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JEL: Q13, Q19, M31

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DECODING INTENTIONS TO PURCHASE ORGANIC FOOD PRODUCTS IN AN EMERGING ECONOMY VIA ARTIFICIAL NEURAL NETWORKS

Purpose. This study investigates the factors influencing consumers' intentions to purchase organic food products in an emerging economy. It addresses the knowledge gap regarding the slower growth of the organic food market in these regions despite the global trend toward environmental sustainability.

Methodology / approach. A survey approach involving 350 participants was used. Structural equation modeling (SEM) with SmartPLS 4 and Artificial Neural Network (ANN) with IBM SPSS 28 were used to analyse the impact of awareness of need, personal norms, environmental concern, and health consciousness on the intention to purchase organic food products.

Results. The study found significant positive influences of awareness of need, personal norms, environmental concern, and health consciousness on the intention to purchase organic food products, explaining 63.1 % of the variance. Both the analysis approaches (PLS-SEM & ANN) revealed that, health consciousness, followed by awareness of need, emerged as the most important factor related to the intention to purchase organic food products. The results highlight the importance of awareness and personal values in driving pro-environmental behaviour.

Originality / scientific novelty. This research offers essential insights into the determinants of organic food purchase intentions in an emerging economy. It emphasises the significance of awareness and personal values in fostering sustainable consumption behaviour, addressing a less explored area in existing literature.

Practical value / implications. The findings have important implications for policymakers and marketers. Strategies focused on consumer education about the benefits of organic food can enhance awareness and appeal. Understanding core psychological needs and beliefs that shape consumer motivations can guide the development of effective marketing strategies. The study highlights the strong environmental consciousness among consumers and their desire to protect the environment.

Key words: artificial neural networks, green consumerism, green products, organic food, organic food products, sustainability, Sustainable Development Goals.

1. INTRODUCTION

Organic farming is widespread, being practiced in 188 countries. Over 96 million hectares of farmland are cultivated organically by a community of at least 4.5 million farmers. In 2022, the global market for organic food and beverages reached nearly 135 billion euros in sales [1]. Producing organic food is widely acknowledged as a sustainable method that supports the achievement of the Sustainable Development Goals (SDG) [2; 3]. It can help in achieving the SDG 12, which is "Responsible Consumption and Production". The global paradigm shift toward environmental

sustainability has emerged as a paramount force, catalysing the widespread adoption of eco-conscious consumer practices across the globe [4]. This evolution has prompted a surge in interest and investigation, notably directed towards comprehending consumer behaviours, particularly concerning organic food consumption. In 2022, Denmark and Switzerland led the world in per capita organic food consumption. The average consumer in Switzerland spent about 437 euros on organic products, while in Denmark, the figure was around 365 euros per person [5]. Luxembourg also showed significant organic food consumption during the same period. In the United States, organic food is widely accessible in numerous grocery stores and supermarkets, with fresh produce and dairy being the most popular categories. In 2021, the retail sales of organic fruits and vegetables reached USD 21 billion, surpassing all other individual food categories [5]. Despite extensive research focusing on organic food trends prevalent in developed economies like the United States and Western Europe [6; 7], there is a noticeable gap in understanding the slower growth trajectory of the organic food market in emerging economies [8; 9; 10].

Modern farming relies heavily on pesticides for crop production. However, their widespread use has led to problems like pest resistance, loss of natural predators, environmental pollution, harm to non-target species, and health risks for humans [11]. As a result, consumers are turning to alternatives like organic foods, which are free from harmful chemicals and promote more sustainable farming practices. Sustainable consumption has become increasingly important, as society has moved to mass consumption, which significantly threatens to deplete natural resources [12]. While pro-environmental actions often align with pro-social tendencies, the motives for such behaviour demonstrate diversity and are not driven solely by altruistic inclinations. For instance, the purchase of organic food products predominantly originates from individual desires for personal benefits, especially health improvements, preceding considerations for its environmental impact [13; 14; 15]. Understanding consumer behaviour of food consumption is a multifaceted process influenced by many factors. These factors encompass moral and subjective norms [16], social influences [17], as well as cultural and geographical disparities [18]. The intricacies inherent in human psychology within the sphere of food choices have spurred researchers to explore various theories aimed at elucidating these complexities [19]. Efforts to decipher the determinants guiding environmentally friendly product consumption highlight the potential impact of consumers' psychographic traits on their pro-environmental purchasing behaviour [20; 21]. However, a prevalent observation is the predominant testing of behavioural theories within the contexts of developed nations, leaving a considerable void in evaluating their effectiveness across the diverse cultural landscapes of emerging economies [4; 22]. In 2022, India's organic food and beverage retail market was worth around USD 127 million. This market is expected to exceed USD 269 million by 2026, thanks to an impressive annual growth rate of 20.7 % [23]. This rapid growth underscores the importance of researching consumer behaviour regarding organic food purchases in India's emerging economy [24].

The global organic food industry has experienced significant growth in recent

years, because of a combination of shifting consumer preferences, environmental concerns, and public health priorities. By avoiding synthetic chemicals, organic agriculture has positioned itself as a safer and healthier alternative to conventional farming methods, mitigating the risks associated with synthetic substances [25]. This shift highlights the growing awareness among consumers who not only value the quality of their food but also consider its impact on health and environmental sustainability [26]. The increasing availability of organic products in global markets reflects a pivotal transformation in consumer behaviour, demonstrating the connection between personal well-being and ecological responsibility. As individuals become more informed and environmentally conscious, this trend signifies a broader transition toward sustainable consumption practices that transcend cultural and geographic boundaries.

The rising emphasis on healthier lifestyles and sustainable habits has driven notable changes in purchasing decisions, influencing how consumers assess food quality and make choices [27]. Organic foods have gained widespread popularity as people prioritize safety, nutrition, and environmental stewardship. However, as Twumasi et al. [28] point out, this trend is largely led by higher-income groups, as the higher costs of organic products often create barriers for economically disadvantaged populations. Despite these challenges, demand for organic foods continues to grow, driven by increased awareness of the negative effects of conventional food production, including pesticide use and environmental degradation [29]. These trends also underscore persistent inequalities in access to organic products, presenting a critical area for policy intervention. Measures such as subsidies or alternative pricing models could help reduce these disparities, enabling more equitable access to organic foods and encouraging broader participation in sustainable consumption practices.

