

The Role of Sustainable Packaging in Saudi Arabian Supply Chains FMCG: Analyzing Consumer Acceptance and Marketing Strategies for Enhancing Environmental Impact

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Abstract

Sustainable packaging trends have, therefore, shaped consumers' behavior in the fast-moving consumer goods (FMCG) sector in Saudi Arabia. A quantitative approach has been taken in this present study to test the hypothesis that environmental concern, cost consciousness, and cultural values, along with positive portrayals of sustainable packaging, would influence consumer acceptance and satisfaction and marketing strategies toward the product. By applying partial least squares structural equation modelling (PLS-SEM) to survey data from Saudi consumers, research has demonstrated that environmental concerns drive satisfaction and demand, whereas positive portrayals drive advocacy and consumer perceptions. Other findings point to nuances in the role of cost awareness and cultural values in marketing strategy and brand loyalty. This research provides useful insights to businesses and policymakers on how to combine sustainable practices for environmental impact and consumer engagement in Saudi Arabia.

Keywords: Sustainable Packaging, Supply Chain, Consumer Acceptance, environmental impact, and Marketing Strategy.

Introduction

Packaging is an important part of the product and a major part of the product lifecycle, acting as a significant role in protecting against elements and providing information in a competitive packaged world. This section gives a brief introduction to the importance of sustainable packaging, its drivers, and social-environmental impact. In addition, the background is provided for sustainable FMCG within Saudi Arabia, specifically in sustainable packaging that offers solutions to social and environmental sustainability problems that have been overlooked by FMCG companies in the Arabian Peninsula (Wagner & Heinzl, 2020). It highlights unique techniques to influence customer behavior through sustainable packaging attributes and methods for these approaches to be used to assess and develop sustainable packaging for FMCG in Arabian countries. The impact of packaging on the environment is growing and becoming increasingly important to customers. Customers, companies, and governments are increasingly looking for ways to reduce the environmental impacts associated with packaging (Kalinin et al., 2024).

However, product packaging is perceived as an important component in terms of delivering the product to the customer and providing brand distinction at prices. Many product manufacturers argue that product protection is the primary reason for current packaging, yet in practical terms, the right protective packaging is equally accessible through different materials, although consumer acceptance is essential for product manufacturers. For companies whose policies involve sustainable development, an uncompromising approach to sustainable packaging creates numerous management dilemmas. With this in mind, the cost is an important consideration when environmental issues are becoming more significant to customers and legislators for companies providing sustainable packaging in the face of these above-mentioned market challenges (Abunar & Alam, 2020).

Background and Rationale

As the existing body of literature on the influence of packaging material type on consumer attitudes and purchase intentions is sparse, particularly in the Saudi Arabian context, this study is a contribution and an

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attempt to fill this gap. Previous studies have reported that different material types have different impacts on the environment and have proposed that the type of packaging material employed may affect consumer behavior in terms of their purchase intentions (Abass et al., 2024). However, saturated and environmentally conscious markets have reported inconsistencies and contradictions among consumers regarding their packaging material preferences. It is difficult for producers to cater to these cautious, conscious, or indifferent consumers.

Moreover, consumers might have different attitudes and purchase intentions for the same product with different packaging materials. In Asia, consumers expressed favorable attitudes toward recycled paperboard and children's packaging (Elkaliny et al., 2024). However, similar work for Saudi Arabian consumer preferences is deficient. According to culture theory and research on Saudi Arabian society, local culture influences all societal aspects of life, including consumer behavior, and international firms should be aware of this to target a niche market that is already quite successful. Lastly, it has been reported that the large number of Arabic products in various countries may bear the phrase "Made in the Kingdom of Saudi Arabia," which attracts local support. The impact of the phrase "Made in the Kingdom of Saudi Arabia" is unknown in the study of cultural aspects and the impact of packaging on consumers. Therefore, this research attempts to bring some conceptual clarity regarding the topic (Prakash et al., 2024).

Research Objectives

Although having been mature for a number of decades, the literature on both packaging and consumption never quite met until recent environmental concerns about what happens to packaging when consumed products are no longer needed and are discarded (Abass et al., 2024). In this respect, many consumers have evolved towards more ecological lifestyles and are increasingly aware of the important problems associated with excessive packaging or packaging waste, even though these issues are generally raised mainly by richly developed countries (Grover et al., 2019). Nevertheless, with respect to developing countries, existing studies have often focused on obstacles and evolving queries that might modulate their sensitivity toward sustainable commitment to the environment and related products. It is suggested that sustainable development—reconciling economic, social, and environmental performance—will be possible only if population acceptance and, most specifically, mobilization are achieved.

This paper focuses on the case of the Arabian Peninsula, and more specifically, Saudi Arabia, a country whose population seems affected by various factors known to be influential with respect to pro-environmental behavior. Based on a conceptual frame that interconnects several fields of social environmental psychology, marketing, and consumer sciences, this research attempts to define the main profiles of Saudi consumers, as far as currently unknown practices like recycling, moral maturity, and green behaviors are concerned. Thus, this research has three objectives as follows: To provide the reader with a comprehensive review of the concept of sustainable packaging through a detailed review of the literature pertaining to the purchasing behavior of consumers in green topics; To provide strategic and managerial action lines that could be helpful to marketing managers regarding the enhancement of consumer environmental performance and the implementation of sustainable supply chains; To propose future research directions for exploring business opportunities in connection with sustainable packaging innovation in supply chains.

Scope and Significance of the Study

The primary goal of this study is to investigate the acceptance of packaging sustainability in some of the most popular and long-standing FMCG brands consumed by Saudis in a country not only with contrasting environmental factors but also with significantly contrasting economic and cultural conditions. This research focuses on definitions and the reasons why packaging sustainability is important and also explores the primary drivers, such as environmental issues and corporate social responsibility (CSR), for manufacturers to consider and incorporate packaging sustainability strategies into their business operations (Wagner & Heinzel, 2020). These issues are explored through a pioneering empirical study, which is

considered within the context of a more extensive study being developed to incorporate business environment and economic decision-making indices (Kalinin et al., 2024).

The FMCG market sector was chosen for several reasons. Firstly, it is one of the most challenging sectors for packaging since products are widely available, created using minimal raw materials in huge numbers, which affect the environment globally (Butt et al., 2024). Secondly, products are purchased, consumed, and disposed of rapidly, resulting in huge packaging waste and discharges into the environment. The need for evaluation of customer environmental concerns and the development of marketing strategies for realizing these needs are becoming increasingly important, largely as a result of legislation, but the role of customer acceptability has not been directly considered in research (Prakash et al., 2024).

