

Factors influencing organic food purchase decision: fuzzy DEMATEL approach

Generation Y's
organic food
purchase
decision

4567

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Abstract

Purpose – In recent years, consumers today recognise organic foods as high-quality products which can benefit them in various aspects. The tendency to switch consumption behaviours from conventional to ecological food products or organic food has largely been due to the claims that organic crops are grown in eco-friendly and sustainable environments. Thus, the study highlighted unique results on young consumers' purchasing intentions from a new perspective. The paper aims to investigate the factors influencing consumers' purchase decision towards organic food, particularly amongst Generation Y consumers.

Design/methodology/approach – The underlying fuzzy set theory is employed to handle the fuzziness of consumers' perceptions since the attributes are usually expressed in linguistic preferences. Overall, the study focussed on five important aspects – health consciousness, environmental concern, social influencing and ethical concern – that also include twenty criteria that had been identified and introduced after a thorough review of related literature.

Findings – The results reveal that the most important criteria in the selected firm are environment protection, chemical instrument, buying attitude and animal testing. In comparison, the cause group includes criteria such as environment protection, natural food and support for training programmes, whilst the effect group includes production practices, monitoring protections and ethically produced food.

Research limitations/implications – The sample collection from the study focussed on Generation Y consumers who consume organic food in Malaysia. This could lead to the limitation towards external generalisability. The study will provide numerous advantages to the communities. The policy maker should develop a proper marketing strategy to promote organic food as food that is healthier, better in nutrition and safer for society.



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Originality/value – Utilising fuzzy decision-making trial and evaluation laboratory (DEMATEL) in analysing the fuzziness of consumers' perceptions towards consumers' purchase decision can be expected to expand the breadth of knowledge to both academic and practical.

Keywords Organic foods, Fuzzy DEMATEL, Health consciousness, Environmental concern, Ethical concern

Paper type Research paper

Introduction

In this affluent era, human beings have transcended the impossibilities and limits of knowledge acquisition. The advancement of technology has brought a huge transformation to the world and has impacted all levels of human society. No doubt, technology helps many of us to achieve goals and targets in the fastest and easiest ways; yet, there are negative repercussions in some ways. Science and technology have unlocked amazing advancements in farming methods that have improved crop yields and sped crop productions. These methods not only increased crop productions to meet global demands, but also, however, the use of excessive advanced technology has also resulted in more genetically modified organisms (GMO) and excessive use of pesticides and chemicals. Thus, there has been an upsurge of information about the adverse effects of such technology on the environment and human health. Such protests and concerns have also influenced a segment of the human population to rethink and relook the types of food they consume. The young consumers in this new millennium are changing their attitudes and patterns of behaviour when purchasing food products. [Makrides *et al.* \(2021\)](#) emphasised that there are many aspects of consumer cosmopolitanism and illustrated the potential of consumer cosmopolitanism in shaping consumer behaviour and reactions. [Massey *et al.* \(2018\)](#) claimed that the shift in consumer buying patterns towards environmentally sustainable and healthy food shapes the food market and drives the increasing demand for organic food. People have grown more aware of the advantages of organic food, which has increased its appeal globally ([Slabakova, 2020](#)). The current trend is to shift their focus away from conventional foods towards organically grown food in their search for healthy living.

Organic foods were first introduced and strongly promoted by the Americans and the British during the 1920–1940s. Marketing their produce under the name of Whole Food Market, the idea of consuming organic and whole foods became a huge phenomenon, and since then, producers of organic food products have been very enterprising in meeting the rising demands of organic food products in the USA ([Dimitri and Greene, 2002](#)). Due to its popularity, organic food markets began to mushroom, and organic food sales in natural products stores have increased 20–25% annually since the early 1990s ([Dimitri and Greene, 2002](#)).

On the home front, [Dimtri and Greene \(2002\)](#) predicted that the organic food industry in Malaysia would soon flourish, as it was still in its infancy stage. However, being a multi-racial country consisting of around 30 billion people, the organic food industry in Malaysia has much potential to grow. In addition, there is a greater awareness amongst Malaysians regarding the direct link between a healthy lifestyle and the types of foods they eat. This has created a new perspective towards the consumption of organically grown foods. With this increasing awareness, the market growth for the organic food industry is expected to boom in the near future. Thus, findings from this study will create more insight into factors that influence the demand and supply of organic foods in this region. The study will be focussing on Melaka, a state located in the southern part of Peninsular Malaysia. One of the underlying reasons for this is that Melaka is one of the first states in Malaysia to promote and adopt green technology in all aspects of the state's growing industries. One of its efforts can be seen in the number of organic stores or shops that have mushroomed in Melaka. In addition, suppliers such as Zenxin Organic Food Malaysia, BMS Organics and Natural Health Farm Marketing (M) Sdn Bhd are thriving in Melaka, as they have attracted a large number of organic food

enthusiasts amongst the locals and the tourists. As such, the data from this study would be highly authentic given that most of the respondents were familiar with the term “organic food” and were thus able to provide reliable feedback about consumers’ purchase intentions towards organic produce.

National Organic Standards Board of the US Department of Agriculture (USDA) stressed that the pathway for our future generations is by applying renewable resources and the protection of soil and liquid to improve environmental quality. Moreover, in food production, organic farming is the key to a sustainable planet. Thus, Generation Y would naturally seek foods that are farmed without using chemicals or substances that could damage the earth. As a result, the [Statista Portal \(2017\)](#) reported that in 2015, organic food sales in the USA generated approximately 31.32bn US\$ and is predicted to generate about 42bn US\$ in 2014. In support of this phenomenon, [Lohr \(2011\)](#) stated that the annual growth rate of organic food increased from 15 to 30% in certain countries such as Europe, Japan and the USA due to organic food demands increasing globally.

Although organic food accounts for a small portion of the food industry, its fast development has piqued the attention of consumers, companies and academics. The demand for organic food has skyrocketed, particularly in industrialised nations. This tendency has spread to emerging nations such as Malaysia. The growing number of nations producing organic food, as well as the rise in overall sales, indicate the trend towards organic food. The lack of safety laws and enforcement in the way conventional foods are produced creates a new pattern of food consumption amongst young consumers. The current literature on organic food consumption is largely led by Western scholars and focusses on the influence of individual factors on organic food purchase intention, such as individual cognition of organic food ([Kapuge, 2016](#)), health consciousness ([Singh and Verma, 2017](#)), trust ([Du et al., 2017](#)) and environmental protection awareness ([Janssen et al., 2018](#)). There is a wealth of information on organic buyers’ motivations, barriers and personal traits. For example, research shows that organic food consumption is driven by altruistic ([Bauer et al., 2013](#)) and egotistical ([Hoeftkens et al., 2009](#)) motivations. Aside from individual variables, several researchers have investigated the impact of regional factors on consumers’ organic food choices ([Szolnoki and Hauck, 2020](#)). Moreover, as more and more young consumers become more affluent and more educated about the types of food they consume, it becomes natural to turn towards organic food as part of a healthy lifestyle. [Shamsi et al. \(2020\)](#) emphasised that consumers’ decisions when purchasing food-related products are the quality of the organic food. In addition, organic food is considered environmentally friendlier than conventional alternatives ([Gottschalk and Leistner, 2013](#)). [Kushwah et al. \(2019a\)](#) suggested that consumers were conscious about the degrading environmental conditions and their subsequent impact on human health. [Ahmad and Juhdi \(2010\)](#) stated that many Malaysians still lack conscious awareness about organic foods signalling an initial stage of growth in the organic food industry in the country. In their study, the results revealed that Malaysians would choose to buy organic products as their food choice if they are widely available. Consumer involvement refers to how consumers buy organic food products ([Kushwah et al., 2019b](#)). [Kushwah et al. \(2019a\)](#) have emphasised the critical role of consumer barriers that can significantly jeopardise purchase-related decision-making. Their study also suggested demand for organic foods and various factors that could influence Malaysians’ purchasing decisions when choosing organic foods. Because the development of organic food products is expanding, it is critical to recognise the problems and obstacles connected with organic food production in Malaysia. A new marketing strategy is needed for organic food to fill this gap. As a result, retailers must understand the critical factors on consumer repurchase intention on organic food.