Researchers have long been interested in understanding the psychological and behavioural factors that drive pro-environmental actions, such as those that reduce environmental harm or contribute to ecological benefits [30]. One commonly accepted view is that individuals are more likely to adopt environmentally friendly behaviours when they see these actions as personally relevant, whether through self-interest, a sense of social responsibility, or a moral duty toward the environment [31]. These motivations are interconnected, highlighting the complexity of consumer decision-making, where ethical concerns often blend with practical benefits. For example, Yoon et al. [32] found a clear link between environmental motivations and the consumption of organic food, showing that consumers with stronger environmental concerns tend to favour organic fruits and vegetables over conventional options. Understanding these complex motivations is key to developing effective interventions that promote sustainable consumer behaviours.

The perception of organic food as safer and more nutritious also strengthens consumer preferences. Galgano et al. [33] argue that perceived nutritional and safety benefits are often central to the decision to choose organic products over conventional ones. This connection between individual beliefs and actions is often influenced by personal norms—an internal sense of obligation that guides behaviour [34]. Zhang et al. [35] discovered that people with strong environmental beliefs are more likely to engage

in environmentally friendly behaviours, as these beliefs activate personal norms that shape their choices. By incorporating personal norms into the study of consumer psychology, researchers can better understand how ethical values influence behaviour. The Value-Belief-Norm Theory and the Theory of Planned Behavior have both highlighted the importance of personal norms in shaping consumers' intentions to purchase organic food [36]. Expanding these frameworks could provide deeper insights into how societal and cultural factors affect personal norms, enhancing our understanding of global consumption patterns.

The rising demand for organic products is driven by increasing concerns about nutrition, personal health, and the environment [37]. As consumers become more conscious of the environmental impact of conventional food production, many are turning to organic options to support sustainable practices and reduce harm to the planet [29]. This shift represents a growing collective awareness of the importance of sustainable living. As people learn more about the negative consequences of industrialised agriculture such as soil degradation, water contamination, and loss of biodiversity, the push for environmentally responsible consumption becomes even more urgent. These consumer choices reflect a broader societal shift toward stronger environmental responsibility. Understanding the factors that influence the decision to purchase organic products is crucial, especially in the context of global sustainability and climate action.

This study aims to investigate the influence of four critical factors, awareness of need, personal norms, environmental concern and health consciousness on the intention to purchase organic food products. By investigating these factors, this research aims to highlight how environmental consciousness shapes consumer decisions. The study will explore the impact of awareness of need, awareness of consequences, personal norms and environmental concern on the intention to purchase organic food products, thereby bridging a gap in comprehending the role of individual ethical inclinations in fostering pro-environmental behaviour. The study will attempt to address the following research questions (RQs):

RQ1. How does awareness of need (AWN) influence the intention to purchase organic food products among consumers?

RQ2. To what extent do personal norms (PNM) affect consumer behaviour towards purchasing organic food products?

RQ3. How does environmental concern (ECN) impact the intention to purchase organic food products among consumers?

RQ4. What role does health consciousness (HCN) play in shaping consumer decisions regarding the purchase of organic food products?

RQ5. Which is the most important factor amongst AWN, PNM, ECN and HCN in predicting the consumers' intention to purchase organic food products?

Some studies identify health and safety as the primary motivators, whereas others emphasise the significance of sensory appeal, health, natural content, and ethical concerns, among other factors [38]. Given the existing gaps and intricacies surrounding consumers' inclination towards environmentally friendly products, particularly organic food, this study is of paramount importance [39]. A comprehensive investigation and

resolution are imperative to gain a deeper understanding of the factors influencing consumers' preferences and decisions when it comes to purchasing green products, specifically organic food items. This research aims to offer insights into these intricate relationships and contribute meaningfully to the literature on eco-conscious consumer behaviour within the context of organic food consumption.

The research also follows a 2-stage approach to identifying and validating factors influencing consumers' intention to purchase organic food products (IFP):

Stage 1: Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to analyse the connections between AWN, PNM, ECN, and HCN concerning IFP. This method helps in comprehending the overall impact of these variables.

Stage 2: An Artificial Neural Network (ANN) was used to identify the factors that had the greatest impact on the IPF. This stage harnesses ANN's capability to capture both linear and non-linear relationships, offering a more nuanced perspective on the issue.

2. LITERATURE REVIEW

2.1. Awareness of need and intention to purchase organic food products. AWN for organic food goes beyond mere understanding, emerging as a pivotal determinant of consumer intentions and behaviours. Health-conscious individuals, motivated by the dual priorities of food safety and overall well-being, are increasingly inclined toward organic products, which symbolise a commitment to "green" and sustainable eating practices [25]. This awareness is not only a recognition of the benefits of organic food but also a cognitive alignment with broader societal and environmental concerns. Kapuge [40] underscores the role of heightened health awareness in driving organic purchasing behaviours, while Faletar et al. [41] contend that such recognition often stems from dissatisfaction with conventional food production methods and a quest for healthier alternatives. Moreover, the ecological risks associated with practices like the use of chemical pesticides, synthetic fertilisers, and genetically modified organisms amplify this awareness, as highlighted by Tandon et al. [19], Medvedeva et al. [42]. In Taiwan, Tung et al. [43] observe that personal or familial health issues often catalyse a shift toward organic consumption. These insights collectively suggest that awareness of the need for organic food is a critical driver of purchasing intentions, as it integrates health, environmental, and ethical dimensions into consumer decision-making. Thus, the following hypothesis is posited:

H₁ – Awareness of need positively influence the intention to purchase organic food products.

2.2. Personal norms and intention to purchase organic food products. PNM, which represent an individual's belief about the moral acceptability of a behaviour, are integral in shaping consumer intentions, especially in environmentally conscious contexts [44]. According to the Norm Activation Model, PNM are activated when individuals perceive a social behaviour as beneficial and feel a sense of responsibility to act in a way that prevents harm [29]. In the case of organic food, PNM become particularly relevant as they drive individuals to make ethical consumption decisions, such as purchasing organic products due to the perceived environmental benefits and

health advantages [45]. Studies, such as those by Shin et al. [46], have shown that strong PNM positively influence consumers' willingness to select organic food, emphasising the moral responsibility tied to such choices. The activation of these PNM not only affects immediate purchasing decisions but also contributes to long-term commitment to sustainable consumption [47]. Therefore, when individuals have strong PNM regarding the importance of sustainability, these norms significantly increase their intention to purchase organic food products, reflecting a broader shift toward pro-environmental behaviours [48]. This leads to the hypothesis:

H₂ – Personal norms positively influence the intention to purchase organic food products.

