Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 10 Issue 41 (September 2025) PP. 238-252
DOI 10/35631/JTHEM.1041016

JOURNAL OF TOURISM, HOSPITALITY AND ENVIRONMENT MANAGEMENT (JTHEM)
www.jthem.com

EXPLORING KEY BARRIERS TO PLANT-BASED MEAT ACCEPTANCE IN MALAYSIA: SENSORY, PRICE, NUTRITION, AND AVAILABILITY DIMENSIONS

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Article Info:

Article history:
Received date: 17.06.2025
Revised date: 10.07.2025
Accepted date: 02.08.2025
Published date: 07.09.2025

To cite this document:

Zahari, M. S. M., Piah Z. H. M, Fuza Z. I. M, Abdullah, N. H., & Abidin, I. H. Z, (2025). Exploring Key Barriers to Plant-Based Meat Acceptance in Malaysia: Sensory, Price, Nutrition, and Availability Dimensions. *Journal of Tourism Hospitality and Environment Management, 10* (41), 238-252.

Abstract:

The global movement toward a plant-based diet and lifestyle, known as the Plant-Based Revolution, has gained substantial traction in recent years due to its potential benefits for personal health, environmental sustainability, and animal welfare. However, the growing awareness and availability of plant-based options, the widespread adoption of this revolution faces various barriers that hinder its acceptance across diverse populations. This conceptual paper delves into an extensive review of existing literature on the plant-based movement, including its documented health benefits, ecological advantages, evolving consumer attitudes, and the multifaceted barriers impeding its broader societal integration. Drawing upon these interdisciplinary insights, a conceptual framework is proposed. This framework integrates key constructs such as sensory perception, price sensitivity, nutritional skepticism, and product availability each representing salient inhibitors frequently cited in extant literature. Furthermore, the framework is proposed to conceptualize within Malaysia's diverse demographic landscape. The model aims to elucidate the interplay between these variables and their influence on consumer resistance or acceptance, thereby offering a comprehensive lens through which behavioral patterns can be better understood. Ultimately, this proposed

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DOI: 10.35631/JTHEM.1041016

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framework not only guide for empirical investigations but contributes both theoretical and practical implications.

Keywords:

Plant-Based food, Barriers, Sensory, Price, Nutritional, Availability, Acceptance

Introduction

The global food industry is undergoing a transformative shift driven by the emergence of plant-based alternatives to traditional meat products (Mylan et al., 2023; Rai et al., 2023; Alae-Carew et al., 2022). The rapid growth of this sector reflects changing consumer attitudes towards food, health, and the environment. Individuals are increasingly seeking sustainable, healthier, and ethically sound alternatives to meat, prompting the rise of innovative plant-based options that mimic the taste, texture, and nutritional profile of animal-derived products. This growing momentum is evident in the growing adoption of plant-based diets and the rising demand for meat alternatives across diverse consumer groups. Concerns about the environmental impact of animal agriculture, including deforestation, greenhouse gas emissions, and water pollution, have become more prominent, driving consumers to seek alternatives that are more sustainable and have a reduced ecological footprint (Aschemann-Witzel et al., 2021; Scanes, 2018; Kraham, 2017). Additionally, increasing health consciousness and the recognition of the potential health risks associated with excessive meat consumption have contributed to the growing interest in plant-based alternatives (Flint et al., 2023; Ho et al., 2022; Rizzo et al., 2023).

Ethical considerations related to animal welfare have also played a role in motivating consumers to explore meat-free options (Mota-Rojas et al., 2023; Negowetti, 2020). Despite the increasing popularity of plant-based meat alternatives, there are challenges that need to be addressed to facilitate their widespread adoption. One significant challenge is ensuring that these alternatives meet consumer expectations in terms of taste, texture, and overall sensory experience. Many consumers still associate meat with a certain sensory appeal, and for plant-based alternatives to succeed, they must provide a comparable experience (Pointke et al., 2022; Sogari et al., 2023; Michel et al., 2021). Additionally, price remains a consideration for many consumers, as affordability plays a crucial role in the widespread adoption of plant-based alternatives (Viroli et al., 2023; Sharma et al., 2024; Jahn et al., 2021). While the cost of production for plant-based products is gradually decreasing, it is important to assess the price point at which these alternatives become accessible to a broader consumer base (Zhao et al., 2023; Cuffey et al., 2023). Effectivere, effective communication in education around the health benefits of plant-based diets and the nutritional value of meat alternatives are essential (Estell et al., 2021; Craig et al., 2021). Consumers need to be well-informed about the potential health advantages of adopting plant-based alternatives and how they can contribute to a balanced and nutritious diet. Addressing these informational gaps can significantly impact consumer attitudes and preferences. Understanding consumer attitudes towards taste, price, health benefits, environmental impact, and ethical considerations influence consumer adoption and acceptance of novel meat plant-based alternatives is crucial for the successful development and marketing of these products. (Pakseresht et al., 2022; Szenderák et al., 2022; Andreani et al., 2023). Accordingly, this conceptual paper undertakes a comprehensive review of the extant