The role of supply chains is, therefore, of major interest in this work, with explicit control by these chain participants of what is often the last element of the supply chain (Grover et al., 2019). Finally, the FMCG sector impacts every aspect of modern living, personal, professional, and lifestyle choices, and captures the most intimate details of any culture, rendering the results and findings of this study invaluable in several distinct directions (Zhang & Dong, 2020). By providing producers and consumers with verifiable empirical evidence about their attitudes, it is hoped that it will provide key stakeholders with valuable insights on how to improve environmental, economic, and business survival (Ahmed et al., 2024).

It is salient that this study addresses gaps in the body of literature on FMCG packaging environmental protection and draws attention to the role and potential contribution of individuals and business supply chains in bringing the Earth to a more sustainable state. The lack of investigation of public attitudes, the consumer's role within the supply chain system, and the contribution of businesses, particularly in terms of marketing strategies, has, to date, hampered the realization of business and marketing potential (Boz et al., 2020). The results of this work are expected to make a unique contribution to the packaging and sustainable business literature for managers. Although many recent studies have focused on important promotional aspects of packaging, the primary function of packaging is protection, transportation of purchases, storage, ease of use, and disposal of packaging waste. Cost factors appear to override consumer satisfaction regarding these attributes (Elkaliny et al., 2024).

Literature Review

Sustainable Packaging

Sustainable Packaging in FMCG Supply Chains

The FMCG industry and its supply chains are growing fast. As a result, the negative impacts of packaging are increasing every minute with increased product sales. To overcome these sustainability challenges, the sustainable packaging of fast-moving consumer goods has a major role to play in the current complicated supply chains. Currently, the main obstacles to the implementation of sustainable packaging concepts are the lack of interaction around the subject between different stakeholders and the existence of different definitions of the sustainable packaging concept (Wandosell et al., 2021). To bridge the gap or to bring the different understandings of sustainable packaging in line, stakeholders need to assess and study its concepts and applications.

Global companies have taken some initiatives to move toward the sustainability concept of FMCG by reducing their gross emissions and carbon emissions (Rizos et al., 2019). A significant percentage of company packaging uses non-renewable resources. The corporate sector has long realized the importance of addressing the negative effects of packaging on the environment and the importance of the packaging model to the consumer. The real vision of the industry is to build more recycling networks for used products and unite corporate players to build collective attitudes. The FMCG industry is following the trends by creating new ways of selling products and converting them into new indirect models. The attached models help us understand the importance of sustainability of materials and become attractive in package design and advertising (Sharma & Sagar, 2023).

Consumer Behavior and Acceptance of Sustainable Packaging

It is essential to understand the role consumption and consumer behavior play in the market to understand sustainable packaging. An analysis of the drivers of the adoption of sustainable packaging should analyze what consumers actually do and how they might prioritize between options afforded by different packaging systems, as consumers have limits imposed on what they can do with their time and money. The study of the consumer is very important, and FMCG packaging has a significant role to play. Without an understanding of the beliefs and attitudes that consumers have toward packaging, it would not be possible to realize such important requirements (De Canio et al., 2024).

Moreover, by introducing marketing strategies linked with sustainable packaging, it is possible to have a positive impact on the environment. The fast-moving consumer goods market is frequently targeted with innovation as today's contemporary lifestyles demand the maximum use of time via effective and useful packaging. The configuration of sustainable packaging is wide, and society currently characterizes it in five areas. The widespread use of biodegradable and compostable materials in packaging across all consumption sectors plays a significant role in making a shift from the current non-degradable systems to the preservers of nutrient storage systems. Concentrating on sustainable commitments by businesses, the report reads the level of association FMCG brands have towards both the intentions and real commitments to the use of responsibly sourced packaging with sustainable materials (Abatan et al., 2024).

Marketing Strategies for Sustainable Packaging

Packaging is critical for any kind of business. A customer's buying decision can easily be impacted by the packaging of a product. Marketers use packaging to create brand familiarity, raise brand credibility, and enhance brand esteem. Lately, companies have strived to use sustainable packaging for their products. There is an ongoing rumor that having sustainable packaging will propel sales growth and customer satisfaction (Vougioukas, 2024). However, little research has been conducted on getting the customers' reaction to the use of sustainable packaging for these fast-moving products. Finding out customers' notions regarding these types of packaging could steer companies in making decisions and developing strategies. One should remember that getting the customer's opinion on this will help companies take an extraordinary step toward environmental safety (Van Tuan et al., 2022).

Consumer Acceptance of Sustainable Packaging in Saudi Arabia

The consumer acceptance of green purchases is found to be rather high in the Kingdom of Saudi Arabia, regardless of a demonstrated lack of understanding regarding what is classified as environmentally friendly. Therefore, it is important for both consumers and retailers to be introduced to environmentally friendly packaging, monitored for both willingness and understanding over time (Abass et al., 2024; Zhang & Dong, 2020). Subsequently, responsible marketing, which requires customer education, is still essential to consumers of high-end products that exceed what they traditionally receive (Grover et al., 2019). Hence, this research also identifies recommendations for responsible marketing to add to the literature on ecological awareness in the Kingdom of Saudi Arabia. Sustainable packaging is a small part of green marketing, but it can affect the environment. It means the packing scheme is designed to satisfy both the needs of the product and those of the environment (Mohammed, et al., 2020).

Researchers have found that there is a high level of green concern both in practice and economically; otherwise, green items cannot enter the market quickly (Ahmed et al., 2024). This research was predominantly conducted within the past two years when the green concern was high. It is worth mentioning that it is crucial to understand the response of the terminal customer to this impact, and the next two years of statistics will assist in finding the degree of knowledge and the concerns expressed regarding green packaging (Van Tuan et al., 2022). Consumers are also very confused by the distinction between ecologically friendly and certified products. Organizers, in accordance with the consumer approach, should collaborate with regulators to introduce transparency (Prakash et al., 2024). These activities would help customers obtain prior information about these products.

Factors Influencing Consumer Behavior

Various social, demographic, economic, and psychographic factors have been found to influence residents' environmental behavior and are differentiated toward their acceptance of green products. This has been confirmed in developed countries. Furthermore, such influence has been found to differ among residents in developed, developing, and emerging countries rather than from one country to another. In particular, Singapore residents have demonstrated lower acceptance of green products due to a lack of knowledge about the environmental impacts compared to both developed and developing countries (Giri & Chaulagai, 2024). Environmental behavior in the last farm residents is becoming more and more in line with the so-called green marketplace, and the green wave has arrived. However, this behavioral change is more often related to purchasing and consumption decisions, whereas environmentally friendly practices are mostly reduced to waste separation and reducing quantity, especially in emerging countries (Boz et al., 2020).

