multiple options and decision-making indicators. In this method, which is based on pairwise comparison based on the characteristics of the components, it can help to create more integration in choosing the best

solution. Therefore, based on the set of intuitive fuzzy sets, which includes analytical methods, FAHP; to determine based on the test values, which of the above three methods as a set of intuitive fuzzy analyzes, which analysis is the most effective according to the collected data set. According to the real value and intuitive value, based on three FAHP analyzes; VIKOR and EDAS, as a set of fuzzy analyzes, select the best analysis method by comparing them. Therefore, in an artificial intelligence system called fuzzy, the Training method is used to determine the validation. The CV method is a well-developed and accepted method for predicting the accuracy of predictions. This method is mainly used for random or multi-part (k-fold) subsets of test and training suite. This method is known as a component sampling method which is a simple approach to validation. In the k-fold validation method, the data set is divided into k separate sections. Repeat the modeling process for k times and in each k-1 instance, a portion of the data is used

for the training process, and a portion of the data that was not included in the training process is used for the testing and validation process of the predictive model. Finally, the prediction error calculated in each of the k stages is Meand. The advantage of using random data sub-setting in this method eliminates the effect of how the data is distributed for the modeling process. The variance of the averaging results will be very small for the case where the value is very large. The performance evaluation of the algorithms described above has been done using different criteria based on the sensitivity and detection perspective. Sensitivity and detection in statistics are two indicators for evaluating the result of a binary (two-state) classification. When data can be divided into positive and negative groups, the accuracy of the results of an experiment that divides information into these two categories can be measured and described using sensitivity and specificity indices. In this section, MMC, f-measure, recall, precision and accuracy criteria have been used.

- Precision is the ratio of the number of correctly classified items by an algorithm to a specific class, to the total number of items that the algorithm has classified, either correctly or incorrectly, in that class.
- Recall calculates the ratio of the correct number of items classified by an algorithm

from one class to the number of items in that class.

- Measure based on precision and recall criteria in this step, the weighted quantity f-measure can be calculated. This criterion is a good parameter for evaluating the quality of classification and it also describes the weighted Mean between the two quantities Precision and recall. For a classification algorithm under ideal conditions, the value of this quantity is equal to 1 and in the worst case it is equal to zero.
- MMC is another parameter used to evaluate the performance of machine learning algorithms. This parameter indicates the classification quality for a binary set. MMC is a measure of the relationship between the observed values of a binary class and its predicted values. The expected values for this quantity in the range of 1- and 1 are variable. A value of +1 indicates an accurate and error-free prediction of the learning algorithm of the binary class. A value of 0 indicates a random prediction of a binary class learning algorithm. A value of 1- indicates a complete mismatch between the predicted items of the binary class and the observed items.

Based on the following steps and the development of mathematical equations, the analysis of relationships to determine the observed values to the predicted values in the range of 1 to -1 shows.

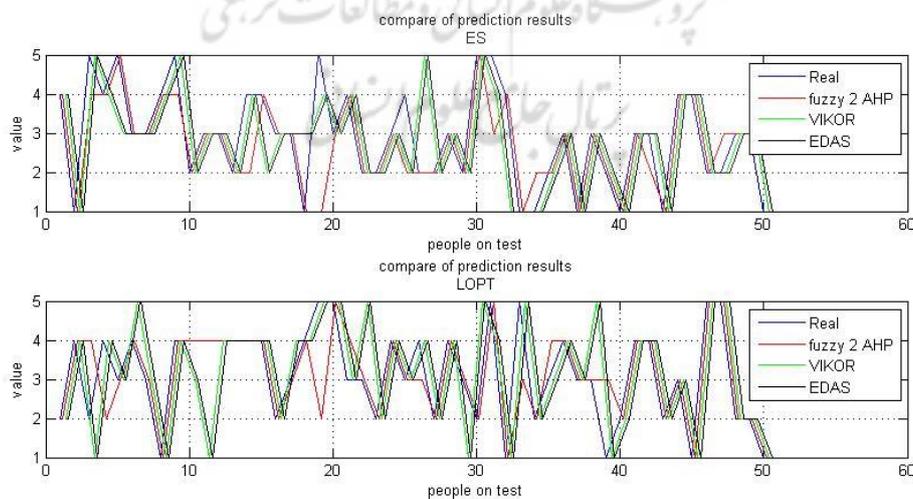


Figure 5. Validation of Matrix Analyzes

As can be seen, validation for FAHP; VIKOR and EDAS show validation of research statements based on VICOR values based on

the following criteria. The total points of the above diagram are presented in Table (6).