Journal of Tourism, Hospitality and Environment Management
JTHEM
EISSN: 0128-178X
Volume 10 Issue 41 (September 2025) PP. 238-252
DOI 10/35631/JTHEM.1041016
literature surrounding the plant-based food revolution and its associated dimensions, culminating in the development of a theoretically grounded conceptual framework.

Literature Review

Origins and Evolution of the Plant-based Movement

The concept of plant-based diets has roots that span centuries, originating from diverse cultural, religious, and philosophical traditions advocating vegetarianism and veganism. Historically, motivations for plant-based eating included ethical, spiritual, and health considerations (Sirvinskas, 2021; Rosenfeld & Burrow, 2017). In recent decades, the modern plant-based movement has gained significant momentum, driven by advances in nutrition science, heightened awareness of environmental challenges, and evolving consumer values. The surge in plant-based alternatives is linked to several key drivers: growing global health concerns associated with meat consumption (Godfray et al., 2018; Gonzalez et al., 2020), mounting scientific evidence supporting the benefits of plant-based nutrition (Storz et al., 2022; Craig et al., 2021), technological innovations that allow plant products to closely mimic meat's sensory attributes (Jang & Lee, 2024; Sha & Xiong, 2020), and increased demand for sustainable and ethical food choices (Nadathur et al., 2024; Hoglund, 2020) . This movement has transitioned from a niche lifestyle to a mainstream trend, buoyed by expanding markets, growing investment, and prominent media attention. Research highlights the early 21st century as a critical juncture when plant-based eating shifted from a marginal alternative to a widespread phenomenon (Sirvinskas, 2020) influenced by changing social norms, celebrity advocacy, and greater product availability across retail and food service channels (Pakseresht et al., 2022; Szenderák et al., 2022; Mancini & Antonioli, 2020).

Health Benefits of Plant-Based Diets

Extensive research over the past few decades has demonstrated a wide range of health benefits associated with plant-based diets, which focus primarily on the consumption of fruits, vegetables, legumes, nuts, seeds, and whole grains while minimizing or eliminating animal products. Epidemiological studies consistently show that individuals who adhere to plant-based diets experience lower incidences of chronic diseases such as cardiovascular disease, type 2 diabetes, hypertension, obesity, and certain types of cancer (Thompson et al., 2023; Greger, 2015; Hemler & Hu, 2019). These benefits are attributed to the diet's high fiber content, abundant antioxidants, and lower levels of saturated fats and cholesterol. Furthermore, clinical trials suggest that plant-based diets can improve metabolic markers, enhance glycemic control, and support healthy weight management (Ivanova et al., 2021; Johannesen et al., 2020; Najjar & Feresin, 2019). Beyond disease prevention, emerging evidence suggests that plant-based nutrition contributes positively to immune function and may enhance mental well-being by reducing inflammation (Khalid et al., 2022; Haghighatdoost et al., 2023; Van Zonneveld et al., 2024). Researchers also point to the role of plant-based diets in promoting longevity and improving overall quality of life, with many studies reporting lower all-cause mortality rates among vegetarians and vegans (Herpich et al., 2022; Key et al., 2022). However, literature also stresses the importance of careful dietary planning to ensure adequate intake of essential nutrients such as vitamin B12, iron, calcium, and omega-3 fatty acids, which may be less abundant in strict plant-based diets (Sexton, 2018; Kanerva, 2019; Peeters et al., 2021).