Countries follow a linear model that enables consumers to become active participants in the greening of specific business sectors and thus in the greening of businesses. It has been proven that ecological consciousness regarding packaging raises consumer questions about the quantities and the potential environmental harm of the packaging, and those perceptions will force the packaging markets to adapt. Social marketing could accelerate this process and implore consumers to demand environmentally friendly packages (Cammarata et al., 2024). It has led environmentally conscious consumer groups and individuals to pressure the food and hypermarket industry to adopt the trend of utilizing packages with some degree of recyclability and sustainability (Makowska et al., 2024). Business approaches that can be implemented need a dual focus on green food packaging to decrease lifecycle impacts and persuade clients to accept such packaging, preferably with a higher price (Van Fan et al., 2024). Companies have to introduce marketing strategies that meet consumers' initial requirements and inform them why such products are eco-friendly. Promoting the possible nature of the solutions requires not just promoting an understanding of sustainable fuels but also requires knowledge and minimizing risk. This awareness may be enhanced through the use of various strategies that build the theme of eco-friendly, sustainable packaging (Fletcher et al., 2024).

Marketing Strategies for Sustainable Packaging in the Saudi Arabian FMCG Sector

On a global scale, products from the FMCG sector might be carriers of sustainable packaging, but they do not always result in high acceptance rates due to inadequate knowledge from the consuming public (Hanaysha, 2023). Marketing strategies should place the consumer at the center, upholding clear, transparent communication on related environmental advantages for branding, combined with e-commerce activities in the digital age to increase consumers' added value (Alghamdi, 2023). This is where businesses should adopt a proactive role and take advantage of the opportunities associated with a product life cycle approach, which also contributes significantly to making overall supply chains in the FMCG segment more sustainable (Ibrahim & Shirazi, 2021).

Saudi Arabia is on the way to implementing the Saudi Arabian Vision 2030. Changes result in a higher level of sophistication in both industry and society, bringing increasing levels of waste management, household waste separation, and recycling, as well as value provision (Rahman, 2022; Abunar & Alam, 2020). In the context of developing transformative future conditions, businesses have the chance to implement the concept of sustainable packaging, unifying economic, environmental, technical, and social requirements in moving packaging to more sustainable, circular systems (Mostafa, 2021). Its advantages are multifaceted: it stands for the well-being of people, the planet, and companies, freeing packaging from the negative impacts of particular geographic regions and contributing to the rise of the urban middle class worldwide, including the Gulf countries and Saudi Arabia (Dantas et al., 2023).

Product Design and Innovation

Increasing the efficiency of existing food wastage policies and resources. Ongoing efforts include enhancing business investor environmental management support and harmonizing business and management education while supporting other relevant organizations. Addressing water scarcity involves enhancing collaboration between government and industries in water risk management (Yusuf & Lytras,

2023). Addressing drug benefits and degradation requires improving pharmaceutical management in the environment. Addressing scarce resources in the food industry involves implementing sustainability approaches at the business and product level (Khayyat et al., 2024). Ongoing improvements in land use focus on enhancing agricultural land practices through stakeholder cooperation.

Designing consumer-accepted and innovative packaging is one of the most important factors associated with sustainable supply chain management, as it aims to reduce the resources consumed in delivering products to customers (Alghamdi & Agag, 2024; Ahmed & Alzahrani, 2024). Inefficient distribution, poor design, and breakage may create waste. Therefore, the redesign and improvement of product packaging are crucial for supply chain efficiency, which enhances environmental performance by delivering safe products without breakages and wastage. In this regard, discussions on business models highlight how leading firms can design ecosystem spaces, value the capture of innovative ideas from consumers, and select various design and innovative options such as crowd or local sourcing and the competing-for-consumption space (Radwan et al., 2024).

By developing a mass product model for companies to design a new way to compete for traditional competencies, leading firms define the ecosystem space and provide a platform for creative consumers, supporting producers in selecting and creating innovative assembly (Almulhim & Al-Saidi, 2023). Based on a variety of success stories, it may be argued that ecosystem efforts have strategic relevance and challenges, outlining a future research agenda for understanding ecosystem strategies for design and innovation (Ben Belgacem et al., 2023). Furthermore, packaging, as a tool that provides communication, differentiation, and brand personality, increasingly contributes to the overall product functions. Consumers select products based on the knowledge gained from the brand name, product category, cost, and packaging (Wasiq et al., 2023). This presents a significant challenge for manufacturers and marketing managers, who are trying to optimize economics and logistics while creating packaging designs that are unique, practical, and eco-friendly; typically, this is contrary to saving money and adhering to budget limitations.

Communication and Branding Strategies

Previous studies have suggested that environmentally friendly branding should be combined with general and product-specific environmental claims or certification logos recognized by the target market to influence the purchasing behavior of consumers (Mathew & Alkhamis, 2024). Such environmentally friendly branding practices help increase consumer awareness and confidence in environmentally friendly packaging. Product-specific information about the environmental benefits and the type of eco-friendly packaging is more likely to be considered than generalized information. In addition, claims about sustainability benefits, such as reusable packaging, recycled packaging, eco-friendly ingredients, and fair trade practices, can lead to a positive impact (Branca et al., 2024).

When companies incorporate environmental claims on the packaging, they should make sure that the contents are consistent with the message. If there is a perception of exaggeration of performance or confusion about the meaning, the credibility and trust that would be established may disappear, and, as a result, consumers may use negative word of mouth to boycott products (Khayyat et al., 2024).

Environmental Impact Assessment

Life Cycle Assessment (LCA)

Life Cycle Assessment (LCA) is a method to comprehensively assess and quantify potential environmental impacts through at least four distinct phases. LCA is particularly useful as a tool to balance choices between major changes in FMCG products and to assist with marketing strategies (Jain et al., 2021). LCA has broad acceptance among larger corporations, particularly in service quality and brand premium, but is generally considered complex, time-consuming, and costly for smaller businesses (Alsabri et al., 2021). Awareness of established FMCG products afterward entails substantial customary marketing effort; hence, the balance is between a positive environmental impact orientation and a marketing effect balancing to at least zero with

existing products, along with additional time and marketing necessity to create awareness and attract customers (Soliman & Bahareth, 2023).