The current study tries to address a research gap by incorporating the theory of planned behaviour (TPB) ([Ajzen, 1991](#)) to explain the behaviour of Malaysian consumers towards

purchase decisions on organic food using the fuzzy set theory. The fuzzy set theory addresses information from the qualitative data and transforms linguistic preferences into crisp values. Additionally, this research employs the DEMATEL to investigate the interrelationships amongst the factors. It is noteworthy to highlight here that no study has comprehensively assessed the factors influencing organic food purchasing decisions. Hence, this present study bridges the gap and spearheads an empirical investigation regarding the factors influencing consumers repurchase decisions on organic food in Malaysia. In precise, this study being undertaken will present insight into the factors that influence their purchase decisions. This paper continues with the literature review and hypotheses development. The following sections outline the methodology and the results. Lastly, this study is concluded with a discussion of results and several implications.

Literature review

Theory of planned behaviour

TPB explains intention in terms of behaviour, attitudes and beliefs. In this theory, the intention is explained as the direct precedent of action, which is the expression of an individual to carry out a particular behaviour. According to [Phuah et al. \(2011\)](#), subjective norms like green society and perceived behavioural control like environmental friendliness are the TPB's perception of organic food consumption. Hence, individuals' awareness of green products is the significant factor affecting individuals' values towards organic food products, whether they are desirable or not. By positing that behavioural intentions influence individual behaviour, the theory aimed to forecast human behaviours (e.g. purchases, decision-making or behaviour based on situation or subjective context) by suggesting that attitudes and subjective norms influence individual behaviour; these are primarily aroused by attitudes and subjective norms. As a result, the theory is founded on two key components: first, the function of observed magnitudes (attitude), which the consumer may connect with the behaviour and second, subjective norms are the idea that a significant person or group of individuals would accept and support a certain action. Subjective norms are formed by perceived social pressure from other individuals on certain conduct and their desire to conform to these people's opinions. As a result, the theory is extensively utilised in various fields to shed light on a person's unique behaviour in response to a given event ([Nahapetyan et al., 2019](#); [Sharma and Foropon, 2019](#)). Recent research investigates the function of attitude in the TPB to better understand its predictive value for organic-food-purchasing intention. Current studies examine the role of attitude in the TPB to deeply understand its predictive power towards organic-food-purchase intention. Various studies prove that consumer attitude can influence consumer purchase intention, either directly or indirectly, through alternative variables (e.g. health consciousness, environmental concern, food safety and taste) ([Nguyen et al., 2019](#); [Pham et al., 2018](#)).

Organic food

Organic food, known as green products, is about freshness, nutritious and eco-friendly and reducing the environmental pollution. In fact, there are some foods that are labelled as organic food which mean that it is produced by not using conventional pesticides. Furthermore, organic food consists of various types of food such as dairy products, vegetables, meats, etc. The term "organic foods" is known as green products grown in eco-friendly and sustainable environments. The products should meet specific requirements for freshness and nutrition and be produced without using conventional methods such as pesticides or chemical fertilisers. Furthermore, organic foods can also include various types of food such as dairy products, vegetables, meats, etc.

Consumers today “think green” and are more ready to pay a premium for organic food items. The willingness to pay for a premium price showed that people care about their health and the environment usually pay more attention to green practices in the food and beverage industry (TM *et al.*, 2021). The global organic food industry is projected to expand at a rate of more than 16% by 2020. In Malaysia, the organic food industry has grown significantly during the past decade. Malaysia is one of the nations where organic food has a lot of potentials. Malaysian customers are growing increasingly concerned about their health and are gradually shifting their preferences towards organic food. The growing demand for Malaysian organic goods has been fuelled by rising demand in local markets. The value of organic food production in Malaysia is expected to reach 200m RM by 2025 to meet the demand for organic food and the export market (MARDI, 2020). However, demand for organic food remains low, and Malaysia presently relies largely on imported organic food to satisfy local demand, with 60 to 90% of organic food items imported (Somasundram *et al.*, 2016). Furthermore, Pang *et al.* (2021) have researched organic food at a macro-level in the organic business and organic agriculture growth. In Asia, just 0.01%, or 603 hectares, of the 6.1 million hectares of organic agricultural land in 2017 were handled by 119 farmers in Malaysia (Willer and Lernoud, 2019). This demonstrates that the organic food industry, at least, in Malaysia, is still in its infancy. Subsequently, Malaysian customers are more likely to believe that a social lifestyle is a motivation to buy organic goods, which are more costly than conventional foods (Nathan *et al.*, 2021).

The idea of consuming organic foods has attracted many young consumers today as supporting a healthy living that promotes sustainable farming, and agriculture methods sit well with these young minds. According to Shaharudin *et al.* (2010), the Internet is flooded with information and research findings that encourage young consumers to buy foods grown in eco-friendly and sustainable environments free from chemicals. Andersen (2007) also noted that many young consumers are willing to pay premium prices for organic foods, which they presume is much healthier than conventionally grown or farmed produce. Hence, the advent of the internet has created a new perception about organic foods as part of healthy living. Organic food is often derived from the organic agricultural production system, which is a catch-all phrase for non-polluting natural food produced and processed in accordance with worldwide organic agricultural production regulations and standards (Li and Cui, 2021). This has directly influenced Malaysian Generation Y consumers to switch from conventional to organic foods. However, in order to discover an efficient way to increase customer demand for organic food purchases, it is necessary to first understand the psychological mechanisms that drive their purchasing decisions. So this issue has not been properly addressed yet.

Environmental concern

Environmental concern affects how individuals perceive and evaluate products. People who care more about the environment often consider the impact of their behaviour on the environment. Huang *et al.* (2020) noted that environmentally conscious people often link products with environmental issues when purchasing products. Shaharudin *et al.* (2010) explained that the production of organic foods is all about freshness with no chemical additives and should be produced in eco-friendly and sustainable environments. Many consumers choose to consume organic foods due to an acute sense of protection and conservation of the environment. Environmental knowledge, environmental values, environmental attitudes, willingness to act and actual action are the main measurements to comprehend environmental awareness. Petrescu *et al.* (2020) claimed that environmental concern is gaining importance in consumer food choices, generating changes in production and supply and demonstrating how the consumer can contribute to environmental health.

Interestingly, some consumers go organic to satisfy a sense of self-fulfilment. These people trust self-improvement as a superior attitude, and they are more willing to take up any challenge to advocate it. For example, they wish to boost themselves by achieving ecological lifestyles, such as being volunteers to protect the environment and participate in environmental awareness events. According to [Fraj and Martinez \(2007\)](#), people who are conscious of ecological issues will support organisations committed to environmental protection.