**Table 6.** Validation of Research Propositions (Source: Research Findings)

Amounts	MMC	f-measure	recall	precision	Accuracy	Rank
Fuzzy amounts	57.32	39.37	70.91	48.39	81.54	3
VIKOR amounts	85.37	74.28	66.15	89.45	93.06	1
EDAS amount	66.91	58.33	73.68	59.35	84.41	2

As can be seen, the value of VIKOR is selected for this analysis as the superior criterion of intuitive fuzzy sets due to its higher validity than other models in this set and is used to determine the most important dimension of accepting customers' green perception based on visual themes of green advertising on social media.

### B. Intuitive Fuzzy VIKOR Process

For perform this analysis, we must first explain the steps of fuzzy hierarchy analysis to determine the importance of the selected criteria in the process of evaluating propositions, and then set priorities by creating intuitive fuzzy VIKOR stages. According to the process of this analysis, according to the experts, tangible and common expressive items in the fuzzy pairwise comparison questionnaire should be used instead of the usual definite

ratios common in traditional methods such as AHP. Therefore, this part of the following 5 steps is estimated based on the following equations.

#### – Preparation of Pairwise Comparison Matrix

To prepare a pairwise comparison matrix, the criteria or sub-criteria are compared in pairs. A scale of 1 to 9 can be used for this purpose, while a score of 1 indicates the equal importance of the two elements to each other and a score of 9 indicates the highest importance of one element (matrix row) compared to the other (matrix column). The scale used in this research is a 5-point fuzzy scale proposed by Tesfamariam and Sadiq (2006) based on the hourly scale. Using a 5-point scale gives experts more leeway when making pairwise comparisons.

**Table 7.** Linguistic Scales for Determining Fuzzy Hierarchical Priorities

Numerical value	Linguistic value	Fuzzy number scale	Explanation
1	Same preference	(1, 1, 1)	The index i is equal to or has no precedence over j.
3	Somewhat preferred	(1, 3, 5)	Option or index i is slightly more important than j.
5	Preferred	(3, 5, 7)	Option i is more important than j.
7	Very preferred	(5, 7, 9)	Option i is more important than j.
9	Absolutely preferred	(7, 9, 9)	Option i from j is absolutely not more important and comparable to j.

After determining the comparison of row "i" and column "j", the geometric mean of each comparison is determined based on the fashion index. It is important to note that in intuitive fuzzy VIKOR analysis, components are

selected as the basis based on propositions as a reference, so in the hierarchical matrix analysis section, prioritized propositions must first be identified.

**Table 8.** Matrix Comparison Questionnaire Related to Research Propositions (Source: Research Findings)

	Symbols	B1	B2	B3	B4	B5
Identify the brand	B1	1	1	1		
Feel the convergence of the Lego shape in creating green values	B2		1	1	1	
Creating interactive concepts in customers	B3			1	1	1
Stimulating the perception of customers' health in the advertising slogan	B4				1	1
Stimulate brand mental association	B5					1

Axel and Saati (1983) introduced the use of geometric mean as the best way to combine couple comparisons. Therefore, a geometric mean is taken from the data of each row. The weights obtained are not normal. Normal weight means that the sum of the weights is equal to 1. Therefore, the geometric mean obtained in each row is divided by the sum of the elements of the geometric mean column. The new column that contains the normalized weight of each criterion is called the special vector or Eigenvalue. The final weight of each matrix is the resulting Eigenvalue column. Therefore, the following table determines the weight of each component based on the above relation:

– **Aggregation Matrix of Pairwise Comparisons**

In this step, after gathering the opinions of experts about the research propositions, the opinions of experts are aggregated using the geometric mean. It is assumed that  $(lk, mk, rk)$  is a triangular fuzzy number corresponding to the opinion of  $k$  expert, where  $lk, mk, rk$  are the most pessimistic values, respectively;  $lk$  is the most probable value and the most optimistic value, then the aggregate value of the experts' opinions is calculated using Equation (1) in the following order:

$$\tilde{a}_{ij} = (\sqrt[k]{l_1 \times l_2 \times \dots \times l_k}, \sqrt[k]{m_1 \times m_2 \times \dots \times m_k}, \sqrt[k]{r_1 \times r_2 \times \dots \times r_k}) \tag{1}$$

– **De-fuzzification expert opinions**

At this stage, after forming the aggregate fuzzy pairwise comparison matrix, de-fuzzyization is performed. The "COA" center of area method is used to fuzzification the matrix of fuzzy pairwise comparisons assembled to definite values (Islam et al., 2017). is assumed to be a triangular fuzzy number  $\tilde{R}_i = (L\tilde{R}_i, M\tilde{R}_i, U\tilde{R}_i)$ , so based on the approach of Wu et al. (2009), the fuzzy value is calculate as follows:

$$BN\tilde{P}_i = \frac{[(U\tilde{R}_i - L\tilde{R}_i) + (M\tilde{R}_i - L\tilde{R}_i)]}{3} + L\tilde{R}_i \tag{2}$$

In this, using the above relation, the matrix elements of the fuzzy aggregate pairwise comparisons are transformed into definite numbers.

– **Calculate local weights**

After collecting the data and converting the views of each news item into the corresponding fuzzy numbers, matrices of matched comparisons are obtained. Expert opinions are then aggregated using the geometric mean.  $\tilde{A}$  matrix of pairwise comparisons is assumed to be aggregated, then based on the approach of Wu et al. (2009) the fuzzy local weight for the criteria or sub-criteria from Equations (3) to (5) is calculated as follows:

$$\tilde{A} = \begin{bmatrix} 1 & \tilde{a}_{12} & \dots & \tilde{a}_{1n} \\ \tilde{a}_{21} & 1 & \dots & \tilde{a}_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \tilde{a}_{n1} & \tilde{a}_{n2} & \dots & 1 \end{bmatrix} \tag{3}$$

$$\tilde{r}_i = (\tilde{a}_{i1} \otimes \tilde{a}_{i2} \otimes \dots \otimes \tilde{a}_{in})^{\frac{1}{n}} \tag{4}$$

$$\tilde{w}_i = \tilde{r}_i \otimes (\tilde{r}_1 \oplus \tilde{r}_2 \oplus \dots \oplus \tilde{r}_n)^2 \tag{5}$$

In the above relation;  $\tilde{a}_{ij}$  is the value of the aggregated pairwise comparison of criterion  $i$  compared to criterion  $j$ ;  $\tilde{r}_i$  is the geometric mean of the fuzzy pair comparison value of criterion  $i$  compared to other criteria; The  $\tilde{w}_i$  solution weight is the criterion  $i$ . Finally, the final weight of each sub-criterion is calculated by multiplying the local weight of the main criterion by the local weight of that sub-criterion. After collecting the opinions of the research participants in the form of expressive items presented in Table (7), the matrix of fuzzy pairwise comparisons is formed based on their opinions. In fact, after creating the pairwise comparison matrix, it is about the main criteria. The participants' opinions were first aggregated based on the following equation to form a fuzzy pairwise comparison matrix for the main criteria.

$$\tilde{a}_{ij} = (\sqrt[k]{l_1 \times l_2 \times \dots \times l_k}, \sqrt[k]{m_1 \times m_2 \times \dots \times m_k}, \sqrt[k]{r_1 \times r_2 \times \dots \times r_k}) \tag{6}$$

Therefore, Table (9) shows a fuzzy pair comparison matrix that summarizes the views of research participants about research propositions. At this stage, a pairwise comparison between the research propositions should be determined. Relying on linguistic scales in hierarchical fuzzy, the score is as follows.