As a conceptual comparison, subsequent chain businesses have large effects on previous chain requirements, both in terms of recognition, material, and environmental impacts. The assessor may select environmental test considerations, usually according to project decision timing, to utilize traditional LCAs. Non-incorporation risks occur and are not recognized, decreased by more than 50%. Any potential commercial revelations from combining traditional with non-incorporation considerations are reduced by the LCA environment, by rivals and other stakeholders to adjust sustainability criteria. Sequential chains within the LCA do evolve but necessarily employ the same levels and tools of sustainable knowledge (Vidregar et al., 2021).

Carbon Footprint Analysis

Zero Fossil Material Production (ZFMP) technology is applied for producing Biodegradable Polymer-based Material Fibers (BPMFs) as raw materials with preferred physical and mechanical properties (Poddar et al., 2024). In this step, no external materials, especially chemicals, are used in the production of BPMFs, which reduces the carbon footprint related to materials and product production. Research indicates that the carbon footprint over time of the Sustainable Resource Plasma-Thermal Recycling – Mechanical Processing Energy System (SR-PTR-MPES) end types is reduced compared to conventional waste-to-energy technology, landfill disposal, and composting (Quicker et al., 2020). Furthermore, the carbon footprint of the process depends primarily on the required temperature, pressure, and feedstock, making it crucial to understand the impacts of the types of parameters and their possible combinations (Correa et al., 2019).

Eventually, the carbon footprint is determined in large part by the need for optimal mass yielding. These contribute significantly to reducing carbon footprints at the highest internal rate of return in a circular carbon competitive economy for the described green processes and propose to direct policy preferences in favour of the lowest Greenhouse Gases (GHG) emissions (Chen et al., 2023).

Theoretical Framework

The product life cycle theory was founded on the fact that all products, at any time, endure a universal lifetime that is divided into various stages, each comprising characteristics, costs, and demand. This concept is based on four stages describing all products: introduction, growth, maturity, and decline (Ren et al., 2024). Corporations appear to possess pioneering leadership capital at that stage since they have stronger market dominance. It operates in an increasingly competitive field, where the availability of good substitutes leads to measurement and quality definitions and fruitful marketing endeavors. Generally speaking, the key to profit and development within the domestic enterprise lies in the process aligned with the pursuit of new products that coincide with the evolutionary staging of the product's lifecycle (Kong et al., 2022). The introduction of the latest technologies into an oriented environment is not the exception.

On the other hand, the Value Chain Theory indicates that the product goes through numerous procedures and moves through the organization's associated commodity chain before any product can be purchased by the customer (Vougioukas, 2024). Processes and projects designed to introduce us to the importance of the focusing organization are communications, selling, and preparation. The activities in relation to a particular trademark or commercial enterprise form the production responsibilities and services of such elements. Administering and coordination are the supportive functions of each business. These structural categories determine a company's market entry restrictions and improve its performance on the basis of specialization and the shared creation of important business functions (Wandosell et al., 2021).

Arguably, hypermarket retailers' roles in sustainable packaging are the most important in the integrated supply chain layer. Hypermarkets, shopping malls, and bazaars, being consumer-facing organs of supply chain management, are the most important mechanisms of direct communication between organizations within the supply chain and consumers (Kariuki et al., 2024). The effects of sustainable packaging can be created by the purchasing decisions of such organizations, marketing activities, collection, and logistic

operations in waste consumption. These organizations hold the most critical responsibility and may implement long-term corporate performance and sustainability policies in the supply chain.

Moreover, the Green Consumer Role Purchasing decisions taken by green customers can alter a business. Such individuals take ecological matters into account during selection decisions. A substantial contribution can be made by parties that have vital leisure time to waste from consumption for greener operations and the continued occupation of sustainable constructs (Alhamad et al., 2022). Data presents simple and useful information about consumer values and ethics. Changes in environmental policies reveal the validity of this new market section. Policies on customers and donors indicate that although parties could have access to better care for donations and initiatives that mitigate waste are required by providers, the continued existence of activities that suppress and meet basic human needs should be at the discretion of potential e-commerce businesses.

Conceptualizing Sustainable Packaging in Supply Chains

Nowadays, corporations invest a large amount of resources into particular research and development activities related to sustainable development. Indeed, sustainable performance has become a principal part of overall performance for many global companies, particularly because of the increasing globalization of the industry (Mukonza & Swarts, 2020). One area in relation to sustainable development that is of particular importance to companies is packaging, which has both economic and environmental significance. Thus, some companies are now involved in the so-called greening of packaging (Abunar & Alam, 2020).

This study aims to investigate the impact of sustainable packaging in the FMCG sector within Saudi Arabia, focusing on consumer acceptance and marketing strategies that enhance the environmental impact. The conceptual model proposes that environmental concerns, cost awareness, and positive portrayal of sustainable packaging influence consumer behavior regarding sustainable packaging.

Table 1. Research Variables

Variable	Description	Measurement
Independent Variables		
Environmental concern	This variable refers to consumers' awareness of and concern for environmental issues, especially those related to packaging.	This will be measured through survey questions assessing the level of agreement on statements like "I am concerned about the environmental impact of packaging" using a 5-point Likert scale.
Cost Awareness	This variable refers to consumers' sensitivity to the cost implications of sustainable packaging.	It will be measured using survey items that assess the perceived cost of sustainable packaging and its impact on purchasing decisions using a 5-point Likert scale.
Positive Portrayal of Sustainable Packaging	This variable captures how the marketing of sustainable packaging influences consumer perceptions.	Survey questions will evaluate how effective marketing campaigns and branding strategies have been in presenting sustainable packaging positively using a 5-point Likert scale.
Dependent Variables		
Satisfaction with Sustainable Packaging	This variable assesses consumer satisfaction levels related to the use of sustainable packaging in FMCG products.	Questions will measure satisfaction with the quality, design, and eco-friendliness of sustainable packaging using a 5-point Likert scale.
Demand for Sustainable Packaging	This variable captures the willingness of consumers to purchase products with sustainable packaging.	It will be measured by asking consumers about their likelihood of choosing products with sustainable packaging over conventional options using a 5-point Likert scale.
Marketing Strategies for Sustainable Packaging	This variable involves strategies used to promote sustainable packaging, focusing on the communication and	Survey questions will assess consumer perceptions of marketing campaigns for sustainable packaging using a 5-point Likert scale.

	branding tactics that influence consumer behavior.	
Public Influence on Sustainable Packaging	This variable evaluates how public awareness and advocacy for sustainable packaging impact consumer behavior.	It will be measured by questions related to the influence of public campaigns, social media, and word-of-mouth on consumer decisions using a 5-point Likert scale.