Based on [Lung's \(2010\)](#) research, most of the consumers from Asia, especially Thailand, Malaysia and Korea, are often willing to pay superior prices for products that help and improve the environment. Besides that, many consumers from this segment of society are willing to forgo products that contribute to environmental degradation, such as soil or water pollution ([Fraj and Martinez, 2007](#)). Therefore, this shows that consumers choose ecological products not only because of health consciousness, but also due to a deep concern for the conservation of the planet.

Many researchers have found various types of consumers' characteristics that are related to environmental consciousness. For instance, gender is a major element that causes different individuals' perspectives in green purchase behaviour, affecting consumers' ecological knowledge ([Mostafa, 2007](#)). The study shows that most of the respondents who consume organic products are young adult women who had a higher disposable income and higher education levels compared to other groups. This implies that these chose to consume organic products due to their concerns for the environment. Indeed, they were more willing to purchase the product if it claimed to have originated from environmental-friendly conditions and even if it is costlier than other products.

[Tobler et al. \(2011\)](#) mentioned that intention of consumers whilst purchasing food or products will be influenced by surrounding factors such as the ecological environment. As a result of this study, a consumer's point of view towards ecological products will be influenced by the sustainable environment factor. Therefore, if an individual has a higher level of emotion towards ecological environments, eventually that individual will be willing to pay more to consume the green product. Moreover, [Sangkumchaliang and Huang \(2012\)](#) explained in their research that most of the respondents consumed organic food because they desire to improve the sustainability of the environment and support local farmers.

In addition, there are various types of factors that may affect an individual's green purchase intention, and a major determinant seems to be environmental-friendly behaviour ([Lee et al., 2012](#)). "Consumers who possess an environmental concern are more likely to exhibit a positive attitude, possess highly positive norms and high levels of perceived behavioural controls, which ultimately drives consumers to have great intentions to buy eco-friendly products" ([Albayrak et al., 2013](#)). According to [Aman et al. \(2012\)](#), a consumer who is concerned about environmental issues and is more willing to purchase green products has a direct relationship with his or her attitude is classified under the term collectivist culture. Conversely, individuals who lack awareness about the sustainability of the environment are classified under individualistic culture and tend to care less about the planet and its natural resources ([Kumar, 2012; McCarty and Shrum, 1994](#)).

Furthermore, [Chan and Lau \(2000\)](#) revealed in their study that "the effect of man's emotions in relation to eco-systems and actually determine consumers' pro-environmental behaviour". Therefore, consumers who concern themselves with environmental issues unwittingly display eco-friendly behaviour. [Shamsollahi et al. \(2013\)](#) the environmental consciousness encourages consumers to purchase organic food and positively impacts organic food purchase intention. In short, according to [Ahmad and Juhdi \(2010\)](#), consumers who are more concerned about the environment would have a higher desire to purchase ecological or organic products.

Social influence

Consumers too hold a wide array of enduring images about themselves, which are somewhat associated with their inherent personalities and their consumption patterns are related to self-image (Yusof *et al.*, 2012). In addition, the degree of an individual's community interaction is identified as "Self-image" (Chiou *et al.*, 2011).

Individuals will tend to have considerable awareness of the environment and consume eco-friendly products to change their self-image (Zia-ur-Rehman and Khyzer, 2013). Eventually, this segment of society will keep their eyes peeled on products that have been produced under environmental-friendly conditions whilst avoiding those that are not. Hence, an excellent image and reputation will be formed when individuals are seen to consume organic foods. Aitken *et al.* (2020) concluded that to consume sustainably, people need positive attitudes and intentions, supportive social norms and the appropriate information to enable them to feel a sense of control over their decision.

Hosany and Martin (2012) stated that youngsters have a greater intention to consume ecological products because they could promote and shape their self-image in order to communicate and stay well in their social groups. For this reason, their self-image is being reflected by their actions. Furthermore, purchasing something with an intention to develop their own self-image can be an act of strength behind purchasing actions of people. Once again, according to Hosany and Martin (2012), those who are acquisitive have an extreme desire to purchase something to promote their self-image. In addition, by synchronising with their social groups, young consumers tend to purchase items to fit in with the reference group and promote their self-image.

Van der Werff *et al.* (2013) claimed that perception towards a person or image formed by others towards an individual could be explained as self-image. Many researchers have carried out many studies to investigate the relationship between self-image and the purchase intention towards green product behaviour (Wahid *et al.*, 2011; Barber *et al.*, 2012). According to Oliver and Lee (2010), the results of their studies on consumers in the USA and Korea showed that higher-purchase intentions towards a product occur when individuals have the desire to shape their self-image.

According to Ewing (2001), social norms are major motivators of environmental-friendly behaviour. United Nation Environment Programme UNEP and United Nation Educational (2001) explained that young people are easily influenced because they are more changeable and easily adapts to new things. Therefore, young consumers' purchasing behaviours would easily be influenced by their social groups' coercive powers when purchasing a new product. Lee (2008) suggested that the most significant element influencing green purchase behaviour is social influence. For example, an individual will foster intentions towards environmental awareness when he or she belongs in a social group whose peers hold the same perception, attitude and habits. To be brief, altering an individual's perception, feelings and behaviours due to the influence of a social group is defined as a social influence (Rashoote, 2007). Furthermore, Ling's (2013) studies stated that when an individual is persuaded to perform an action in order to retain a good relationship within the group, it is described as a form of peer pressure. According to social impact theory, peer pressure is defined as a specification of environmental practice that coerced, strengthened and fostered by an individual's major peer network. In this world with ongoing Internet technology, messages and information are easily disseminated and communicated in order to influence personal opinions and preferences through social networking. Moreover, the availability of Internet forums serves as effective platforms to influence and affect individuals to comply and follow a trend on social media.

Ohman (2011) clarified that social media influence is a major factor that has influenced individuals' purchasing intentions towards green products. Apart from their peers, a social influence community can include family members, colleagues, sale assistants and even strangers (Maram and Kongsompong, 2007). Additionally, Ohman (2011) declared that social

pressure from any of these socially influential communities could alter an individual's perception and behaviour into carrying out an actual buying intention. [Feil et al. \(2020\)](#) presented consumer purchase behaviour differently because organic food consumption is mainly an autonomous choice driven by specific aspects, like sustainability concerns and healthy lifestyles.

Ethical concerns

[Monika et al. \(2014\)](#) highlighted that there is also a significant element that influences customers' purchase intention towards organic foods, which is ethical concerns. When the organic market has resulted in a lot of research, an appreciable number of consumers showed keen interest in ethical matters beyond what is stated in the labels. Instead, discerning consumers require more than labels as proof that organic foods are produced with the highest ethical requirements and standards. Therefore, a comprehensive study is needed to look into the different types of values influencing consumer choice behaviour towards green products (such as organic) ([Groening et al., 2018](#)). Furthermore, [Pinar and Oznur \(2012\)](#) identified that individuals who share these ethical concerns prefer organic foods more than other types of food.

Therefore, individuals' principle beliefs are the main factors that can influence their consumption choices. This has been defined as "Ethical Consumerism" in a research by [Crane and Matten \(2004\)](#). According to researchers ([Daniel et al., 2008](#); [De Devitiis et al., 2008](#)), achieving a "fair trade" field is the major element to promote ethical consumerism amongst young consumers. Therefore, they are motivated to purchase organic foods in order to improve farmers' lifestyles by providing better price paid. However, consumers from this market segment also take into consideration factors like social identity and environmental awareness whilst consuming ecological products. The "ethical consumerism" community prefers to consume certain products because they can decrease greenhouse gas overflow and reduce the levels of pollution in tropical rainforests.