2.3. Environmental concern and intention to purchase organic food products.

ECN reflects individuals' awareness of environmental issues and their willingness to support or contribute to solutions [49; 50]. This concern is a measure of how strongly individuals' value ecological preservation and their commitment to sustainable practices [51]. As global environmental awareness grows, consumers increasingly lean toward eco-friendly products, with many willing to pay a premium for them [52]. However, the strength of the relationship between ECN and purchasing behaviour is debated. Joshi & Rahman [53] found it weak or insignificant, suggesting that other mediating factors may influence this link. Conversely, Prakash et al. [37] observed a significant positive relationship in the context of organic food products, highlighting their unique positioning as environmentally beneficial and health-conscious choices. Choi & Johnson [54] further argued that consumers with high ECN perceive their green purchasing decisions as impactful, thus increasing their likelihood of buying such products. Wei et al. [55] and Kumar et al. [56] noted that ECN tends to play a more pronounced role in developed nations, whereas its influence is comparatively subdued in developing countries, possibly due to differences in environmental education and economic priorities. Recent empirical evidence by Al Falah et al. [57] reaffirmed the positive association between ECN and purchase intention for organic food, emphasising its critical role in driving consumer behaviour. This discussion proposes the hypothesis:

H₃ – Environmental concern positively influences the intention to purchase organic food products.

2.4. Health consciousness and intention to purchase organic food products.

As modern consumers navigate a more sophisticated lifestyle marked by rising education levels and improved standards of living, their preferences increasingly reflect a conscious shift toward healthier choices, particularly in the realm of organic food products [58]. HCN, which encompasses individuals' attitudes toward health, their awareness of health issues, and their commitment to maintaining well-being, has emerged as a key driver in this behavioural transformation [59; 60]. This mindset motivates individuals to avoid products with chemical additives, instead prioritising options perceived as safer, more nutritious, and conducive to long-term health [61]. Organic foods, widely regarded as free from harmful additives and environmentally friendly, align seamlessly with the priorities of health-conscious consumers [62; 63]. Furthermore, research underscores that health-conscious individuals increasingly value

organic foods for their perceived ability to reduce health risks and promote overall wellness [64]. The trend of prioritising natural and healthy eating practices reflects a growing societal emphasis on well-being, as highlighted in recent studies [65]. Empirical evidence from Iqbal et al. [66] and Pahari et al. [67] demonstrates a positive correlation between heightened HCN and increased intention to engage in healthy consumption behaviours. So, this study posits the following hypothesis:

H₄ – Health consciousness positively influences the intention to purchase organic food products.

2.5. Proposed theoretical model. The proposed theoretical model and hypotheses are represented in the model (Figure 1). The effect of all four independent variables on the intention to purchase organic food products was tested in this research.

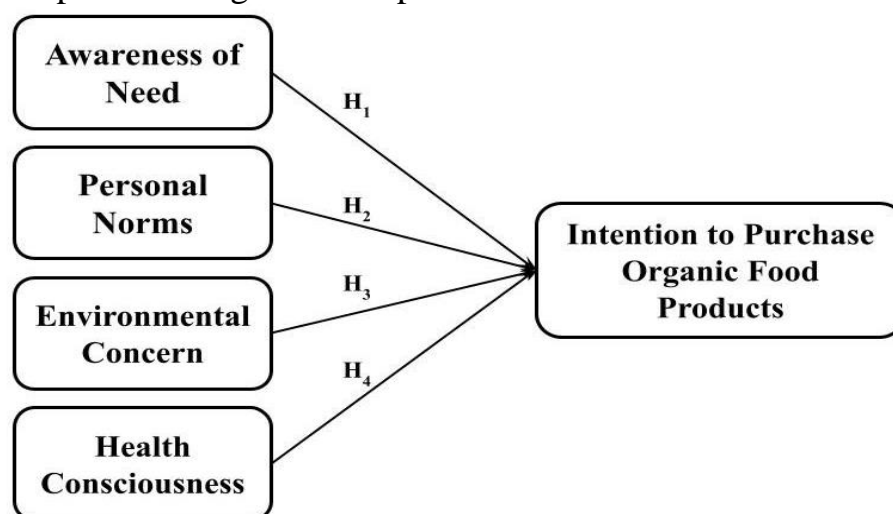


Figure 1. Proposed theoretical model

Source: authors' own creation.

3. METHODOLOGY

3.1. Study description. A descriptive research design was used to study consumers' intentions regarding the purchase of organic food products. The study specifically targeted individuals who regularly buy organic food items, employing a purposive sampling method to select participants with specific characteristics relevant to the research. Purposive sampling was used because it aligns the sample more closely with the research goals, enhancing the study's rigor and the reliability of its data and findings [68]. Before circulating the questionnaire, it was sent to five researchers, which had good research experience and expertise. After their validation, data collection occurred through circulating a standardised questionnaire online with predefined scales to assess various factors influencing organic food products purchase intentions. Data was collected from a total of 350 respondents, which was considered as a sufficient sample size as per the Kline [69]. Prakash et al. [37] carried out their research for studying the consumer intention towards organic food products with the sample size of 334, and found significant results. After data collection, to analyse the gathered data, PLS method was used. This statistical approach incorporates principles of variance analysis and SEM. SmartPLS 4 was utilised for data analysis to extract

meaningful insights from the collected data. According to Hair et al. [70], SEM is recommended for studies involving multiple constructs and measured variables, as it allows for simultaneous estimation of relationships and equations. The IBM SPSS 28 was used for ANN analysis, analysing the sample adequacy and common method bias.

ANN is a highly effective machine learning technique used in multiple fields of research. Although PLS-SEM analysis offers benefits for generating inferential statistics, it struggles with non-linear relationships, which can lead to an oversimplified view of complex decision-making in real-life scenarios [71]. To address this limitation, ANNs are used to capture these non-linear and non-compensatory relationships between predictors and outcomes, offering a more nuanced representation of human decision-making [72]. In a recent study by Machfudiyanto et al. [73], they used both PLS-SEM and ANN in the same study to analyse multiple factors that influence the implementation of work safety design. Combining these two approaches, this research methodology was carefully designed to thoroughly investigate the eco-conscious consumption behaviours associated with organic food products.