Source: Authors' own

Hypotheses

The increasing emphasis on sustainability globally, particularly in emerging markets such as Saudi Arabia, has significantly reshaped consumer behavior. Factors such as environmental concerns, cultural values, and cost-related considerations now play a pivotal role in influencing purchasing decisions. Sustainable packaging, as a core component of green supply chains, addresses environmental, economic, and social dimensions of consumer demand, positioning it as a critical driver of this transformation. Thus, this research attempted to examine the drivers of consumer behavior in relation to sustainable packaging in FMCG sectors within Saudi Arabia and identifies how environmental concerns, positive portrayals, cost awareness, and cultural values shape satisfaction, demand, marketing strategies, and brand loyalty. As shown in Figure 1: a proposed relationship between these factors is hypothesized for an investigation into how sustainable practices impact consumer loyalty and advocacy within the FMCG sector (Almohammadi & Abdulghaffar, 2022; Ghali-Zinoubi, 2022; Kaur et al., 2022; Prakash et al., 2024; Alsulami et al., 2024).

The following 12 hypotheses were formed to guide the present study:

- H1: Environmental concerns are positively associated with (1) satisfaction with sustainable packaging; (2) the demand for sustainable packaging; (3) marketing strategies for sustainable packaging; and (4) public influence on sustainable packaging.
- H2: Cost awareness is positively associated with (1) satisfaction with sustainable packaging; (2) the demand for sustainable packaging; (3) marketing strategies for sustainable packaging; and (4) public influence on sustainable packaging.
- H3: Positive portrayal of sustainable packaging is positively associated with (1) satisfaction with sustainable packaging; (2) the demand for sustainable packaging; (3) marketing strategies for sustainable packaging; and (4) public influence on sustainable packaging.

The corresponding null hypotheses (H0) are that the independent variables (environmental concerns, cost awareness, and positive portrayal of sustainable packaging) are not associated with each of the four dependent variables.

Conceptual Framework

A pictorial illustration of the conceptual framework is presented in Figure 1. The three independent variables are presented on the left, and the four dependent variables on the right. The 12 hypothesized associations are depicted by the lines mapping the two domains.

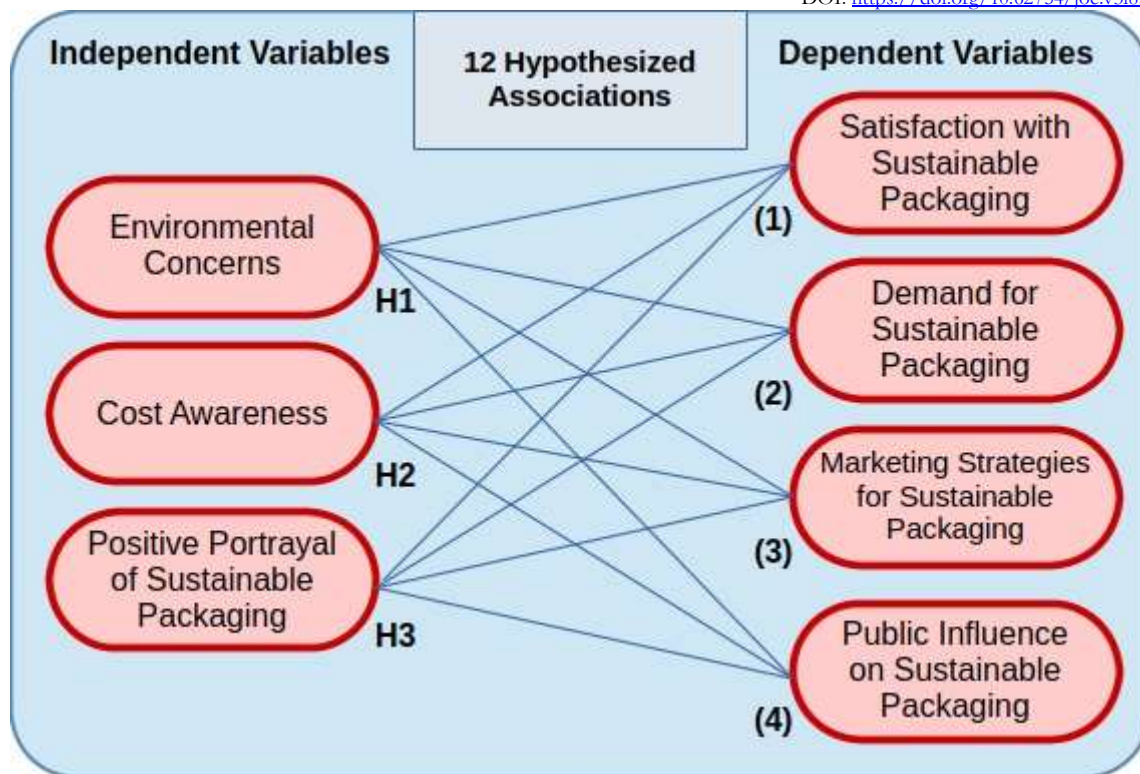


Figure 1. 12 Hypothesized Associations

Research Methodology

Research Approach

This study adopted a quantitative research methodology, employing a deductive approach to test predefined hypotheses and examine the relationships between sustainable packaging, consumer acceptance, and marketing strategies. The explanatory nature of this research seeks to uncover causal relationships and associations, providing valuable insights into the factors driving consumer behavior in Saudi Arabia's FMCG sector.

Research Design

The research design was cross-sectional, capturing data at a single point in time to analyze the interactions between key variables. The study focused on assessing Saudi consumers' attitudes, experiences, beliefs, and intentions regarding sustainable packaging within the FMCG sector. Data collection was conducted via a structured questionnaire distributed through social media platforms to ensure broad accessibility. The questionnaire, designed in English, was user-friendly and clearly structured, enabling respondents to provide meaningful insights into their purchasing intentions and preferences for sustainable packaging.

Sampling Technique

A combination of snowball and convenience sampling techniques was employed to recruit participants. These methods facilitated efficient data collection from Saudi Arabian e-commerce consumers, with a specific focus on individuals familiar with brands carrying the "green label." Snowball sampling leveraged participant referrals to reach a broader audience, while convenience sampling targeted accessible individuals within the target population, ensuring a diverse and relevant sample.