Health consciousness

Health consciousness is regarded as the degree where health concerns are considered in individual's daily life activities ([Yadav and Pathak, 2016](#); [Wang et al., 2019](#)). An individual's positive and healthy attitude has a positive relationship with green purchase intentions. For instance, an individual's interest in learning more about nutritious and healthy foods will indirectly form purchase intentions towards organic food. Consumers usually create a high level of consciousness about body health when they have acquired adequate knowledge about the relationship between health and how food is produced and processed. Conversely, consumers who lack awareness about their overall health will be more neutral when choosing functional foods ([Verbeke, 2005](#)). For example, consumers from that segment will have lesser interest in choosing functional foods such as omega to enrich egg and fatty fish that can boost their health conditions. Keeping this ideology in mind, people tend to prefer to buy organic products which are produced in a natural manner ([Shamsollahi et al., 2013](#))

[Phuah et al. \(2011\)](#) confirmed that an increase in individual's consciousness towards health issue had buoyed the growth of organic food markets worldwide. Thus, there is a direct relationship between awareness towards health issue and demand for organic food, green food and natural food. In addition, with the rising increase of non-communicable diseases, consumers are now more cautious about food consumption practices. Based on the Country Report (Consumer Foodservice in Malaysia), there is a significant rise in health consciousness amongst Malaysians that has also influenced consumers' consumption of food choices. Furthermore, with more awareness about organic foods in government health educational campaigns, Malaysians are becoming more conscious about health-related matters and are more conscious in purchasing functional products such as natural foods and organic food products.

Correspondingly, studies by [Werner and Alvensleben \(2011\)](#) stated that intentions to consume organic products are directly affected by the level of awareness individuals have towards health-related issues. [Basha and Lal \(2018\)](#) suggest that consumers are aware of organic foods and their impact on societal health, but they are not willing to make a favourable purchase decision, and their study has provided a new insight of consumers' behaviour in the organic food industry. Customers' purchasing intentions for organic goods may be predicted using health consciousness ([Kabir and Islam, 2021](#)). According to the results of many research studies, consumer well-being is the most important factor in their buying intentions. Earlier research ([de Magistris and Gracia, 2008](#)) has identified a health problem that predicts consumer purchases and use of organic foods.

Methodology

This study attempts to use fuzzy DEMATEL to identify the driving attributes to explore the interrelationships of these attributes. These models address problems of attribute dependence, linguistic preferences and hierarchical structure modelling by providing more valuable information for strategic direction ([Sarkis, 2003](#); [Tseng, 2009](#); [Tseng et al., 2020](#)). [Wu et al. \(2016\)](#) stressed that fuzzy DEMATEL methods has been employed in a study to examine the interrelationships amongst the studied attributes and review the qualitative information linguistic descriptions provided by experts and generate a causal diagram of interdependent proposed attributes. Besides, in the literature reviewed, fuzzy set theory has been used to quantify equivocal concepts related to subjective human judgements in an uncertain environment. At the same time, the DEMATEL method was designed not only to build and analyse the structure of causal relationships between complex perspectives, but also to construct correlations between aspects and criteria ([Wu and Lee, 2007](#)). There are numerous research studies that use DEMATEL to conduct fuzzy logic experiments ([Keskin, 2015](#)). Several recent DEMATEL studies in the area of food consumption and food industry such as [Khan et al. \(2021\)](#) assessed the most influential sustainable supply chains indicators from the food sector using DEMATEL. [Dubey and Tanksale \(2022\)](#) used DEMATEL to find the cause–effect relationship amongst the identified obstacles to India's adoption and expansion of food banks. [Liu et al. \(2021\)](#) conducted research on investigating the impediments to sustainable food use and production in China through DEMATEL analysis.

DEMATEL technique has been effectively used in various areas, but there is yet to be a successful application in the subject of organic food purchase–decision measurement. It is intriguing to build a comprehensive knowledge of the cause–effect connections of organic food purchase decisions using DEMATEL since it differs from previous organic food research. This article identifies cause and effect groups, allowing readers to get a better knowledge of the interactive relationship that exists between them. It also makes recommendations for improvements that will help them perform better in their overall performance. In combining fuzzy set theory and DEMATEL methods, this study reviews the distribution of attributes based on identifying the driving and dependence powers between them. For this reason, this study proposes that four aspects represent the attributes and twenty-one criteria, including environmental concern (AS1), social influence (AS2), ethical concern (AS3) and health consciousness (AS4) that are illustrated in [Table 1](#). In total, 21 evaluators actively purchased organic food and resided in Melaka, Malaysia and evaluated the causal factors of purchase decisions. These evaluators are within Generation Y's age cohort (25–40 years) with a working experience of between 3 and 17 years and with an income level of 2500 RM and above. As an indicator of their purchasing experience, they were selected. Generation Y was the chosen population in this study in Malaysia, as the population from this generation is estimated at about 12 million ([Department of Statistics, 2021](#)) and these Generation Y customers are typically enthusiastic about acquiring organic food.

Aspects	Criteria	Reference
AS1 Environmental concern	C1 Environment protection	Shamsollahi <i>et al.</i> (2013)
	C2 Chemical instruments	
	C3 Growth hormones	
	C4 Production practices	
	C5 Monitoring protection	
AS2 Social influence	C6 Support for training programmes	Zia-ur-Rehman and Muhammad (2013)
	C7 Learning from friends	
	C8 Discussion with peers	
	C9 Mentoring environmental issues	
	C10 Information sharing	
AS3 Ethical concern	C11 Ought to purchase	Ooi (2014)
	C12 Obligated to consume	
	C13 Ethically produced food	
	C14 Buying attitude	
	C15 Animal testing	
AS4 Health consciousness	C16 Community commitment	Shamsollahi <i>et al.</i> (2013)
	C17 Health is very important for me	
	C18 Natural food	
	C19 Human health	
	C20 Chemical residues	
	C21 Healthy lifestyle	

Table 1.
Aspect and criteria

The fuzzy DEMATEL model

The fuzzy DEMATEL model combines the fuzzy linguistics aspect of fuzzy theory with the DEMATEL. Applying the DEMATEL in a fuzzy context enables researchers to analyse the causal relationships of fuzzy variables and determine the interactive influence between variables. The computation procedures of the fuzzy DEMATEL model consist of the steps as follows:

Step 1: Develop evaluation standards and design a fuzzy linguistic scale. Measuring the relationship between criteria requires that the comparison scale be designed into four levels: 0 (no influence), 1 (very low influence), 2 (low influence), 3 (high influence) and 4 (very high influence). An initial direct relation Matrix *A* is a $n \times n$ Matrix obtained by pairwise comparisons in which T_{ij} is denoted as the degree to which the criterion *i* affects the criterion *j*, i.e.

$$T = [t_{ij}]_{n \times n}$$

Step 2: Normalising the direct relation matrix. On the base of the direct relation Matrix *A*, the normalised direct relation Matrix *I* can be obtained through the equation as follows:

$$S = k \times A$$

$$k = \frac{1}{\max \sum_{1 \leq i \leq n, j=1}^n a_{ij}}$$

Step 3: Attaining the total relation matrix. Once the normalised direct relation matrix *S* is obtained, the total relation matrix *I* is denoted as the identity matrix.

$$T = X(1 - X) - 1$$

Step 4: Producing a causal diagram. The sum of rows and the sum of columns are separately denoted as vectors D and R within the total relation Matrix M . A causal and effect graph can be acquired by mapping the dataset of $(D + R, D - R)$. The horizontal axis vector $(D + R)$ named "Prominence" is made by adding D to R , which reveals how much importance the criterion has. Similarly, the vertical axis $(D - R)$ named "Relation" is made by subtracting D from R , which may group criteria into a cause group. Or, if the $(D - R)$ is negative, the criterion is grouped into the effect group.

$$T = [t_{ij}]_{n \times n}, \quad i, j = 1, 2, \dots, n$$

$$D = \left[\sum_{i=1}^n t_{ij} \right]_{1 \times n} = [t_j]_{n \times 1}$$

$$R = \left[\sum_{j=1}^n t_{ij} \right]_{1 \times n} = [t_i]_{n \times 1}$$

Step 5: Obtaining the inner dependence matrix. In this step, the sum of each column in total relation matrix is equal to 1 by the normalisation method, and then, the inner dependence matrix can be acquired.