While PLS-SEM analysis provides valuable inferential statistics, it is limited in addressing non-linear relationships, which can lead to an oversimplification of complex real-world decision-making processes [71]. To overcome this limitation, researchers have adopted a dual-stage analysis approach that combines PLS-SEM with ANN analysis, offering a more comprehensive perspective [74]. Based on this concept, Lee et al. [75] presented an improved two-stage framework using deep learning techniques to improve the analysis process.

Table 1 presents the previously published studies, which used both PLS-SEM and ANN approaches in the same study for analysis of data.

Table 1

Previous studies combining PLS-SEM and ANN

Source	Country	Context	Method	Sampling	Analysis approach
Sritong et al. [76]	Thailand	Adoption of metaverse technology in Bangkok	Online survey	Not mentioned	PLS-SEM & ANN
Yang et al. [77]	China	Sustainable customer retention through social media marketing activities	Online survey	Not mentioned	PLS-SEM & ANN
Luyao et al. [78]	China	Intention to adopt wearable payment devices in China	Online survey	Convenience	PLS-SEM & ANN
Hidayat-ur-Rehman et al. [79]	Saudi Arabia	The factors of M-Wallets adoption	Online & offline	Convenience	PLS-SEM & ANN
Almarzouqi et al. [80]	Dubai	Determinants predicting the electronic medical record adoption in healthcare	Offline questionnaire	Convenience	PLS-SEM & ANN
Abbasi et al. [81]	Malaysia	Adoption of Cryptocurrency	Online survey	Purposive	PLS-SEM & ANN

Note. PLS-SEM – Partial Least Squares Structural Equation Modeling; ANN – Artificial Neural Network.
Source: created by authors.

From Table 1, it can be observed that this method was widely used by the researchers in different domains.

3.2. Sample adequacy and common method bias. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy resulted in a high score of 0.903, and Bartlett’s Test of Sphericity was significant ($p < 0.05$), both of which suggest that the sample used in this research was appropriate [82]. The researchers used Harman’s single factor test to assess whether there was potential bias associated with a common method. According to Podsakoff et al. [83], common method bias becomes problematic when a single latent factor predominantly explains the variance. However, upon conducting un-rotated factor analysis, it was found that only 23.2 % of the maximum covariance was explained by a single factor. This percentage is less than 50 %, suggesting that common method bias is unlikely to significantly affect the data in this study [84].

3.3. Measures. Each item was assessed using a Likert-type scale consisting of five points, ranging from 1 to 5. Where, 1 represents “strongly disagree”, and 5 signifies “strongly agree”. Table 2 details the origins of the scales used in this study.

Table 2

Source of instrument

Constructs	Items	Source
Awareness of need (AWN)	AWN1 The production of conventional food products increases climate changes	[85; 86; 87]
	AWN2 The production of conventional food products presents problems for sustainability of (one) society	
	AWN3 The use of conventional food products causes a lot of problems for the environment	
Personal norms (PNM)	PNM1 According to the values that are important to me, I feel an obligation to purchase organic food products	[85; 88; 87]
	PNM2 I feel a personal obligation to purchase as much organic food products as possible	
Environmental concern (ECN)	ECN1 I always make an extraordinary effort to purchase organic food products to save our environment	[37; 89]
	ECN2 I am purchasing organic food products due to environmental reasons	
	ECN3 If I have a choice between the products, I will prefer to buy an environmentally safe product	
Health consciousness (HCN)	HCN1 I feel that I sacrifice a lot for my health	[90]
	HCN2 I am ready to give up a lot, to eat as healthy as possible	
	HCN3 I believe that I take health into consideration a lot in my life	
	HCN4 I believe it is important to understand, well, how to eat healthy	
Intention to purchase organic food products (IFP)	IFP1 I intend to purchase organic food products	[91; 92]
	IFP2 Next time when I purchase food products, my choice is going to be organic food products	
	IFP3 I will probably purchase organic food products in the future	

Source: created by authors.

4. RESULTS

4.1. Structural model assessment

4.1.1. Demographics. Table 3 presents the demographic profile of the respondents, illustrating their age, gender, education level, occupation, and income distribution. In terms of age, the majority of respondents fall within the 18 to 25 bracket (38.6 %), followed by the 26 to 35 group (32.3 %). Gender distribution shows a slight predominance of females (49.5 %) over males (46.6 %). Regarding education, the highest proportion have graduated (46.0 %), with a significant portion also holding postgraduate degrees (40.6 %). In terms of professional qualifications, private employees represent the largest group (34.3 %), closely followed by students (26.6 %). Income-wise, a considerable portion earns between INR 750001 to INR 1500000 (34.0 %).

Table 3

Demographic profile of the respondents

	Characteristics	Frequency	%
Age	18 to 25	135	38.56
	26 to 35	113	32.28
	36 to 45	78	22.28
	46 and above	24	6.88
Gender	Male	163	46.57
	Female	187	53.43
Education	Graduation	161	46.00
	Postgraduation	142	40.57
	Ph.D	25	7.14
	Any other	22	6.29
Occupation	Student	93	26.57
	Private employee	120	34.29
	Government employee	68	19.43
	Self-employed	61	17.42
	Retired	8	2.29
Income	Less than INR 500000	110	31.43
	INR 500001 to INR 750000	96	27.43
	INR 750001 to INR 1500000	119	34.00
	INR 1500000 above	25	7.14

Note. 1 INR = 0.012 USD.

Source: derived from the IBM SPSS 28 software and computed by authors.

4.1.2. Reliability and validity. To gauge the composite reliability, we used three metrics: Cronbach's alpha, rho_a and average variance extracted (AVE) to assess internal consistency, reliability, and convergent validity, respectively. The findings from this evaluation are detailed in Table 4. Cronbach's alpha values for all constructs surpassed 0.70, affirming the robustness of the proposed model. The rho_A values are greater than 0.70 as mentioned by Dijkstra & Henseler [93]. Each variable exhibited internal consistency reliability meeting the threshold, with all indicators scoring above 0.70 [94; 95]. Furthermore, AVE was used to ascertain convergent validity, revealing that all variables surpassed 0.5, indicating compliance with the convergent validity standard [95; 96].