**Table 9.** Fuzzy Pairwise Comparison (Source: Research Findings)

Symbol	B1			B2			...			B5		
B1	1.000	1.000	1.000	3.303	4.093	5.116	...	...	...	2.193	3.087	3.406
B2	0.123	0.141	0.218	1.000	1.000	1.000	...	...	...	1.244	2.545	3.113
⋮	⋮	⋮	⋮	⋮	⋮	⋮	...	...	...	2.421	3.352	3.837
B5	0.271	0.334	0.449	0.315	0.383	0.462	...	...	...	1.000	1.000	1.000

The command (Cumulative AHP Fuzzy Matrix) is then run in MATLAB software to determine the weight level of each component. The conversion to fuzzy scale is based on the compatibility rate shown in the last three lines of the command, which is CR = 0.08. After aggregating the participants and forming the aggregated fuzzy pairwise comparison matrix, the local weight of the principal components is calculated using Equation (7).

$$BN\tilde{P}_i = \frac{[(U\tilde{R}_i - L\tilde{R}_i) + (M\tilde{R}_i - L\tilde{R}_i)]}{3} + L\tilde{R}_i \quad (7)$$

These weights are presented in Table (10). It is noteworthy that the compatibility rate for the pairwise comparison matrix of the original criteria is CR = 0.08. In fact, since the compatibility rate is less than 0.1, the matrix of pairwise comparisons of research propositions is consistent.

**Table 10.** Fuzzy Local Weight of Research Propositions (Source: Research Findings)

	Symbols	Weight of matrix comparison matrix criteria		Rank
Identify the brand	B1	(0.312; 0.388; 0.447)	1 <sup>th</sup>	
Feel the convergence of the Lego shape in creating green values	B2	(0.202; 0.269; 0.304)	3 <sup>th</sup>	
Creating interactive concepts in customers	B3	(0.270; 0.315; 0.268)	2 <sup>th</sup>	
Stimulating the perception of customers' health in the advertising slogan	B4	(0.153; 0.193; 0.234)	5 <sup>th</sup>	
Stimulate brand mental association	B5	(0.183; 0.247; 0.292)	4 <sup>th</sup>	
		CR = 0.08 < 0.1		

As Table 10 shows, based on the fuzzy local weight of the research propositions, it was determined that the most important parameter of the visual themes of green advertising on social media is brand identification, which due to the obtained fuzzy weights, it has the highest importance rate compared to other research propositions. After completing this step, based on the research propositions, the most strategic component of the research should be selected, ie the most effective basis for evaluating the

acceptance of customers' green perception. Accordingly, if  $D = [x_{ij}]_{m \times n}$  is a fuzzy-intuitive decision matrix for a multi-criteria decision's problem where "A<sub>1</sub>, A<sub>2</sub>, ..., A<sub>m</sub>", m is an option for decision makers and "C<sub>1</sub>, C<sub>2</sub>, ..., C<sub>m</sub>" n are the criteria to check, so X<sub>ij</sub> is the rank of option A<sub>i</sub> according to the criterion C<sub>i</sub>, which will be expressed as a fuzzy intuitive parable. First, in this section, it is necessary to define linguistic variables to rank the components.