Sample Size

Based on guidelines by Ndesaulwa et al. (2017), a minimum sample size of 289 respondents was required to achieve a 95% confidence interval with a 5% margin of error. This study exceeded that threshold, including a total of 346 participants, thereby enhancing the robustness and representativeness of the data. The chosen sample size was sufficient to accurately reflect the opinions and behaviors of the target population, supporting the generalizability of the findings.

Unit of Analysis & Target Population

The study adopted and extended three sustainability theories. Five sustainability theories are relevant to this study. They are stakeholder, environmental performance, quality, and risk theories that collectively propose strategic sustainable supply chain management (SSCM) as a practical framework for supply chain performance and business continuity. Additionally, credible attribute and ranking models were developed to solve the problem of the increased significance of e-commerce as part of FMCG distribution operations and the consumer-perceived product packaging strategies concerning sustainable supply chain operations in Saudi Arabia.

The unit of analysis for this research was the individual, targeting both e-commerce companies and consumers in Saudi Arabia, with the aim of gathering insights on sustainable product packaging. By applying partial least squares structural equation modelling (PLS-SEM) to survey data from Saudi consumers, this study demonstrates that environmental concerns drive satisfaction and demand, while positive portrayals influence advocacy and consumer perceptions. The survey was conducted on a platform that facilitated efficient experimental sessions, either in person or remotely, allowing for diverse question formats beyond simple "yes" or "no" responses. This included summary reports and plot-based analysis to enhance the depth of data analysis. The survey included various question types, information treatments, and incentive mechanisms to ensure credible and consistent responses. Additional contextual information was provided to participants to support reliable decision-making and capture response heterogeneity, thereby increasing the validity and relevance of the study's findings.

Measurement of Scales

The study adopted and extended three sustainability theories. Five sustainability theories are relevant to this study. They are stakeholder, environmental performance, quality, and risk theories that collectively propose SSCM as a practical framework for supply chain performance and business continuity. Additionally, credible attribute and ranking models were developed to solve the problem of the increased significance of e-commerce as part of FMCG distribution operations and the consumer-perceived product packaging strategies concerning sustainable supply chain operations in Saudi Arabia. The reliability and validity of the measurement scales were thoroughly tested during the survey design phase, ensuring alignment with the study's objectives and hypotheses. This methodological rigor underpins the credibility of the findings and supports the broader academic contribution of the research.

Data Analysis and Results

Demographic Analysis

Gender

Descriptive statistics were used to analyze the gender distribution among respondents. As shown in Table 2, the sample achieved a balanced representation, with 173 male respondents (50%) and 173 female respondents (50%). This equal distribution ensures that the findings reflect a gender-neutral perspective on consumer behavior toward sustainable packaging in Saudi Arabia.

Table 2. Descriptive Statistics for Gender

Gender	Frequency	Percent	Valid percent	Cumulative percent
Male	173	50.00%	50.00%	50.00%
Female	173	50.00%	50.00%	100%
Total	346	100%	100%	

Age

Descriptive statistics for the frequencies test were used to determine the respondents' age categories, and they were divided into four groups. Table 3 clearly shows the frequencies of the age groups. Table 3 shows that there are 69 respondents whose age group was 18 to 20 years, 149 respondents belonged to the age range of 20 to 30 years, 93 respondents aged between 25 and 29, and 35 respondents belonged to others (not specified).

Table 3. Descriptive Statistics for Age

Age Group	Frequency	Percent	Valid Percent	Cumulative Percent
18-20 years	69	19.94%	19.94%	19.94%
20-30 years	149	43.10%	43.10%	63.04%
25-29 years	93	26.88%	26.88%	89.92%
Other (not specified)	35	10.08%	10.08%	100%
Total	346	100%	100%	

Frequency of Purchasing FMCG Products

Out of the 346 respondents, 87 reported purchasing FMCG products on a daily basis, making up approximately 25% of the sample. A larger group of 138 respondents, or 40%, indicated they purchase FMCG products weekly. Meanwhile, 69 respondents, representing 20% of the total, stated they make these purchases on a monthly basis. Lastly, 52 respondents, or around 15%, reported rarely purchasing FMCG products. Table 4 indicates the frequency of purchasing FMCG products.

Table 4. Descriptive Statistics for Frequency of Purchasing FMCG Products

Purchasing Frequency	Frequency	Percent	Valid Percent	Cumulative Percent
Daily	87	25.14%	25.14%	25.14%
Weekly	138	39.94%	39.94%	65.08%
Monthly	69	19.94%	19.94%	85.02%
Rarely	52	15.04%	15.04%	100%
Total	346	100%	100%	-

Data Analysis

The collected data underwent rigorous treatment using appropriate statistical software to provide illuminating insights into the research hypotheses. This section outlines the analysis methods used and the operationalization of the main constructs. Objectives of the study were achieved in two phases:

Phase 1: Descriptive Data Collection

The primary purpose of the first phase was to gather descriptive data for each item in the consumer questionnaire. Measures that respondents were unaware of or those that scored low on importance and

agreement were excluded from subsequent analyses of covariance. The descriptive statistics gathered guided this selection process. The state of awareness was assessed using agreement items to measure the level of sustainable packaging awareness.

Phase 2: Effects of Sustainable Packaging Awareness

The second phase investigated the effects of sustainable packaging awareness on firm and product perceptions. Only measures that met the threshold for inclusion were considered for analysis in this phase. Data analysis in the second phase was conducted using linear or non-linear weighted least squares models.

This phase tested the 12 research hypotheses specified in Section 11977. The basic process involved incorporating the main effect interaction via dummy variables into the decision calculus of each descriptive choice model. Four instances of each model were performed, creating four replicates for each of the three poses for each respondent on each day for each product. The within-subject error provided insights into the nature of the interaction.

Statistical Methods

A combination of descriptive and inferential statistics was employed to analyze the data. Descriptive statistics provided an overview of demographic and behavioral trends, while inferential statistics enabled hypothesis testing and the exploration of relationships between variables. Advanced modelling techniques, such as the compressed non-compensation method, were utilized to evaluate the intent and intensity of responses, ensuring robustness and precision in the analyses.

Statistical Significance

All tests were conducted at a 99.9% confidence level. Both grouping and analytical techniques were employed to facilitate the identification and articulation of theoretical, academic, and managerial materiality.

Hypothesis Testing

Table 5 presents the results of the chi-squared test of independence for each of the 12 hypotheses.