Table 4

Reliability and validity

Construct	Items	Factor Loadings	Cronbach's Alpha	rho_a	Composite Reliability	AVE
AWN	AWN1	0.765	0.722	0.730	0.844	0.643
	AWN2	0.848				
	AWN3	0.791				
PNM	PNM1	0.918	0.836	0.843	0.924	0.858
	PNM2	0.935				
ECN	ECN1	0.773	0.781	0.779	0.873	0.696
	ECN2	0.862				
	ECN3	0.865				
HCN	HCN1	0.799	0.815	0.838	0.876	0.639
	HCN2	0.867				
	HCN3	0.702				
	HCN4	0.822				
IFP	IFP1	0.866	0.853	0.853	0.911	0.773
	IFP2	0.892				
	IFP3	0.880				

Note. AWN = Awareness of need; PNM = Personal norms; ECN = Environmental concern; HCN = Health consciousness; IFP = Intention to purchase organic food products.

Source: derived from the SmartPLS 4 software and computed by authors.

4.1.3. Discriminant validity. The Heterotrait-Monotrait ratio (HTMT) technique was used to evaluate the model's ability to distinguish between different variables. The results indicate that the model effectively demonstrates discriminant validity, as evidenced by all HTMT values falling within the acceptable range [93]. This indicates that the model adeptly distinguishes between unique traits, avoiding any overlap or confusion, thus ensuring a clear understanding of each variable being examined (see Table 5 for details).

Table 5

Discriminant validity (HTMT)

Construct	AWN	ECN	HCN	IFP	PNM
AWN	-	-	-	-	-
ECN	0.632	-	-	-	-
HCN	0.600	0.848	-	-	-
IFP	0.774	0.801	0.817	-	-
PNM	0.533	0.853	0.721	0.729	-

Note. AWN = Awareness of need; PNM = Personal norms; ECN = Environmental concern; HCN = Health consciousness; IFP = Intention to purchase organic food products.

Source: derived from the SmartPLS 4 software and computed by authors.

4.1.4. Fornell-Larcker Criterion. The Fornell-Larcker method stands as a widely recognised technique for assessing discriminant validity [97]. Table 6 showcases the discriminant validity results acquired through the Fornell-Larcker method. The data reveals that the square root of a construct's AVE exceeds its highest correlation with any other latent variable.

Table 6

Fornell-Larcker criterion

Construct	AWN	ECN	HCN	IFP	PNM
AWN	0.802	-	-	-	-
ECN	0.482	0.834	-	-	-
HCN	0.483	0.714	0.800	-	-
IFP	0.609	0.661	0.706	0.879	-
PNM	0.417	0.704	0.625	0.618	0.926

Note. AWN = Awareness of need; PNM = Personal norms; ECN = Environmental concern; HCN = Health consciousness; IFP = Intention to purchase organic food products.

Source: derived from the SmartPLS 4 software and computed by authors.

4.1.5. Multicollinearity. Table 7 displays the Variance Inflation Factor (VIF) for the latent variables, all falling comfortably within the acceptable threshold of 5 [98]. This indicates that there are no concerns regarding multicollinearity.

Table 7

Variance inflation factor

Constructs	VIF
Awareness of need → Intention to purchase organic food products	1.381
Personal norms → Intention to purchase organic food products	2.122
Environmental concern → Intention to purchase organic food products	2.702
Health consciousness → Intention to purchase organic food products	2.266

Source: derived from the SmartPLS 4 software and computed by authors.

4.1.6. Hypotheses results and structural model assessment. The Table 8 in the study presents the results of a structural model path analysis, which is used to evaluate the relationships between various factors related to intention to purchase organic food products. The results indicate that awareness of need and intention to purchase organic food products have a positive and significant relationship, as suggested by hypothesis H₁ ($p = 0.000$). The analysis revealed a positive and significant relationship between personal norms and intention to purchase organic food products, as predicted by hypothesis H₂ ($p = 0.017$). The study found that environmental concern and intention to purchase organic food products are positively related, as stated by hypothesis H₃ ($p = 0.000$). Additionally, health consciousness and intention to purchase organic food products showed a positive and significant relationship, as suggested by hypothesis H₄ ($p = 0.002$). The structural model (SmartPLS Output) is shown in the Figure 2.

Table 8

Structural model results

Hypotheses	β	Standard deviation (STDEV)	T-statistics ($ \beta /STDEV$)	P-values (< 0.05)	Results
H ₁ AWN → IFP	0.298	0.047	6.271	0.000	Significant
H ₂ PNM → IFP	0.146	0.061	2.398	0.017	Significant
H ₃ ECN → IFP	0.349	0.045	7.696	0.000	Significant
H ₄ HCN → IFP	0.173	0.055	3.144	0.002	Significant
r ² : IFP – 0.631; Q ² : IFP – 0.616					

Note. AWN = Awareness of need; PNM = Personal norms; ECN = Environmental concern; HCN = Health consciousness; IFP = Intention to purchase organic food products.

Source: derived from the SmartPLS 4 software and computed by authors.