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Environmental Impact and Sustainability of Plant-Based Foods

The environmental sustainability of plant-based diets has become a central theme in the discourse surrounding global food security and climate change mitigation. Compared to conventional animal agriculture, the production of plant-based foods generally requires substantially fewer natural resources, including land, water, and energy inputs (Detzel et al., 2022; Espinosa et al., 2022). Life cycle assessments reveal that plant-based food production emits significantly lower levels of greenhouse gases such as methane, nitrous oxide, and carbon dioxide (Detzel et al., 2022; Shanmugam et al., 2023; Xu et al., 2021). This reduction in emissions is critical given that livestock farming is a major contributor to anthropogenic greenhouse gas emissions globally (Duxbury & Mosier, 2022; Hung & Subramanian, 2020). Additionally, the shift to plant-based diets can reduce pressures on ecosystems by lowering deforestation rates, habitat destruction, and biodiversity loss that are often linked to the expansion of grazing lands and feed crop cultivation (Haar, 2024; Cleveland & Jay, 2024; Mendoza, 2023). Moreover, plant-based diets contribute to reduced water pollution, as animal agriculture is a known source of nitrogen and phosphorus runoff that leads to eutrophication of aquatic systems (Tiwari & Pal, 2022; Scanes, 2018). Literature increasingly emphasizes the potential of plant-based diets to promote circular and regenerative food systems, enhancing soil health and reducing waste (Sadhukhan et al., 2020; Boukid, 2024; Knorr & Augustin, 2024). However, scholars note that the sustainability benefits depend on the types of plant foods consumed and their methods of production; for instance, highly processed plant-based products may have different environmental footprints compared to minimally processed whole foods (Daas et al., 2024; Prescott et al., 2023; Macdiarmid, 2022). Thus, environmental impact assessments are increasingly sophisticated, considering regional agricultural practices and supply chain factors.

Consumer Attitudes and Motivations Toward Plant-Based Diets

The adoption of plant-based diets is influenced by a complex interplay of factors that shape consumer attitudes and motivations. Ethical concerns about animal welfare are often cited as primary driver, with many consumers motivated by the desire to reduce animal suffering and support humane treatment (Alonso et al., 2020; Hernandez et al., 2022; Esbjerg et al., 2022). Health consciousness is another key factor, as individuals become more aware of the link between diet and chronic diseases (Chimezie, 2023; Moubarak, 2025). Environmental awareness has emerged as a growing motivation, with consumers recognizing the ecological benefits of plant-based diets and seeking to reduce their personal carbon footprint (Carey et al., 2023; Espinosa et al., 2022; Kustar & Patino, 2021). Cultural and social influences also play significant roles, including the impact of social media, peer groups, and celebrity endorsements, which can shape perceptions and normalize plant-based lifestyles (Sadhukhan et al., 2020; Boukid, 2024). Studies show considerable demographic variation in acceptance, with younger generations, women, and individuals with higher education levels more likely to adopt plant-based diets (Raptou et al., 2024; Wyker & Davison, 2010; Shin et al., 2024). Personal identity and lifestyle congruence further influence choices, as some consumers integrate plant-based eating into broader wellness or ethical frameworks (Mason-D'Croz et al., 2022; Matharu et al., 2024; Bublitz et al., 2023). Nevertheless, literature acknowledges that despite growing interest, barriers such as food neophobia, attachment to traditional meat consumption, and perceived social norms continue to affect acceptance (Tiwari & Pal, 2022; Ngatia et al., 2019). Understanding these diverse and sometimes conflicting motivations is essential for developing effective communication strategies and interventions that can address consumer concerns and foster more widespread adoption.

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Conceptualization Of Barriers

The widespread adoption of plant-based diets, while promising in terms of sustainability and health, is hindered by several conceptual barriers that influence consumer decision-making. Understanding these barriers through a conceptual lens enables us to address the underlying perceptions and cognitive factors that shape resistance to plant-based alternatives. This section conceptualizes four core barriers which is sensory perception, price, nutritional misconceptions, and availability that consistently emerge in literature and affect consumer acceptance of plant-based foods.