Table 5. Results of the Chi-Squared Test of Independence

Dependent variable	Independent variable		
	Environmental concerns (H1)	Cost awareness (H2)	Positive portrayal of sustainable packaging (H3)
(1) Satisfaction with sustainable packaging	$\chi^2=15.34$ df=5 $p=0.009 \leq 0.05$ \therefore Ho is rejected.	$\chi^2=22.47$ df=5 $p=0.08 > 0.05$ \therefore Ho is accepted.	$\chi^2=27.32$ df=5 $p < 0.001 \leq 0.05$ \therefore Ho is rejected.
(2) Demand for sustainable packaging	$\chi^2=12.78$, df=3 $p=0.004 \leq 0.05$ \therefore Ho is rejected.	$\chi^2=9.03$ df=5 $p=0.11 > 0.05$ \therefore Ho is accepted.	$\chi^2=5.12$ df=5 $p=0.40 > 0.05$ \therefore Ho is accepted.
(3) Marketing strategies for sustainable packaging	$\chi^2=10.24$ df=5, $p=0.07 > 0.05$, \therefore Ho is accepted.	$\chi^2=6.29$ df=8 $p=0.61 > 0.05$ \therefore Ho is accepted.	$\chi^2=12.49$ df=8 $p=0.13 > 0.05$ \therefore Ho is accepted.
(4) Public influence on sustainable packaging	$\chi^2=6.29$ df=8 $p=0.61 > 0.05$, \therefore Ho is accepted.	$\chi^2=10.14$ df=8 $p=0.25 > 0.05$ \therefore Ho is accepted.	$\chi^2=21.90$ df=8 $p=0.007 \leq 0.05$ \therefore Ho is rejected.

Furthermore, Figure 2 presents the relationships between environmental concerns, cost awareness, and the positive portrayal of sustainable packaging with various dimensions of consumer behavior.

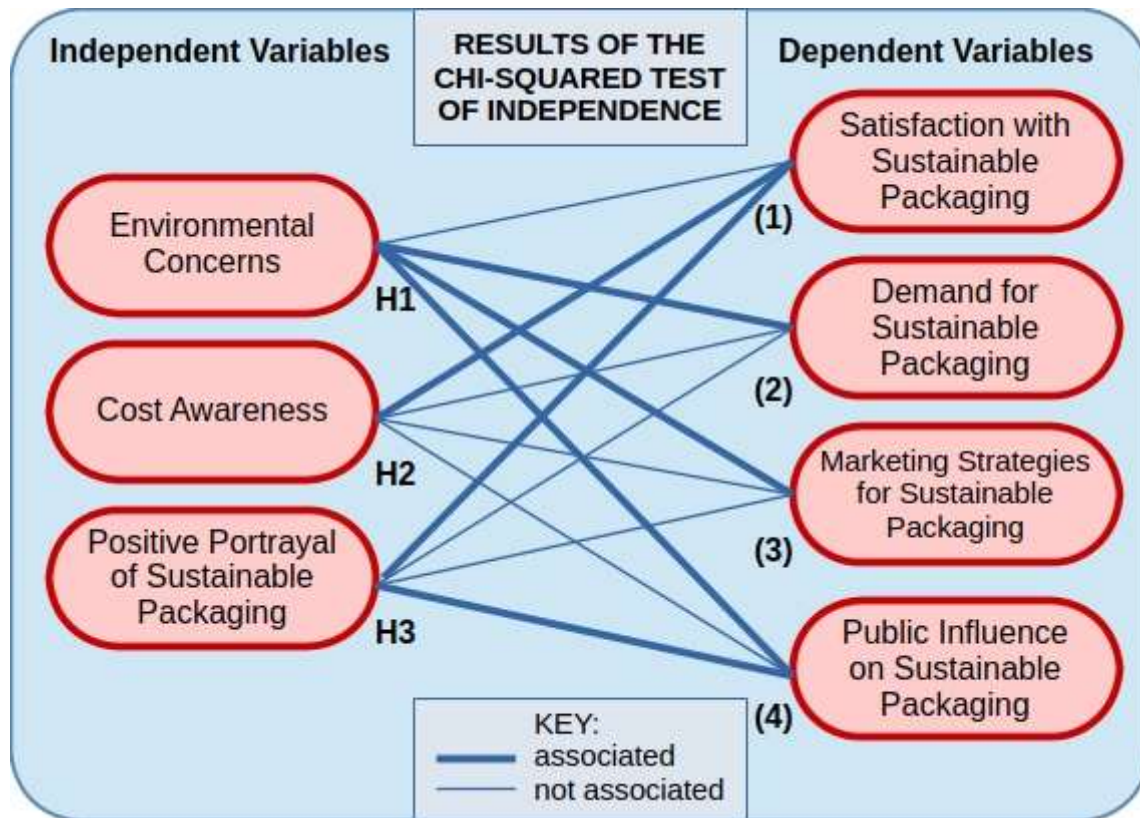


Figure 2. Diagrammatic Illustration of The Study's Results, Showing Significant and Non-Significant Associations

The findings provide key insights into these dynamics:

- Environmental concerns play a pivotal role in influencing both demand for sustainable packaging ($\chi^2=12.78$, $p=0.004$) and satisfaction with it ($\chi^2=15.34$, $p=0.009$). This reinforces the notion that consumers prioritizing environmental issues are more inclined to support sustainable packaging, emphasizing the importance of incorporating ecological considerations into corporate strategies. However, environmental concerns did not significantly impact marketing strategies ($\chi^2=10.24$, $p=0.07$) or public influence ($\chi^2=6.29$, $p=0.61$). This suggests that while consumers may personally value sustainability, their environmental concerns do not necessarily translate into active advocacy or influence broader marketing outcomes.
- Cost awareness, on the other hand, did not exhibit significant effects on demand ($\chi^2=9.03$, $p=0.11$) or satisfaction ($\chi^2=22.47$, $p=0.08$). This indicates that while cost considerations remain relevant, they are not the primary drivers of consumer preferences for sustainable packaging. Similarly, cost awareness had no substantial impact on marketing strategies ($\chi^2=6.29$, $p=0.61$) or public influence ($\chi^2=10.14$, $p=0.25$). These findings highlight a potential disconnect in consumer understanding of the long-term economic advantages of sustainable packaging, which could benefit from targeted educational initiatives.

- The positive portrayal of sustainable packaging emerged as a critical determinant of satisfaction ($\chi^2=27.32$, $p<0.001$) and public influence ($\chi^2=21.90$, $p=0.007$), demonstrating the effectiveness of strong branding and communication in shaping consumer perceptions and advocacy. However, it showed no significant impact on demand ($\chi^2=5.12$, $p=0.40$) or marketing strategies ($\chi^2=12.49$, $p=0.13$). This suggests that while positive portrayals enhance consumer satisfaction and advocacy, they are insufficient on their own to drive purchasing behavior, indicating the necessity for comprehensive, multi-faceted approaches.