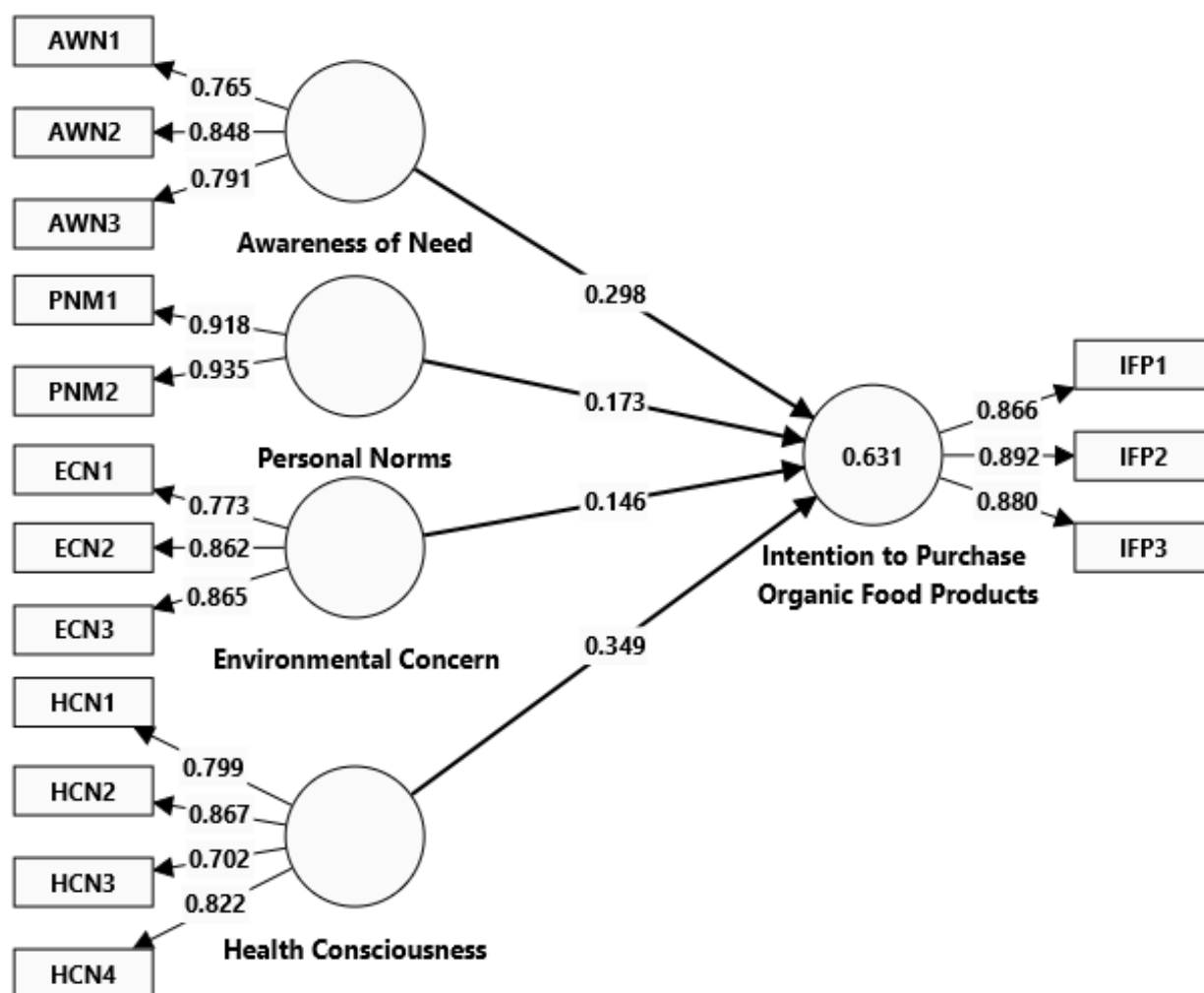


Figure 2. Structural model

Source: derived from the SmartPLS 4 software.

4.2. Artificial neural networks analysis

4.2.1. Neural network performance. ANN mimic the operations of the human brain by identifying hidden patterns in data through a method known as “training”. Once trained, it can apply its understanding during “testing”. One significant benefit of ANN is the capability to manage intricate relationships without needing assumptions about how the data is distributed [99]. The analysis utilising ANN was carried out with IBM SPSS 28, its output diagram in depicted in the Figure 3. The ANN algorithm is adept at capturing both linear and nonlinear relationships and operates without requiring a normal distribution [100]. This algorithm learns through a training process to predict outcomes using a feed-forward-backward-propagation technique, where inputs are processed in a forward direction and estimated errors are propagated backward [101]. Multilayer perceptrons and sigmoidal activation functions were used in the input and hidden layers [102]. Through multiple iterations of learning, errors are minimised, enhancing the prediction accuracy [103]. In line with Leong et al. [104], 90 % of the samples were designated for training and used the remaining samples for testing. To avoid overfitting, a ten-fold cross-validation procedure was used, and the

root mean square of errors was calculated [105]. Table 9 shows the neural network results.