Sensory Perception and Taste Expectations

One of the most prominent barriers to plant-based food acceptance is rooted in sensory perception, particularly taste, texture, aroma, and the overall eating experience (Pointke et al., 2022; Sogari et al., 2023). Traditional meat products occupy a deeply embedded role in cultural and culinary practices, symbolizing not only nourishment but also pleasure, indulgence, and tradition (Hoek et al., 2004; Hartmann & Siegrist, 2017). Consumers frequently evaluate plant-based alternatives through a comparative lens, expecting them to mimic the sensory attributes of conventional meat such as the juiciness of beef or the fibrous structure of chicken (Tso & Forde, 2021). When these expectations are unmet, products are often rejected regardless of their nutritional or environmental advantages (Vainio et al., 2016; Weinrich, 2018).

The "taste barrier" is further compounded by cognitive and psychological associations, wherein plant-based products are perceived as less flavorful, overly processed, or lacking in indulgence (Siegrist & Hartmann, 2019; Grasso et al., 2019). Studies have shown that preconceived beliefs and food-related memories shape consumers' willingness to accept and positively evaluate new sensory experiences (Hoek et al., 2013; Schouteten et al., 2016). This phenomenon suggests that the sensory challenge is not purely physiological but also psychological and effective in nature (Onwezen et al., 2021).Therefore, even if plant-based innovations achieve technical parity in flavor or texture, they may still encounter resistance unless consumers are reconditioned to appreciate novel taste profiles and redefine what constitutes a satisfying eating experience (Tziva et al., 2020; Michel et al., 2021). This underscores the importance of addressing both hedonic qualities and consumer expectations through marketing strategies, sensory education, and reframing plant-based eating as a positive, modern, and enjoyable dietary practice (Sanchez-Sabate & Sabaté, 2019; Bryant et al., 2019).

Price and Perceived Economic Value

Affordability constitutes a pivotal conceptual barrier in the widespread adoption of plant-based meat alternatives, underpinned not only by actual economic constraints but also by entrenched perceptions of value (Hoek et al., 2011; Slade, 2018). While empirical pricing data often reveal only marginal cost differentials between plant-based products and conventional meat, consumers frequently perceive the former as disproportionately expensive (Asioli et al., 2017). This disjunction underscores that price sensitivity is as much a cognitive and affective construct as it is an objective financial consideration (Grunert, 2005). For many consumers, the prospect of incurring a price premium for products that are unfamiliar, perceived as organoleptically inferior, or regarded as nutritionally ambiguous evokes resistance and skepticism (Apostolidis & McLeay, 2016).

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Moreover, the strategic market positioning of plant-based alternatives as specialty or premium goods has inadvertently contributed to their symbolic exclusivity, further alienating budget-conscious consumers (Tziva et al., 2020; Michel et al., 2021). This premiumization effect reinforces the perception that such products are accessible only to affluent, health-conscious, or environmentally driven segments of the population, thereby limiting their broader appeal (Verain et al., 2016). The framing of value how consumers cognitively balance cost against expected benefits such as taste, healthfulness, and convenience emerges as a decisive determinant in purchase intention (Niva et al., 2017). Without a compelling narrative articulating long-term benefits such as potential reductions in chronic disease risk or contributions to environmental sustainability plant-based alternatives are likely to remain constrained by psychological price resistance, particularly among socioeconomically disadvantaged groups (Siegrist & Hartmann, 2019; Chriki & Hocquette, 2020).

Nutritional Misconceptions and Information Deficits

Despite an expanding corpus of scientific literature affirming the health advantages of plant-based diets, including reduced risk of chronic diseases such as cardiovascular conditions, type 2 diabetes, and certain cancers (Tuso et al., 2013; Satija & Hu, 2018), persistent misconceptions regarding their nutritional adequacy continue to hinder broader consumer adoption. A substantial proportion of the population remains skeptical about whether plant-based alternatives can deliver sufficient quantities of essential nutrients, particularly protein, vitamin B12, iron, and omega-3 fatty acids, nutrients traditionally associated with animal-derived foods (Melina, Craig, & Levin, 2016; Clarys et al., 2014). These doubts are frequently exacerbated by ambiguous or inconsistent nutritional labeling, limited public knowledge, and the pervasiveness of sociocultural narratives that equate meat consumption with strength, vitality, and complete nourishment (Ruby & Heine, 2011). Such conceptual barriers are deeply rooted in historical and cultural constructions of diet and health, which frame plant-based eating patterns as restrictive, nutritionally inferior, or relevant only to niche populations such as vegans, elite athletes, or health-conscious elites (Lea et al., 2006).