**Table 11.** Defines Expression Variables for Ranking (Source: Research Findings)

Expressive terms	Corresponding intuitive fuzzy number
Very weak	$\langle [(0,0,1); 0.10], [0,0,1.5]; 0.90 \rangle$
Weak	$\langle [(0,1,2.5); 0.20], [0.5,1,2.5]; 0.75 \rangle$
Medium downward	$\langle [(0,3,4.5); 0.35], [1/5,3,5.5]; 0.60 \rangle$
Medium	$\langle [(2.5,5,6.5); 0.50], [3.5,5,7.5]; 0.45 \rangle$
Medium upward	$\langle [(4.5,7,8); 0.65], [5.5,7,9.5]; 0.35 \rangle$
Good	$\langle [(5.5,9,9.5); 0.80], [7.5,9,10]; 0.15 \rangle$
Very good	$\langle [(8.5,10,10.5); 0.90], [9.5,10,10]; 0.10 \rangle$

Given the knowledge of this scale, in a group decision-making environment, first k should evaluate the status of each option

according to the criteria based on the use of the mean method according to Equation (17).

$$x_{ij} = \frac{1}{K} [x_{ij}^1 + x_{ij}^2 + \dots + x_{ij}^k] \quad \text{Equation (8)}$$

Then, in order to rank the factors based on the method of intuitive fuzzy VIKOR analysis, the following equations are used. The best rank  $x_i^+$  and the worst rank  $x_i^-$  each criterion must first be calculated:

$$x_i^+ = \max x_{ij}, x_i^- = \min x_{ij} \quad \text{Equation (9)}$$

$$A^+ = \{x_1^+, x_2^+, \dots, x_n^+\}, A^- = \{x_1^-, x_2^-, \dots, x_n^-\} \quad \text{Equation (10)}$$

$A^+$  and  $A^-$  points are positive and negative ideals, respectively, that are subjective and cannot be assigned to a candidate. So far no one was able to send in the perfect solution, which is not strange. In the second drama,  $S_i$  and  $R_i$  for  $i = 1, 2, 3, \dots, m$ , which represent the mean and worst group scores for option  $A_i$ , respectively, are calculated according to the following equations:

$$S_i = \sum_{j=1}^n w_j \times \left( \frac{x_i^+ - x_{ij}}{x_i^+ - x_i^-} \right) = \langle [S_{1i}, S_{2i}, S_{3i}]; \mu_{S_i}, (S'_{1i}, S'_{2i}, S'_{3i}); \nu_{S_i} \rangle \quad \text{Equation (11)}$$

$$R_i = \max \left( w_j \times \left( \frac{x_i^+ - x_{ij}}{x_i^+ - x_i^-} \right) \right) = \langle [R_{1i}, R_{2i}, R_{3i}]; \mu_{R_i}, (R'_{1i}, R'_{2i}, R'_{3i}); \nu_{R_i} \rangle \quad \text{Equation (12)}$$

Calculate the rating index " $i = 1, 2, 3, \dots, mQ_i$ " according to the following relation:

$$Q_i = V \left( \left( \frac{S_i^+ - S_{ij}}{S_i^+ - S_i^-} \right) \right) + (1 - V) \left( \left( \frac{R_i^+ - R_{ij}}{R_i^+ - R_i^-} \right) \right) = \langle [Q_{1i}, Q_{2i}, Q_{3i}]; \mu_{Q_i}, (Q'_{1i}, Q'_{2i}, Q'_{3i}); \nu_{Q_i} \rangle \quad (13)$$

$$S^- = \text{Max}_i S_i, S^* = \text{Min}_i S_i, R^- = \text{Max}_i R_i, R^* = \text{Min}_i R_i$$

Note: The weight of the majority of the strategy agrees with the standard or maximum group desirability.

In the above relation;  $\left| \frac{S_i^+ - S_{ij}}{S_i^+ - S_i^-} \right|$  Indicates the ratio of the distance to the negative ideal solution of option  $i$ , in other words, the majority

agrees with the ratio  $i$ ;  $\left| \frac{R_i^+ - R_{ij}}{R_i^+ - R_i^-} \right|$  shows the ratio of the distance to the ideal solution of option  $i$  and means opposition to the ratio of option  $i$ . Therefore, the value of  $v$  is greater than 0.5,  $Q_i$  leads to the majority agreeing, and when the value is less than 0.5, the  $Q_i$  index indicates the negative attitude of the majority. In general, when the value of  $v$  is equal to 0.5, it indicates the agreed attitude of the experts. Therefore, for convert the intuitive fuzzy  $Q_i$  calculated to a definite  $Q_i$  through the following equation

$$Q_i = \frac{\langle [Q_{1i}, Q_{2i}, Q_{3i}]; \mu_{Q_i}, (Q'_{1i}, Q'_{2i}, Q'_{3i}); \nu_{Q_i} \rangle}{6} \quad \text{Equation (14)}$$