Fuzzy set theory

A fuzzy set is a theory of graded concepts. This proposed concept takes the truth into account, and the fuzzy set represents a degree of classification as ranging between one and zero (Zadeh, 1965). Additionally, Zimmermann (2011) claimed that the fuzzy set theory has matured into a wide range collection of concepts and techniques for dealing with complex phenomena that are not analysed by classical methods based on probability theory and bivalent logic.

First, contract with Z to be a universe of discourse; let $Z_{1/4} \{z_1, z_2, z_3, \dots, z_n\}$. Then, conduct a fuzzy set as A of Z represents a set of pairs $\{(z_1, f_{\bar{A}}(z_1)), (z_2, f_{\bar{A}}(z_2)), (z_n, f_{\bar{A}}(z_n))\}$, where $f_{\bar{A}} : Z$ is $a_0 - 1$ membership function of \bar{A} and define $f_{\bar{A}}(z_i)$ as the membership degree of z_i in \bar{A} . Several relevant important definitions and notations of fuzzy set theory were reviewed and proposed by Tsai and Hung (2009), Tseng *et al.* (2019, 2020) and Lin (2013) and they are as follows:

Definition 1. The fuzzy set A denoted as A_i or A_f depends on whether the Z is an infinite set or a finite set

$$\begin{cases} \bar{A}_i = \frac{\int f_{\bar{A}}(z_i)}{z}, \quad \text{where } z \in Z, \quad \text{when } Z \text{ is an infinite set} \\ \bar{A}_f = \frac{\sum_i f_{\bar{A}}(z_i)}{(z_i)}, \quad \text{where } z_i \in Z, \quad \text{when } Z \text{ is a finite set} \end{cases}$$

Definition 2. The fuzzy set \bar{A} is the normal universe of discourse Z , and its membership function $f_{\bar{A}}(z)$ must satisfy the maximum $f_{\bar{A}}(z)$ equals 1.

Definition 3. The fuzzy number is a fuzzy subset in a normal universe of discourse Z without a convex condition.

Definition 4. The fuzzy α -cut A_α and strong α -cut \bar{A}_α of the fuzzy set \bar{A} in the universe of discourse Z is denoted as follows:

$$\begin{aligned} \bar{A}_\alpha &= \{z_i | f_{\bar{A}}(z_i) \geq \alpha, z_i \in Z\}, \text{ where } \alpha \in [0, 1] \\ \bar{A}_{\alpha^+} &= \{z_i | f_{\bar{A}}^+(z_i) \geq \alpha, z_i \in Z\}, \text{ where } \alpha \in [0, 1] \end{aligned} \quad (1)$$

Definition 5. If the fuzzy set \bar{A} of the universe of discourse Z exists with the convex condition and each A_α is convex, A_α is close to interval σ . This can be defined as follows:

$$\bar{A}_\alpha = [\sigma_1^\alpha, \sigma_2^\alpha], \text{ where } \alpha \in [0, 1] \quad (2)$$

Definition 6. A triangular fuzzy number (TFN) can be written as a triplet number $(a_1; b_2; c_3)$. The membership function of the fuzzy number \bar{A} is defined as follows:

$$f_{\bar{A}}(z) = \begin{cases} 0, & z < a_1 \\ \frac{(z - a_1)}{(b_2 - a_1)}, & a_1 \leq z \leq b_2 \\ \frac{(c_3 - z)}{(c_3 - b_2)}, & b_2 \leq z \leq c_3 \\ 0, & z > c_3 \end{cases} \quad (3)$$

Assuming the k experts of the decision group need to consider the fuzzy weight $\bar{W}_{ij}^k = (w_{1ij}^k, w_{2ij}^k, w_{3ij}^k)$ of the i th criteria, this influences the j th criteria appreciated by the k th evaluators. The equations must be rewritten as follows:

Normalisation

$$\begin{aligned} zw_{1ij}^k &= \frac{(w_{1ij}^k - \min w_{1ij}^k)}{\Delta_{\min}^{\max}} \\ zw_{2ij}^k &= \frac{(w_{2ij}^k - \min w_{2ij}^k)}{\Delta_{\min}^{\max}} \\ zw_{3ij}^k &= \frac{(w_{3ij}^k - \min w_{3ij}^k)}{\Delta_{\min}^{\max}} \end{aligned} \quad (4)$$

where, $\Delta_{\min}^{\max} = \max w_{3ij}^k - \min w_{1ij}^k$

Calculate left (ls) and right (rs) normalised values

$$\begin{aligned} zls_{ij}^k &= \frac{zw_{2ij}^k}{(1 + zw_{2ij}^k - zw_{1ij}^k)} \\ zrs_{ij}^k &= \frac{zw_{3ij}^k}{(1 + zw_{3ij}^k - zw_{2ij}^k)} \end{aligned} \quad (5)$$

Compute total normalised crisp value:

$$z_{ij}^k = \frac{[zls_{ij}^k(1 - zls_{ij}^k) + (zrs_{ij}^k)^2]}{[1 - zls_{ij}^k + zrs_{ij}^k]} \quad (6)$$

Generation Y's
organic food
purchase
decision

Aggregation of crisp values:

Gathering the aggregate value of the subjective judgements from the composite different opinions of k evaluators

$$\bar{W}_{ij}^k = \left(\frac{1}{k}\right) \left(\bar{W}_{ij}^1 + \bar{W}_{ij}^2 + \bar{W}_{ij}^3 + \dots + \bar{W}_{ij}^k\right) \quad (7)$$

Results and discussions

This study is an attempt to apply the fuzzy DEMATEL method to investigate the factors that influence Generation Y consumers' purchasing decisions of organic food amongst Generation Y consumers. Based on the feedback received from the experts, the modified instrument intends to enhance the clarity and appropriateness of the measurements. There are 21 criteria through the interview, expert committee discussions and extensive literature reviews. These processes underwent several repeats to acquire the reliable criteria and definite structure to represent consumers' purchasing decision of organic foods. The survey was formulated based on the selected criteria. A pilot test was conducted first with two expert committees to check if the questions were clear and relevant. Once there was any sign of ambiguity, the survey was modified repeatedly until it presented a clear understanding to the respondents.

The researchers released the survey questionnaire to the chosen firms' coordinators. The respondents were asked to evaluate the interrelationships of each criterion using a survey by linguistic scales. This step entailed substituting conventional measurement scales with a fuzzy linguistic scale to process the ambiguity of human thought. Based on the concepts of Tseng and Lin (2008), the present study used TFNs to determine the degree of interactive influence between variables: (0.0, 0.0, 0.0) numbers denoting no influence (NO); (0, 0.25, 0.5) numbers denoting a very low (VL) influence; (0.25, 0.5, 0.75) numbers denoting a low (L) influence; (0.5, 0.75, 1.0) numbers denoting a high (H) influence and (0.75, 1.0, 1.0) numbers denoting a very high (VH) influence (Tables 2 and 3).