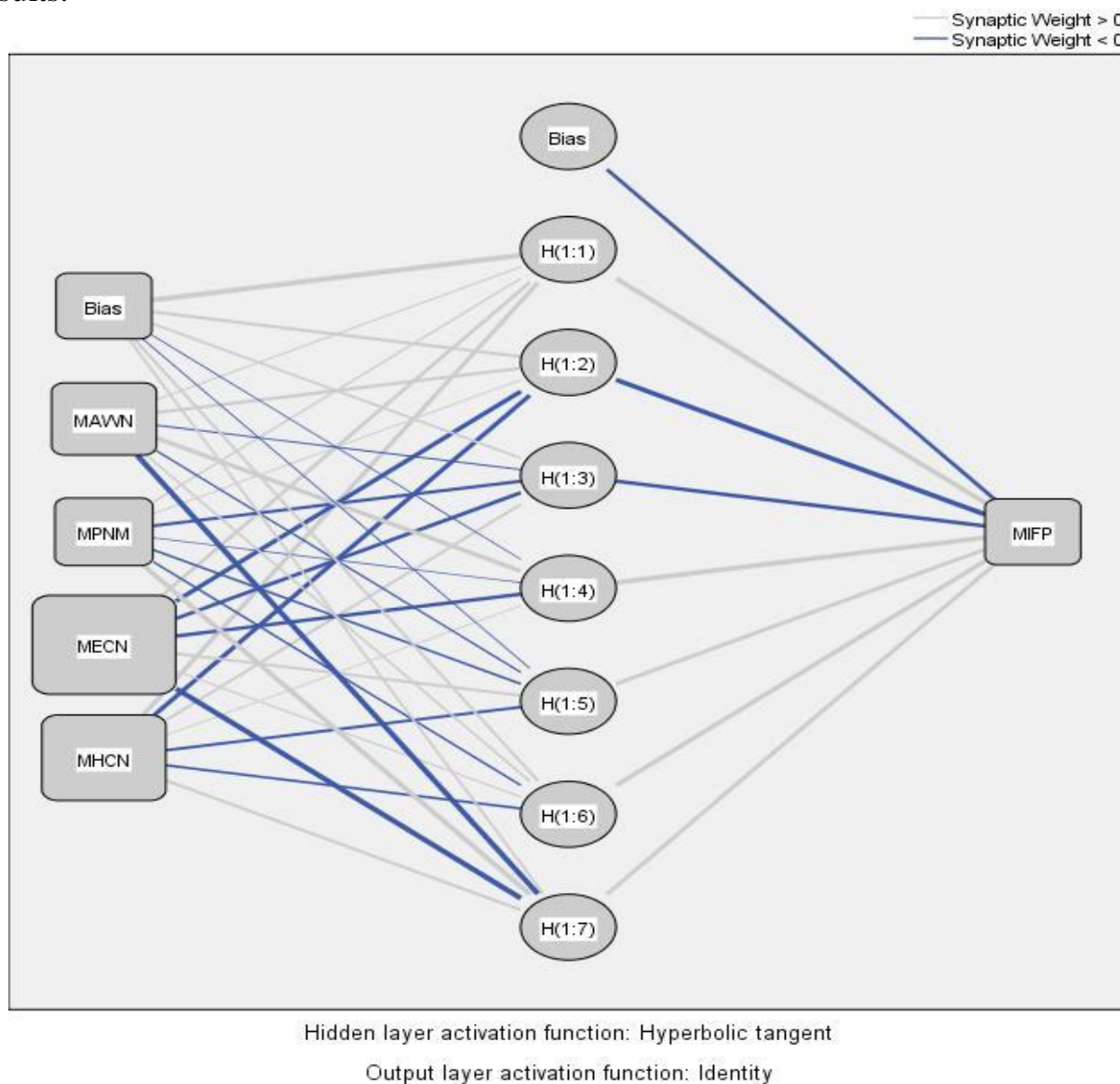


Figure 3. Artificial neural network output diagram

Source: derived from IBM SPSS 28 Software.

Table 9

Neural network performance validation results

Ten-folds	Training			Testing			Total Samples (N1+N2)
	N1	SSE	RMSE	N2	SSE	RMSE	
1	2	3	4	5	6	7	8
ANN1	316	63.833	0.449	34	6.283	0.430	350
ANN2	316	43.268	0.370	34	7.644	0.474	350
ANN3	311	57.865	0.431	39	6.398	0.405	350
ANN4	307	64.589	0.459	43	6.044	0.375	350
ANN5	318	62.619	0.444	32	5.738	0.423	350
ANN6	310	60.584	0.442	40	5.017	0.354	350
ANN7	314	70.301	0.473	36	5.058	0.375	350

Continuation of Table 9

1	2	3	4	5	6	7	8
ANN8	308	58.736	0.437	42	9.423	0.474	350
ANN9	313	59.053	0.434	37	5.757	0.394	350
ANN10	316	67.106	0.461	34	4.176	0.350	350
Mean	-	60.795	0.440	-	6.154	0.405	-
Std. dev.	-	7.304	0.0278	-	1.480	0.044	-

Notes. 1. SSE = Sum square of errors; RMSE = Root mean square of errors; N = Sample size; Std. dev. = Standard deviation.

2. In the ANN model, Awareness of need, Personal norms, Environmental concern, and health consciousness served as the input neurons; while Intention to purchase organic food products served as the output neuron.

3. Automatic architecture selection was used.

4. Number of hidden layers was 1.

5. Hidden layer activation function was hyperbolic tangent.

6. Output layer activation function was identity.

7. Type of training was batch.

8. Optimisation algorithm was scaled conjugate gradient.

9. Maximum training epochs was set to compute automatically.

Source: derived from the IBM SPSS 28 software and computed by authors.

4.2.2. Sensitivity analysis. To assess how effectively each input neuron predicts outcomes, a sensitivity analysis was performed, as shown in Table 10. This analysis involved determining the normalised significance of each neuron. This was done by dividing the relative importance of each neuron by the highest importance value and then expressing the results as percentages [106].

Table 10

Sensitivity analysis

Ten-folds	AWN	PNM	ECN	HCN
ANN1	0.600	0.282	0.374	1.000
ANN2	0.598	0.525	1.000	0.797
ANN3	0.986	0.682	0.549	1.000
ANN4	0.546	0.785	1.000	0.555
ANN5	0.950	0.734	0.678	1.000
ANN6	0.879	0.641	0.496	1.000
ANN7	1.000	0.496	0.285	0.535
ANN8	1.000	0.735	0.503	0.978
ANN9	1.000	0.604	0.549	0.798
ANN10	0.656	0.880	0.456	1.000
Average importance	0.822	0.634	0.589	0.866
Normalised importance, %	94.83	73.24	68.01	100.00

Note. AWN = Awareness of need; PNM = Personal norms; ECN = Environmental concern; HCN = Health consciousness.

Source: derived from the IBM SPSS 28 software and computed by authors.

The sensitivity analysis evaluated the stability of the conclusions by examining how the significance of various factors influencing purchasing behaviour shifted with minor changes. Specifically, it involved calculating the average importance scores of AWN, PNM, ECN, and HCN in forecasting the intention to purchase organic food

products. The sensitivity analysis identified HCN as the most impactful factor within the ANN model, with a normalised importance of 100 %. AWN followed with 94.8 %, PNM with 73.2 %, and ECN with 68.0 %. These results indicate that a consumer's HCN is the most crucial determinant in predicting their intention to purchase organic food products.

5. DISCUSSION

The findings of this study reveal the intricate dynamics that shape consumers' intentions to purchase organic food products. The results support the hypotheses that awareness of need, personal norms, and environmental concern significantly and positively influence the intention to purchase organic food products. The model, encompassing these factors, explains a substantial portion (63.1 %) of the variance in consumers' intentions.

AWN, reflecting an individual's recognition of the environmental issues associated with conventional food production, emerged as a significant predictor of the intention to purchase organic food. This finding underscores the importance of fostering awareness about the environmental implications of food choices to drive pro-environmental behaviour. Consumers' perception of environmental value can significantly influence their inclination toward making green purchases [107]. This perception also plays a role in shaping the intention to purchase organic products, which are known for being environmentally friendly [108].

The study also revealed a strong positive influence of PNM on the intention to purchase organic food. This finding aligns with earlier research on the topic of buying behaviour concerning organic food, as found in studies by Hansmann et al. [109] and Yang et al. [110]. Individuals with deep convictions about environmental preservation were more likely to align their actions with their ethical beliefs, fostering a commitment to pro-environmental consumption. This highlights the role of personal values and moral convictions in shaping consumer behaviour. This result is in line with the finding by Doran and Larsen [111], which investigated selecting eco-friendly travel choices.