These entrenched cognitive schemas significantly influence consumer confidence, often manifesting as resistance or ambivalence toward dietary change (Hartmann & Siegrist, 2017). In the absence of robust, evidence-based public education initiatives and transparent communication from food producers, these misperceptions are likely to persist across diverse demographic and cultural segments (Graça et al., 2015). Addressing this barrier requires not only nutritional reformulation and clear labeling practices but also a paradigm shift in public discourse surrounding plant-based nutrition.

Availability and Market Access

Availability, both in its objective and perceived forms, constitutes a pivotal determinant in the adoption of plant-based alternatives. Empirical studies have documented that access to plant-based foods is often unevenly distributed, particularly in rural, underserved, or economically marginalized regions where supply chains remain underdeveloped, retail penetration is minimal, and restaurant offerings lack dietary diversity (Neff et al., 2009; Jabs & Devine, 2006). In such contexts, genuine scarcity of plant-based options is compounded by infrastructural and economic constraints, limiting consumer exposure and accessibility.

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Even in urban or higher-income areas where plant-based products are ostensibly present, consumer perceptions of availability may not align with reality. Many individuals regard these foods as difficult to locate or inconvenient to prepare, especially when they are segregated into specialty aisles, presented with unfamiliar packaging, or necessitate nontraditional cooking techniques (Aschemann-Witzel et al., 2020; Hoek et al., 2011). This mismatch between presence and perception underscores the dual nature of the barrier: it is both logistical and conceptual, shaped by consumer expectations of familiarity, convenience, and cultural embeddedness (Rogers, 2003). The cultural marginalization of plant-based eating often positioned as a niche lifestyle choice rather than a normative dietary pattern further exacerbates the issue of perceived inaccessibility (Ruby, 2012; De Boer et al., 2014). Mainstream culinary traditions continue to privilege animal-based proteins, rendering plant-based alternatives socially and gastronomically peripheral. The lack of integration into everyday food environments and popular cuisines reinforces the notion that plant-based consumption is both inconvenient and ideologically deviant (Vranken et al., 2014). Consequently, overcoming this availability barrier necessitates systemic shifts in how plant-based products are positioned, marketed, and distributed. Increased visibility in conventional retail spaces, incorporation into culturally resonant dishes, and the facilitation of user-friendly preparation methods are essential to fostering normalization. Without such integrative strategies, the perception of plant-based diets as inaccessible or impractical is likely to persist, thereby impeding their broader adoption across diverse sociocultural contexts (Michel, Hartmann, & Siegrist, 2021).

Proposed Conceptual Framework

Forming the foundation for empirical investigation, the present study proposes a conceptual framework derived from the synthesized literature on key barriers on sensory, price, nutritional, and availability that collectively constrain the adoption of plant-based meat alternatives. These constructions, grounded in behavioral, cultural, and economic dimensions, offer a comprehensive lens to examine consumer resistance and acceptance.