The respondents' feedback was converted into TFNs and normalised to a crisp value by Eqs (4)–(6); however, the 21 evaluators' opinions needed to be aggregated into the subjective judgement using Eqn (7) to acquire the crisp value \bar{W}_j (see Table 4). The crisp value in the purchase decision criteria from the fuzzy assessment is composed of the initial direct relation matrix. The sum of rows and the sum of columns are separately denoted as, respectively, D and R within the total relation. Table 6 presents the prominence and relation axes of the aspects for the cause and effect group using $(D + R)$ and $(D - R)$.

Linguistic variable	Influence score	Corresponding triangular fuzzy numbers (TFNs)
No influence	0	(0, 0.1, 0.3)
Very low influence	1	(0.1, 0.3, 0.5)
Low influence	2	(0.3, 0.5, 0.7)
High influence	3	(0.5, 0.7, 0.9)
Very high influence	4	(0.7, 0.9, 1.0)

Table 2.
The fuzzy
linguistic scale

E1	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	
A1	I	HI	VL	VL	VL	VL	HI	HI	VL	I	I	I	VL	I	HI	HI	VL	VL	I	I	HI	
A2	HI	I	I	I	I	I	HI	I	I	I	I	I	HI	HI	I	I	I	I	I	I	I	VL
A3	VL	I	I	VL	VL	VL	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	VL
A4	VL	VL	HI	I	HI	I	I	I	I	I	I	I	I	HI	HI	VL	VL	VL	VL	I	VL	
A5	VL	I	I	I	I	I	I	I	I	I	I	I	I	VL	VL	VL	VL	VL	VL	VL	VL	
A6	VL	VL	VL	VL	VL	I	HI	I	I	I	I	I	I	I	VL	HI	HI	HI	HI	HI	I	
A7	I	I	I	I	I	I	I	VL	I	I	HI	HI	HI	HI	HI	HI	I	VL	VL	HI	I	
A8	VL	VL	VL	I	I	I	I	I	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	
A9	I	HI	VL	VL	VL	I	I	VL	I	HI	I	I	I	I	I	I	I	HI	HI	HI	VL	
A10	I	HI	VL	VL	VL	I	I	VL	HI	I	I	I	I	I	I	I	HI	HI	HI	I	VL	
A11	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	HI	HI	HI	I	I	I	
A12	I	HI	VL	VL	VL	I	I	VL	HI	I	I	I	I	I	I	HI	HI	HI	I	I	I	
A13	I	HI	VL	VL	VL	I	I	VL	HI	I	I	I	I	I	I	HI	HI	HI	I	I	HI	
A14	I	HI	VL	VL	VL	I	I	VL	HI	I	I	I	I	I	I	HI	HI	HI	I	I	HI	
A15	HI	I	I	I	I	I	I	I	I	I	I	I	I	I	I	HI	HI	HI	I	I	HI	
A16	I	I	VL	VL	VL	HI	HI	VL	HI	HI	I	I	I	I	I	HI	HI	HI	I	I	HI	
A17	I	HI	VL	VL	VL	HI	HI	VL	HI	HI	I	I	I	I	I	HI	HI	HI	I	I	HI	
A18	I	I	I	I	I	I	I	I	I	HI	I	I	I	I	I	HI	VHI	I	I	I	I	
A19	I	VL	VL	VL	VL	VL	I	VL	VL	VL	VL	VL	VL	VL	VL	HI	VL	I	I	VL	I	
A20	VL	I	I	I	I	I	I	I	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	VL	I	I	
A21	I	I	HI	HI	I	I	HI	HI	VL	I	I	I	I	I	I	I	I	I	HI	I	I	

Table 3.
The respondent from
Expert 1

Table 5 presents the total direct relation matrix of the criteria. The results were obtained from repeated processes using Eqs (1)–(6) to acquire the total direct relation matrix (U). Table 6 presents the $(D + R)$ and $(D - R)$ used to arrive at the prominence and relation axes for the cause and effect groups. The table shows the results of testing the causal relationships of the outcome of the purchase decisions criteria. This study shows that environment protection (C1) is the most important criteria of environmental concern (AS1) based on the first and highest criteria $(D + R)$, with value of 10.1017. Environment protection (C1) and discussion with peers (C8) are in the cause group based on their positive values $(D - R)$ of 1.8556 and 0.0345. Natural food (C18) and healthy lifestyle (C21) are the two most important criteria from the aspect of health consciousness (AS4) based on their higher $(D + R)$ values of 6.0742 and 6.2186. These criteria are also the net cause of higher-positive values $(D - R)$, such as 0.8942 and 0.2371. Meanwhile, obligated to consume (C12) and buying attitude (C14) are the criteria of ethical concern (AS3), and support for training programmes (C6), learning from friends (C7) and discussion with peers (C8) of social influence (AS2) are notable criteria in the cause group. Figure 1 shows the cause and effect groups. The results from the causal diagram divide criteria into two groups of cause and effect criteria. A6, A7, A8, A12, A14, A18 and A21 belong to the cause group, which should be controlled and paid more attention to. A1, A2, A3, A4, A5, A9, A10, A11, A13, A15, A16, A17, A19 and A20 are in effect group that needs to be improved. Amongst those, A18 and A3 would to be taken into deeper consideration. The fuzzy DEMATEL method is comprehensive and applicable to all companies facing problems that require group decision-making in a fuzzy environment.

Despite the fact that health consciousness was anticipated to be a significant factor in the decision to purchase organic foods, this result is contrary to the conventional wisdom. Several studies (Sharaf and Isa, 2017; Yadav and Pathak, 2016) showed that health consciousness were more significant to consumers than environmental concerns when it came to making buying choices for organic foods. The results indicated that natural food (C18) and healthy lifestyle (C21) affects Generation Y's purchase decisions. However, according to the findings of this research, Malaysian Generation Y consumers do not significantly associate health

	x_l	x_m	x_r	x_l	x_m	x_r	x_l	x_m	x_r	x_l	x_m	x_r
A1	[1.00	0.78	0.56	] [ 0.444	0.444	0.444	] [ 0.000	0.000	0.000	] [ 0.000	0.000	0.000
A2	[0.44	0.44	0.44	] [ 1.000	0.778	0.556	] [ 0.222	0.222	0.222	] [ 0.222	0.222	0.222
A3	[0.00	0.00	0.00	] [ 0.222	0.222	0.222	] [ 1.000	0.778	0.556	] [ 0.000	0.000	0.000
A4	[0.00	0.00	0.00	] [ 0.000	0.000	0.000	] [ 0.444	0.444	0.444	] [ 1.000	0.778	0.556

	x_{ls}	x_{rs}	x_{ls}	x_{rs}	x_{ls}	x_{rs}	x_{ls}	x_{rs}
A1	1.000	0.714	0.444	0.444	0.000	0.000	0.000	0.000
A2	0.444	0.444	1.000	0.714	0.222	0.222	0.222	0.222
A3	0.000	0.000	0.222	0.222	1.000	0.714	0.000	0.000
A4	0.000	0.000	0.000	0.000	0.444	0.444	1.000	0.714

	X_{ij}	x_{ij}	x_{ij}
A1	0.714	0.444	0.000
A2	0.444	0.714	0.222
A3	0.000	0.222	0.714
A4	0.000	0.000	0.444

Table 4.
Fuzzy direct relation
matrix and
defuzzification into
crisp values –
Respondent 1