Based on the calculated  $Q_i$  value, the options are prioritized. Based on the equations developed in the intuitive fuzzy VIKOR analysis, the research criteria are prioritized as the basis of research in this section. Considering that in order to determine the importance of each of the components and themes determined for choosing the decision basis (strategic capabilities), the participation of 50 members of the target community in a small part was used, so according to the "Mode" index, the highest frequency distribution for each of the verbal expressions used. In fact, the "Mode" index was used to reduce the complexity of significance processes to determine in the form of tables the importance of each criterion, ie its components and themes to determine the importance of the decision basis (assessment of intellectual capital maturity). Then, in the form of Table (12), the importance of the decision basis (assessment of intellectual capital maturity) is determined in relation to the themes (two-way learning propositions). In Table (12), the "fashion" index was used for the importance of the decision basis (strategic capabilities).

**Table 12.** Determining the Importance of the Decision Basis (Source: Research Findings)

		Visual themes of green advertising					
		Symbols	B1	B2	B3	B4	B5
Accepting the green perception of customers	Culture-based perception	A1	Medium	Bad	Relatively good	Relatively good	Medium
	Perception based on sustainable development	A2	Good	Relatively bad	Medium	Good	Good
	Perception based on social convergence	A3	Relatively good	Medium	Very bad	Relatively good	Medium

Then the verbal ratios assigned to determine the importance of the decision basis

(acceptance of customers 'green perception) of the themes, ie the visual propositions of green advertising, should be converted into triangular

intuitive fuzzy numbers and then the decision makers' opinions should be aggregated.

**Table 13.** Intuitive Fuzzy Decision Matrix and the Weight of each Theme Based on the Decision Basis (Source: Research Findings)

		Research components			
Symbols		A1	A2	...	A3
Research topics	B1	$\langle [(5.15/6.65/385); 0.50, [(7.15/5.5/805); 0.20] \rangle$	$\langle [(4.25/5.15/315); 0.40, [(6.5/5/765); 0.20] \rangle$	...	$\langle [(2.2/3/155); 0.25, [(3.3/3.1/275); 0.20] \rangle$
	B2	$\langle [(4/5.2/305); 0.35, [(5.65/5/645); 0.25] \rangle$	$\langle [(3.7/4.1/270); 0.30, [(4.4/4/425); 0.20] \rangle$	...	$\langle [(3/3.85/235); 0.25, [(4.15/3.9/410); 0.20] \rangle$
	⋮	⋮	⋮	...	⋮
	B5	$\langle [(3.5/4.25/275); 0.30, [(4.5/4/425); 0.25] \rangle$	$\langle [(4/5.05/300); 0.30, [(5.6/5/625); 0.20] \rangle$	...	$\langle [(2/2.8/155); 0.25, [(3/3.3/280); 0.20] \rangle$

At this stage, the most influential component to determine the most important basis of the decision, namely the acceptance of customers 'green perception, should be combined to

determine which of the themes (visual green advertising) has a more fundamental role in evaluating customers' green perception.

**Table 14.** Determination of Intuitive Fuzzy Weights (Source: Research Findings)

		Symbols	Weight of matrix comparison matrix criteria		
Research topics	Identify the brand	B1	$\langle [(0.65/0.9/0.965); 0.75, [(0.85/0.95/1); 0.20] \rangle$	1 <sup>th</sup>	Rank
	Feel the convergence of the Lego shape in creating green values	B2	$\langle [(0.25/0.35/0.5); 0.25, [(0.3/0.35/0.60); 0.75] \rangle$	5 <sup>th</sup>	
	Creating interactive concepts in customers	B3	$\langle [(0.60/0.85/0.95); 0.75, [(0.8/0.85/0.9); 0.20] \rangle$	2 <sup>th</sup>	
	Stimulating the perception of customers' health in the advertising slogan	B4	$\langle [(0.32/0.40/0.65); 0.40, [(0.35/0.40/0.60); 0.55] \rangle$	4 <sup>th</sup>	
	Stimulate brand mental association	B5	$\langle [(0.55/0.8/0.885); 0.60, [(0.65/0.8/0.85); 0.30] \rangle$	3 <sup>th</sup>	