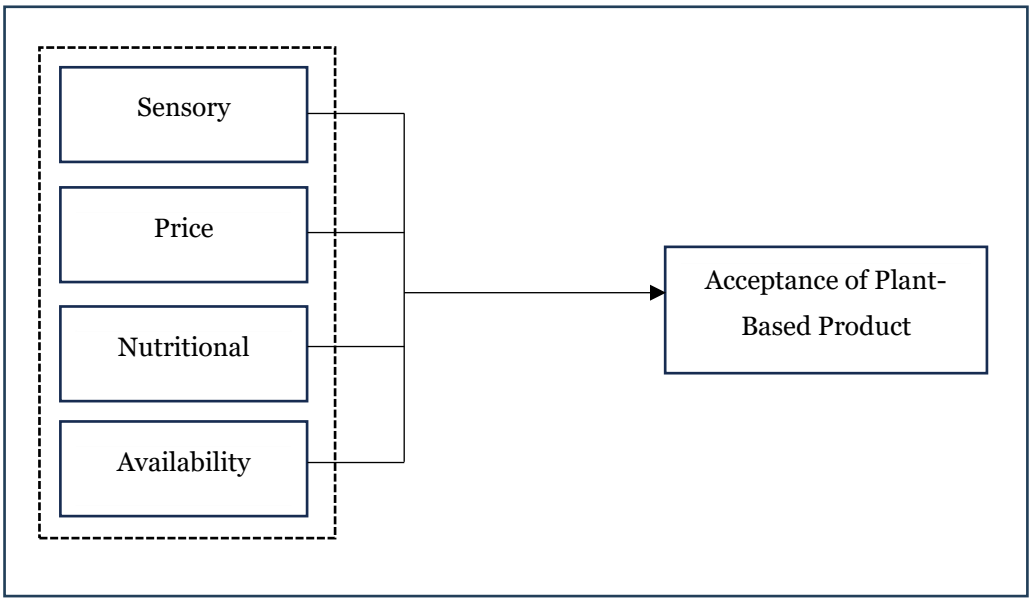

Figure 1: Conceptual Framework

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EISSN: 0128-178X
Volume 10 Issue 41 (September 2025) PP. 238-252
DOI 10/35631/JTHEM.1041016

Discussion

The proposed conceptual framework underscores the multidimensional challenges impeding the widespread acceptance of plant-based meat alternatives. While consumer interest in sustainable and ethical food choices continues to rise globally, several key barriers namely sensory attributes, pricing concerns, nutritional perceptions, and availability may continue to inhibit broader integration into mainstream dietary patterns. This framework is particularly relevant to the Malaysian context, where the plant-based food market remains in its nascent stage. In Malaysia, cultural dietary preferences are deeply rooted in traditional cuisines that emphasize meat-based dishes, often richly seasoned and texturally complex. As such, local consumers may find plant-based meat alternatives lacking in taste, mouthfeel, or familiarity, contributing to sensory resistance. Price also plays a significant role, as plant-based products are often perceived as premium items, rendering them inaccessible to price-sensitive consumers, especially in lower-income segments. Furthermore, uncertainty surrounding the nutritional adequacy of plant-based alternatives, particularly regarding protein content and processing levels, may fuel skepticism. Limited availability in mainstream retail outlets and foodservice channels further compounds these issues, restricting consumer exposure and trial. Consequently, unless these multidimensional barriers are addressed through targeted education, product innovation, and improved accessibility, consumer adoption in Malaysia is likely to remain limited. This highlights the need for localized strategies that align plant-based offerings with Malaysian taste profiles, price expectations, and nutritional norms.

Theoretically, this framework provides a more nuanced and empirically grounded lens to understand consumer resistance to plant-based meat alternatives by moving beyond the often-assuming environmental or ethical motivations that dominate sustainability discourses. While pro-environmental attitudes have been linked to increased willingness to adopt sustainable food choices, emerging literature emphasizes that such motivations are often insufficient to drive actual behavior, particularly when core consumption needs such as taste, cost, nutritional adequacy, and accessibility—are perceived to be compromised. As such, this framework integrates behavioral, cultural, and economic dimensions to reflect a more realistic set of constraints facing consumers in everyday food decision-making.

From a practical perspective, the proposed framework yields concrete and actionable insights into diverse stakeholders seeking to advance the adoption of plant-based meat alternatives. Product developers are encouraged to prioritize the refinement of sensory attributes such as taste, texture, and visual appeal in order to more closely emulate conventional meat experiences and meet consumer expectations. Marketers and retailers can facilitate broader uptake by implementing strategic pricing mechanisms that enhance perceived value and affordability, particularly among cost-sensitive populations. Nutrition educators hold a pivotal role in dispelling misconceptions surrounding the nutritional adequacy of plant-based products through rigorous, evidence-based communication. Simultaneously, policymakers are well-positioned to enhance product accessibility by expanding distribution networks, especially within underserved or rural communities. Collectively, these coordinated efforts can help mitigate the current adoption barriers and foster more inclusive, enduring shifts toward plant-based dietary practices. Furthermore, empirical research should rigorously test the proposed relationships within this framework using robust quantitative methodologies to assess the relative influence of each barrier and their interaction across distinct consumer segments. This integrative approach not only advances theoretical discourse but also enhances the strategic

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EISSN: 0128-178X
Volume 10 Issue 41 (September 2025) PP. 238-252
DOI 10/35631/JTHEM.1041016
precision of practical interventions, thereby accelerating the transition toward a more sustainable food system.

Acknowledgements
The authors gratefully acknowledge Universiti Teknologi MARA (UiTM) and UCSI University for their institutional support and academic resources, which greatly facilitated this study.

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EISSN: 0128-178X
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