Table 5.
Criteria's total direct
relation matrix

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	D
C1	0.2651	0.3216	0.2895	0.2577	0.2512	0.2646	0.2911	0.2801	0.2925	0.2858	0.2848	0.2866	0.2949	0.3106	0.3093	0.2476	0.2940	0.2946	0.2631	0.3012	0.2927	5.9786
C2	0.2031	0.3854	0.3165	0.2853	0.2717	0.2737	0.3166	0.2793	0.3160	0.3115	0.2921	0.2982	0.3317	0.3328	0.3391	0.2615	0.3411	0.3133	0.2672	0.3265	0.3109	6.3734
C3	0.1649	0.2726	0.3101	0.2467	0.2387	0.2132	0.2509	0.2443	0.2421	0.2405	0.2291	0.2273	0.2624	0.2553	0.2549	0.2158	0.2748	0.2502	0.2229	0.2746	0.2626	5.1537
C4	0.1588	0.2576	0.2619	0.2801	0.2374	0.2081	0.2463	0.2416	0.2284	0.2344	0.2177	0.2194	0.2391	0.2452	0.2470	0.2045	0.2579	0.2376	0.2199	0.2599	0.2566	4.9605
C5	0.1634	0.2605	0.2533	0.2367	0.2705	0.2089	0.2386	0.2353	0.2315	0.2307	0.2187	0.2194	0.2376	0.2448	0.2468	0.1984	0.2539	0.2331	0.2119	0.2501	0.2478	4.8928
C6	0.2034	0.3280	0.2924	0.2668	0.2579	0.3329	0.3191	0.2947	0.3221	0.3141	0.2878	0.2865	0.3161	0.3269	0.3183	0.2687	0.3255	0.3169	0.2856	0.3213	0.3050	6.2900
C7	0.2072	0.3431	0.3068	0.2750	0.2703	0.2907	0.3572	0.2940	0.3055	0.3043	0.2927	0.2892	0.3193	0.3264	0.3201	0.2747	0.3285	0.3065	0.2757	0.3104	0.3148	6.3126
C8	0.1918	0.3031	0.2849	0.2646	0.2553	0.2594	0.2897	0.3152	0.2704	0.2760	0.2552	0.2594	0.2796	0.2909	0.2835	0.2459	0.2867	0.2739	0.2629	0.2891	0.2915	5.7289
C9	0.1908	0.3171	0.2774	0.2436	0.2384	0.2656	0.2803	0.2600	0.3396	0.2948	0.2705	0.2680	0.2965	0.3054	0.3082	0.2433	0.3181	0.2863	0.2547	0.2938	0.2939	5.8461
C10	0.1897	0.3207	0.2787	0.2415	0.2397	0.2657	0.2827	0.2567	0.3017	0.3384	0.2687	0.2717	0.3014	0.3090	0.3021	0.2389	0.3178	0.2867	0.2592	0.2938	0.2874	5.8522
C11	0.1823	0.3040	0.2651	0.2322	0.2276	0.2462	0.2779	0.2471	0.2725	0.2708	0.3151	0.2781	0.2934	0.2916	0.2971	0.2242	0.2884	0.2764	0.2386	0.2773	0.2735	5.5796
C12	0.1922	0.3228	0.2745	0.2446	0.2408	0.2591	0.2830	0.2598	0.2912	0.2875	0.2954	0.3283	0.3115	0.3124	0.3187	0.2375	0.3081	0.2860	0.2546	0.2931	0.2890	5.8900
C13	0.1923	0.3369	0.2919	0.2598	0.2509	0.2642	0.2935	0.2612	0.2900	0.2963	0.2846	0.2911	0.3545	0.3176	0.3146	0.2460	0.3268	0.2928	0.2642	0.2983	0.3004	6.0287
C14	0.2201	0.3609	0.3232	0.2797	0.2780	0.2902	0.3229	0.2944	0.3259	0.3255	0.3147	0.3178	0.3459	0.3841	0.3494	0.2703	0.3566	0.3291	0.2887	0.3451	0.3261	6.6487
C15	0.2157	0.3418	0.2986	0.2687	0.2610	0.2759	0.3011	0.2734	0.3113	0.3052	0.2910	0.2951	0.3172	0.3272	0.3643	0.2537	0.3257	0.3071	0.2634	0.3074	0.3093	6.2141
C16	0.1689	0.2615	0.2384	0.2154	0.2077	0.2455	0.2503	0.2312	0.2455	0.2544	0.2315	0.2367	0.2488	0.2639	0.2532	0.2779	0.2672	0.2505	0.2342	0.2554	0.2621	5.1001
C17	0.2016	0.3461	0.3103	0.2838	0.2669	0.2804	0.3134	0.2872	0.3183	0.3158	0.2949	0.2924	0.3309	0.3298	0.3249	0.2698	0.3793	0.3031	0.2739	0.3294	0.3162	6.3672
C18	0.2370	0.3729	0.3388	0.3004	0.2952	0.3056	0.3372	0.3157	0.3480	0.3443	0.3294	0.3313	0.3538	0.3592	0.3664	0.2875	0.3638	0.3818	0.3011	0.3542	0.3450	6.9684
C19	0.1811	0.2628	0.2477	0.2309	0.2187	0.2439	0.2533	0.2393	0.2584	0.2538	0.2424	0.2430	0.2585	0.2550	0.2587	0.2380	0.2568	0.2571	0.2894	0.2351	0.2682	5.2123
C20	0.1859	0.3190	0.3010	0.2713	0.2566	0.2660	0.2968	0.2825	0.2838	0.2872	0.2703	0.2623	0.2948	0.3094	0.3020	0.2429	0.3183	0.2768	0.2582	0.3493	0.3022	5.9365
C21	0.2066	0.3407	0.3188	0.2946	0.2739	0.2884	0.3239	0.3015	0.3157	0.3101	0.2925	0.2967	0.3274	0.3315	0.3284	0.2776	0.3358	0.3142	0.2846	0.3286	0.3631	6.4557
R	4.1230	6.6790	6.0798	5.4793	5.3080	5.5491	6.1258	5.6944	6.1104	6.0814	5.7790	5.7986	6.3150	6.4280	6.4072	5.2244	6.5251	6.0742	5.4739	6.3158	6.2186	0.2807

	<i>D</i>	<i>R</i>	<i>D + R</i>	<i>D - R</i>
C1	5.9786	4.1230	10.1017	1.8556
C2	6.3734	6.6790	6.6790	(0.3056)
C3	5.1537	6.0798	6.0798	(0.9261)
C4	4.9605	5.4793	5.4793	(0.5189)
C5	4.8928	5.3080	5.3080	(0.4153)
C6	6.2900	5.5491	5.5491	0.7409
C7	6.3126	6.1258	6.1258	0.1867
C8	5.7289	5.6944	5.6944	0.0345
C9	5.8461	6.1104	6.1104	(0.2643)
C10	5.8522	6.0814	6.0814	(0.2293)
C11	5.5796	5.7790	5.7790	(0.1994)
C12	5.8900	5.7986	5.7986	0.0914
C13	6.0287	6.3150	6.3150	(0.2862)
C14	6.6487	6.4280	6.4280	0.2208
C15	6.2141	6.4072	6.4072	(0.1931)
C16	5.1001	5.2244	5.2244	(0.1243)
C17	6.3672	6.5251	6.5251	(0.1579)
C18	6.9684	6.0742	6.0742	0.8942
C19	5.2123	5.4739	5.4739	(0.2616)
C20	5.9365	6.3158	6.3158	(0.3793)
C21	6.4557	6.2186	6.2186	0.2371
Max			10.1017	1.8556
Min			5.2244	(0.9261)
Average			6.1795	0.0000