Accordingly, in ranking the components of customers 'green perception acceptance, it was also determined that brand identification as an effective visual theme of green advertising is considered as the basis for effectiveness in evaluating customers' green perception acceptance. After preparing the fuzzy aggregate decision matrix, they are first normalized by Equations (15) to (19) and then by Equation (7), this matrix will become a finite decision matrix.

$$R = [\tilde{r}_{ij}]_{m \times n} \quad \text{Equation (15)}$$

$$\tilde{r}_{ij} = \left[ \frac{a_{ij}}{c_j^{\max}}, \frac{b_{ij}}{c_j^{\max}}, \frac{c_{ij}}{c_j^{\max}} \right], j \in B \quad \text{Equation (16)}$$

$$\tilde{r}_{ij} = \left[ \frac{a_j^{\min}}{c_{ij}}, \frac{a_j^{\min}}{b_{ij}}, \frac{a_j^{\min}}{a_{ij}} \right], j \in C \quad \text{Equation (17)}$$

$$C_j^{\max} = \max_i C_{ij} \text{ if } j \in B \quad \text{Equation (18)}$$

$$a_j^{\min} = \min_i a_{ij} \text{ if } j \in C \quad \text{Equation (19)}$$

Which in the above relation; m Number of matrix options; n number of target sub-criteria; B a set of desirability criteria; C set of criteria with unfavorable (Cost criteria); also in these relations,  $r_{ij}^p$ ;  $r_{ij}^m$  and  $r_{ij}^o$  worst computational value; Shows the most probable computational value and the best computational value of the normalized fuzzy decision matrix.

**Table 15.** The Deposited Matrix of Themes to Determine the Most Effective Dimension (Research Findings)

		Visual themes of green advertising					
		Symbols	B1	B2	B3	B4	B5
Accepting the green perception of customers	Culture-based perception	A1	0.510	0.164	0.355	0.404	0.415
	Perception based on sustainable development	A2	0.717	0.814	0.796	0.609	0.571
	Perception based on social convergence	A3	0.782	0.493	0.683	0.255	0.279

After the formation of this matrix, it is necessary to select the ideal positive and negative solutions from the visual themes of green advertising, to select the most desirable solution to evaluate the acceptance of customers' green perception. Therefore, based on relations (20) and (21), the analysis is performed in this section:

$$S_i = \sum_{j=1}^n w_j (\tilde{f}_j^* - \tilde{f}_{ij}) / (\tilde{f}_j^* - \tilde{f}_{ij}^-)$$

Equation (20)

$$R_i = Max [w_j (\tilde{f}_j^* - \tilde{f}_{ij}) / (\tilde{f}_j^* - \tilde{f}_{ij}^-)]$$

Equation (21)

In the above relations;  $S_i$  represents the ratio of the distance of option  $i$  from the positive ideal solution (best combination);  $R_i$  indicates the ratio of the distance of option  $i$  to the solution of the negative ideal (worst combination);  $w_j$  weight below the standard  $j$ ; Based on these relationships, the highest rank is based on the value of  $S_i$  and the worst rank is based on the value of  $R_i$ .