ECN emerged as a predictor of the intention to purchase organic food products; this finding matches with the outcomes of the research done by Prakash et al. [37]. Consumers who exhibited a heightened awareness of environmental issues and demonstrated a willingness to contribute to solutions were more likely to choose organic products. This finding reinforces the importance of addressing and promoting environmental consciousness to encourage sustainable consumption.

HCN of the consumers found to be an important factor affecting the consumers' intention to purchase organic food products. Researchers like Pahari et al. [67] and Wang et al. [112] found the similar results. The study contributes to the existing literature by providing insights into the factors influencing consumers' preferences and decisions regarding organic food consumption in emerging economies.

ANN further established the HCN as the most important antecedent. The research emphasises the need for tailored strategies that consider cultural, social, and economic nuances when promoting environmentally friendly products. As sustainability becomes

an increasingly critical global concern, understanding the drivers of consumer behaviour in diverse contexts is essential for developing effective interventions and policies that encourage eco-conscious choices. After examining the research findings, it is evident that consumers possess an awareness regarding the issues arising from the production and consumption of conventional food items. There is a clear intention among consumers to buy organic food products as a means of contributing to environmental preservation. Consumers are increasingly inclined to buy organic foods due to their heightened concern for the environment and its impact [37].

This study significantly contributes to the theoretical understanding of consumer behaviour, particularly in the context of organic food purchases. By identifying psychological factors, such as core beliefs and motivations, the research deepens insights into what drives consumer intentions toward eco-friendly consumption. The use of ANN marks a methodological advancement, allowing the identification of non-linear relationships that traditional linear models like SEM might overlook. Furthermore, the findings reveal that health consciousness is a stronger predictor of purchase intentions than environmental concerns and personal norms, particularly in urbanising and health-focused emerging economies. This insight underscores the importance of health-oriented motivations in shaping consumer behaviour. Additionally, the study sheds light on the interplay between socio-cultural, economic, and institutional factors in emerging markets, emphasising the unique characteristics of these contexts compared to developed economies. By integrating these elements, the research enriches the theoretical discourse on sustainable consumer behaviour and the adoption of organic food.

The findings offer valuable guidance for policymakers, marketers, and other stakeholders aiming to promote organic food consumption. Marketing strategies should prioritise educating consumers about the benefits of organic food, particularly emphasising health, environmental sustainability, and social responsibility. Highlighting the health advantages in marketing campaigns can be especially effective in appealing to the growing health consciousness in emerging economies. Providing incentives such as complimentary samples or discounts can encourage consumers to try organic products, fostering increased adoption. Policymakers can support these efforts by initiating public health campaigns and providing subsidies for organic farming, promoting sustainable agricultural practices. Certification systems and trust-building measures are also critical for addressing consumer concerns about the authenticity and quality of organic products. Finally, efforts should be made to address affordability issues, especially in regions with significant income gaps, to make organic food a viable alternative for a wider range of consumers.

6. CONCLUSION

The study highlights the pivotal role of awareness in shaping pro-environmental behaviour, particularly its significant influence on the intention to purchase organic food. Awareness empowers consumers to recognise the environmental and health benefits of organic products, fostering a sustainability-oriented mindset. Personal

norms, rooted in ethical convictions and moral responsibilities, are strong predictors of organic food consumption, guiding individual choices and reflecting broader societal values. Environmental concern also emerges as a key factor, emphasising the importance of mitigating ecological harm and positioning organic food as an effective solution. Together, these findings reveal the psychological, ethical, and environmental drivers of consumer behaviour. This research offers valuable insights for policymakers, marketers, and educators aiming to promote eco-friendly consumer choices. Tailored strategies that address cultural, social, and economic differences are crucial, particularly in emerging economies where consumer awareness varies. Marketing efforts should focus on educating consumers about the health, environmental, and social benefits of organic food. Emotional messaging that aligns with ethical values can strengthen consumer connections, while practical initiatives like free samples, discounts, and loyalty programs can encourage adoption. Complementary policies supporting organic farming, reducing access barriers, and incentivising sustainable practices are essential. Policymakers and stakeholders should develop initiatives that emphasise the dual benefits of health and environmental protection. Public awareness campaigns can showcase the tangible impacts of organic food consumption, such as reduced chemical exposure and biodiversity preservation. Educators also play a vital role in incorporating sustainability-oriented programmes into curricula and community outreach to instil eco-conscious values at an early stage. By exploring these interconnected factors, the study provides actionable insights into the psychological and ethical motivations behind organic food purchasing. These findings help stakeholders design strategies aligned with consumer aspirations, fostering individual and societal shifts toward sustainability. The research underscores the transformative potential of organic food consumption in promoting healthier lifestyles, environmental stewardship, and global sustainability. Through collaborative efforts, the organic food sector can drive meaningful change, inspiring communities to adopt more sustainable consumption patterns for the benefit of current and future generations.

7. LIMITATIONS AND FUTURE RESEARCH

While this study provides valuable insights into the factors that influence the intention to purchase organic food, several limitations should be acknowledged. The research relies on self-reported data, which may introduce social desirability bias and compromise the objectivity of responses. The study's cross-sectional design limits the ability to establish causal relationships among variables. Longitudinal studies could provide a more nuanced understanding of the dynamic nature of consumer behaviour over time. The research primarily focuses on the urban population, potentially overlooking rural consumers whose perspectives may differ due to distinct socio-economic and cultural contexts. Future research should strive for a more comprehensive and diverse sample to enhance the generalisability of findings.

In terms of future research directions, investigating the role of socio-demographic factors, such as cultural influences, income disparities, and educational backgrounds, could provide a deeper understanding of the nuances shaping organic food

consumption. Exploring the influence of marketing strategies, certification labels, and information accessibility on consumer choices could offer practical implications for policymakers and businesses aiming to promote sustainable consumption. As the study emphasises the importance of awareness, future research may look into the effectiveness of educational interventions and campaigns in shaping consumer consciousness and behaviour. Considering the global nature of environmental issues, comparative studies across various countries and regions could uncover cross-cultural variations in the determinants of organic food consumption, facilitating a more holistic approach to sustainable consumer behaviour research.

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