Table 6.
The criteria's cause
and effect group

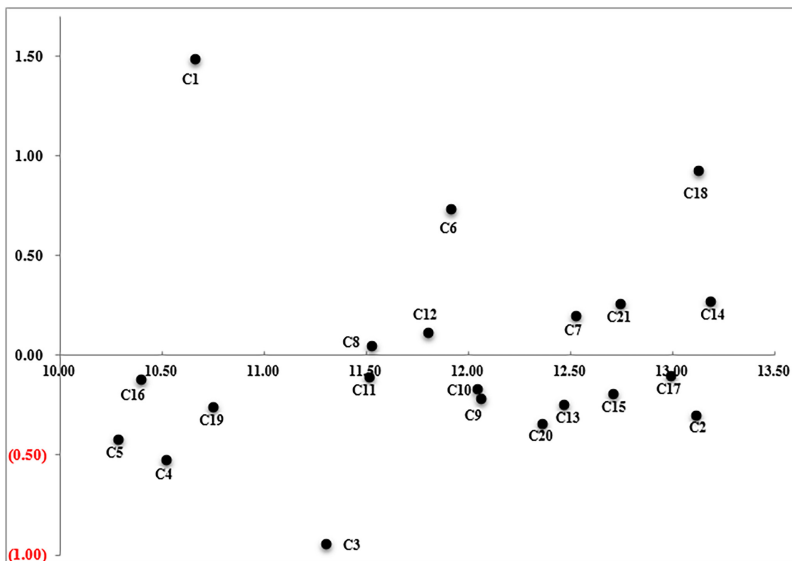


Figure 1.
Criteria cause and
effect groups

consciousness with their decision to purchase organic foods, but they do associate health consciousness with the nature of the food itself as well as living in a healthy lifestyle, which is an important result to note.

The desire to buy organic foods in Malaysia is most strongly influenced by the social influence (AS2) aspect, which is determined to be the most significant element. The social influence criteria assess consumers' measures and concerns regarding peer influences through learning, discussing and mentoring on the knowledge of organic food. Organic goods, which are more costly than conventional foods, are more likely to be purchased by Malaysian Generation Y who value their social lives more than other consumers. Previous research by [Ayub et al. \(2018\)](#) and [Akbar et al. \(2019\)](#) showed that social influence affected consumers' intentions to buy organic foods in Malaysia and Pakistan, respectively. Malaysian consumers seemed to purchase organic goods to fulfil and reflect their social identities ([Saleki et al., 2019](#)), which is consistent with the results of our research. [Nathan et al. \(2021\)](#) revealed that social influence is the most important factor contributing to the intention to purchase organic foods in Malaysia. Although environmental concerns were important in influencing Romanian customers' eating habits ([Oroian et al., 2017](#)), however, this research shows that environmental concern (AS1) where environment protection (C1) is an important criterion significantly impacts Malaysian Generation Y consumers' propensity to buy organic goods. On the contrary, [Nathan's et al. \(2021\)](#) project found that environmental concerns do not have a substantial effect on the intention to purchase organic food amongst Malaysians.

Theoretical and managerial implications

The present research uses a modified TPB as well as the fuzzy set theory to fully investigate Generation Y consumers' purchase decision regarding organic food in Malaysia. Through this study, several theoretical and practical implications can be drawn. Our findings show that consumer attitudes regarding the purchase decisions of organic food are strongly influenced by the environmental concern aspects, namely environment protection (C1). Prior studies have shown that environmental concern leads to better purchase decisions; therefore, this study focusses on purchase decision integrated into the attributes ([Nathan et al., 2021](#)).

Besides, the outcome also reveals that social influence (AS2) which is part of the social norms in TPB has significant effect on Generation Y consumers' purchasing decisions. Previous research studies that use a modified TPB independently investigate consumer purchasing decisions of organic food in a variety of study settings via the perspective of subjective norms, information sharing and peers mentoring ([Li and Jaharuddin, 2020](#)). Additionally, [Pang et al. \(2021\)](#) also used TPB in analysing consumers desire to buy organic food if they received communications with high-efficacy information and thought that purchasing organic food might decrease health and environmental risks. However, the current study makes mixed use of TPB theory and the fuzzy theory to explore Malaysian Generation Y purchase decision of organic food from the perspectives aspects of subjective norms which is social influence with an in-depth study into five criteria, namely support for training programmes, learning from friends, discussion with peers, mentoring environmental issues and information sharing.

The results of this research are useful in a different area. A new model of organic food research is created in this research which consists of health consciousness, environment concern, social influence and ethical concern. This study benefits other researchers in the theoretical and education field by providing useful information and knowledge. Correspondingly, this research has also generated useful output for all under organic food industry players such as marketers, government and producer. By understanding the result, they can have better insights about consumers, especially for Generation Y. Thus, they can find out which factors are most influencing and significant for consumers and take advantages by developing a superior strategy to reach objectives.

The organic shops or restaurants must take into consideration on customer's sensory issue. For example, they can produce great food appeal such as delicious, pleasant smell, great food texture, etc. More organic food restaurants and retail stores aimed towards young customers should be built at universities or colleges to encourage healthy eating. Manufacturers and merchants of organic foods should prioritise nutritional content, long-term health advantages, environmental concerns and making organic food items accessible to young customers. Other than that, producer or supplier of organic food should package their product by labelling an environmental-friendly logo. Therefore, this influences consumer and increase their purchase intention towards organic food. With this understanding, suppliers or producers in the organic food industry should be encouraged to adopt a more environmentally friendly method in their organic production. Therefore, this could positively change consumer's purchase intention from consuming conventional food to organic food. When there is an increase in organic food consumption, the demand of organic food will rise in the market. Then, local communities' economy will be supported, and the Government will focus on the natural production method in agriculture, for example, creating jobs to the community and keeping farmers thriving. Eventually, the Government can improve environmental sustainability growth by reducing pollution. It has a direct relationship to the image of a country. A country who promote environmental friendliness product will definitely gain reputation and good image amongst the world.

Besides the Government, organic food producers will be indirectly promoted to society. As the demand for organic food increased, producers will receive better wages by selling their organic products. Moreover, entrepreneurs of organic food will gain more knowledge from this research better to understand their consumers' perceptions towards organic food. This will enhance the entrepreneurs' strategies in promoting and attracting consumers, especially the Generation Y. In short, this study will provide numerous advantages to the communities. The policy maker should develop a proper marketing strategy to promote organic food as food that is healthier, better in nutrition and safer for society.

Limitations and future research

Nonetheless, this study contains some limitations. First, due to the shortage of respondents to ensure the validity of the research, future research should conduct questionnaires to achieve more in-depth explorations. Second, the attributes presented depend on the authors' work in prior studies and expert preferences in this field, which might also suffer from bias during attribute selection. Additionally, this study employs fuzzy DEMATEL to determine the cause-effect interrelationships amongst the attributes, and the contextual relationship between the analyses is dependent on the experts' knowledge and level of familiarity with organic food; thus, experts' perception or bias may affect the final results. More experts should be included in future research to verify the findings. Third, the sample collection focussed on consumers who consume organic food in Malaysia. This could lead to the limitation towards external generalizability. It may be possible in the future to conduct comparative studies of developed against developing markets in the future. Additionally, future researchers should conduct further studies to ascertain the causes behind consumers' reluctance to purchase organic food and pay special attention to non-buyers' pre-adoption resistance to organic food consumption.

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