**Table 16.** Ideal Positive and Negative Solutions in Intuitive Fuzzy VIKOR Method (Research Findings)

		Visual themes of green advertising				
		Symbols	B1	B2	B3	B4
Positive ideal solution	$S_i$	0.715	0.673	0.432	0.411	0.576
Negative ideal solution	$R_i$	0.364	0.498	0.222	0.387	0.285

The effectiveness of evaluating the acceptance of customers' green perception, which has achieved the highest level of positive ideal ( $S_i = 0.715$ ). The lowest negative ideal is related to the theme of creating interactive concepts in customers (B3), which is equal to ( $R_i = 0.222$ ). The following are the values of  $S_i$ ;  $R_i$  and  $Q_i$  are calculated based on equations (13) and (14). In fact, Table 17 is based on the  $Q_i$  index of prioritizing the criteria for assessing

the maturity of intellectual capital as a decision option. As explained in Equation (14), the optimal value of the  $Q_i$  index  $v$  is equal to  $v = 0.5$ . Based on the  $Q_i$  index and according to the fuzzy VIKOR analysis guidelines, the decision option with the lowest value is selected as the most effective acceptance of customers' green perception. These results are presented in the table below.

**Table 17.** Determining the Most Desirable Option (Research Findings)

	Symbol	Evaluation Criteria			
		$S_i$	$R_i$	$Q_i$	
Culture-based perception	A1	0.304	0.189	0.141	3 <sup>th</sup>
Perception based on sustainable development	A2	0.287	0.121	0.089	2 <sup>th</sup>
Perception based on social convergence	A3	0.196	0.072	0.020	1 <sup>th</sup>

As it turned out, the perception based on social convergence was determined based on the value of  $Q_i$  index equal to 0.020, which shows that the most desirable dimension of evaluating the acceptance of green perception of customers based on the theme of brand identity as a visual statement of green advertising.

### Conclusion

In the current era, consumers are expressing their concerns due to the increase in the level of factories producing products and environmental pollution in the form of the formation of public institutions. The existence of such concerns changed the paradigms of the production and marketing process, and the level of green consumerism should be considered more and

more as a perceived support from customers (Du et al., 2020). The purpose of this study was to evaluate the level of acceptance of green perception of customers based on the visual themes of green advertising on social media based on AHP hierarchical fuzzy analysis in the surveyed companies, it was found that the most prominent statement of the visual themes of green advertising on social media is related to brand identification, which shows the efforts of knowledge-based companies in promoting the effectiveness of brand identity to promote customer loyalty. In fact, the brand identity of green products due to the attractiveness it creates in the market can help to increase the level of effectiveness of the competitive advantage of green products. Because despite the level of integration of expectations and norms created by the existence of a green product brand identity, customers are motivated to use the green product brand in the form of a social norm coherence and that can give customers an identity in using that green brand. Because the development of the effectiveness of social norms in customers will lead to the creation of green brand identity and satisfaction with the marketing functions of such products and will have comprehensive competitive advantages for companies. Results obtained by Sharma Research (2021); Kusumasundjaja (2020) and Kusomasundjaja and Tjiptono (2019) are consistent in terms of the content obtained from the results. On the other hand, in the presence of the theme of green brand identity as a visual proposition of green advertising effective in accepting the perception of customers, it was found that perception based

on social convergence is the most important function, which can affect the customers of green products. In fact, perception based on social convergence is a part of customers' cognitive mechanisms that perform socially responsible processes due to external stimuli. In other words, the content of the green brand identity in the form of an overarching norm will shape the convergent perception of sociality in customers. Because of this perception, due to the existence of environmental values, it is considered as an external stimulus that causes customers to understand the importance of these values, to express committed behaviors towards environmental protection. In this situation, customers make sense of green products with their convergent social support and in an effort to reduce environmental pollution, they raise the level of social perception in terms of sharing experiences of using green products and providing feedback and interacting with knowledge-based companies active in the field of green products. The result obtained by the research of Matinez-Sanchez et al. (2020); Deliana and Adiatamaram (2019); Hasangholipour Yasouri et al. (2009) and Abbasi et al. (2016). In fact, the results show that the existence of stimuli to affect the social perception and pluralism of customers can increase the level of support for green products of knowledge-based companies in today's environmental and indigenous conditions of the country, which faces many pollutions. More sustainability will help to develop the environmental performance of knowledge-based companies active in this field.

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