Discussion of the Findings

The current study's findings bring interesting facts that significantly contribute to the existing literature. The analysis of Saudi Arabian consumers' behavior towards sustainable packaging reveals significant insights into the roles of environmental concerns, cost awareness, and positive portrayals. Environmental concerns are a key driver of demand and satisfaction, although other factors (i.e., cost awareness and positive portrayal) also contribute to consumer decisions, as supported by the acceptance of three H1 hypotheses (H1.2-4) compared to only one or two for H2 and H3. However, the analysis revealed that environmental concerns did not have a significant impact on satisfaction with sustainable packaging (H1.1). These findings confirm Abunar & Alam's (2020) observation that environmental concerns play an important role in influencing consumers. This has implications for marketing strategies related to sustainable packaging, as it suggests a need to focus on such concerns when devising marketing strategies.

Moreover, cost awareness did not have a significant impact on the demand for sustainable packaging, nor did it significantly influence marketing strategies or public influence. It was only found to be associated with satisfaction with sustainable packaging (H2.1). This suggests that while cost is a factor, it may be secondary to other drivers, such as environmental concerns or brand perception in shaping consumer behavior towards sustainable packaging.

The positive portrayal of sustainable packaging was found to significantly influence consumer satisfaction with (H3.1) and public influence on sustainable packaging (H3.4). This suggests that the presentation of a product through branding, advertising, or other communication efforts can shape consumers' view of sustainability and increase their willingness to support sustainable practices. However, positive portrayal did not lead to a significant change in demand for sustainable packaging or influence marketing strategies. These findings indicate that while consumers' perceptions of sustainable packaging are positively influenced by its portrayal, it might not necessarily translate into actual purchasing behavior or influence broader marketing strategies. The distinction between perception and behavior highlights that consumer awareness and attitude toward sustainability are important but do not always align with their purchasing choices.

The findings from this study offer significant insights into the role of environmental concerns, cost awareness, and positive portrayals in shaping consumer behavior towards sustainable packaging in Saudi Arabia. The analysis reveals that environmental concerns are a key driver of demand and satisfaction for sustainable packaging, supporting the research objective of identifying key factors influencing sustainable supply chains. Environmentally conscious consumers are more likely to appreciate and opt for sustainable packaging, demonstrating the importance of environmental factors in shaping consumer preferences.

However, cost awareness had a relatively minor impact on consumer demand, suggesting that while price remains a factor, it is secondary to environmental concerns when it comes to sustainable packaging. This finding indicates a more complex dynamic, where environmentally motivated purchasing behaviors are not significantly hindered by price sensitivity, supporting the conclusion that cost is not a primary barrier for consumers choosing sustainable options.

The positive portrayal of sustainable packaging was found to significantly influence public advocacy and consumer perceptions of sustainability. Positive branding, advertising, or communication strategies can shape how consumers view sustainability and increase their willingness to support sustainable practices. However, the direct effect of positive portrayal on consumer demand was relatively minor, suggesting that

more intensive marketing strategies are required to convert positive perceptions into actual purchasing behavior. In this context, consumer education on the tangible benefits of sustainable packaging, including cost savings and environmental contributions, could play a key role in enhancing demand.

Cultural values, as reflected in the Saudi Arabian socio-economic context, also emerged as a significant factor in consumer behavior. This study highlights that aligning sustainable packaging initiatives with local cultural norms can improve acceptance and advocacy for sustainable practices. The findings suggest that FMCG companies should tailor their branding and communication strategies to resonate with local cultural values in order to boost consumer support for sustainable packaging initiatives. Based on these findings, FMCG companies are encouraged to transition toward sustainable packaging and focus on developing closer connections with their consumers. This is particularly important as the study highlights a gap in consumer knowledge regarding the benefits of sustainable packaging. By investing in consumer education and awareness, FMCG companies can secure long-term success in promoting sustainable packaging, ensuring that the full benefits of sustainability are communicated effectively to consumers.

The results also reveal a significant shift in consumer behavior, with a new group of consumers emerging who value sustainability more than previously expected and are less price-sensitive than anticipated. This indicates that consumer attitudes are evolving, and there is a growing demand for sustainability-driven products. However, a dissonance exists between consumers' positive attitudes toward sustainability and their purchasing behavior, emphasizing the need for FMCG companies to bridge this gap by integrating corporate social responsibility (CSR) into their organizational culture. Companies that align their practices with CSR are in a strong position to build trust and loyalty among environmentally conscious consumers, gaining a competitive edge in the market.

Conclusion and Recommendations

Investigations into Saudi Arabian consumer environmental perceptions are limited, with most available research focusing on industries rather than linking these perceptions with Green Supply Chain Management (GSCM) strategies. For FMCG companies, it is essential to incorporate consumer feedback through surveys when designing packaging or developing GSCM strategies. A significant finding of this study is that unlike in other countries studied in the literature, Saudi consumers perceive the shelf presence of green claims as important. However, environmental concerns do not always translate directly into purchasing behavior. This study contributes to the packaging literature by uncovering unique consumer attitudes toward green claims on food packaging in the Saudi Arabian context. It also suggests that marketing mix strategies play a role in consumer acceptance of sustainable packaging. A hypothetical product was proposed by industry professionals, who are now better positioned to develop and produce it. The study reveals that significant improvements are needed in packaging design and given that more than 50% of consumers place importance on shelf presence, a targeted promotional strategy is also necessary. The findings have important implications for both academics and marketers in the food industry, particularly in understanding consumer preferences. Key areas for improvement in sustainable packaging are identified, along with straightforward marketing strategies to make Saudi Arabian consumers more responsive to green claims. Future research could further explore the impact of visual shelf presence and compare the results across different countries and product categories.

Summary of Findings

This article emerged from an impression that is reflected through the range of research questions and specific objectives. It covers two distinct subject areas that were compatible when combined. At the onset, this work is a study undertaken to investigate and analyze sustainable packaging, evaluating the entire concept and analyzing the functional, practical, and conceptual needs of such. There is an argument suggesting that the holy grail of sustainability within the domain of environmental implications will evolve from sustainable packaging. The subject area of contemporary consumerism—managed through the framework of the fast-moving consumer goods supply chain structure based within the Saudi Arabian market—is another area that was of interest. Sustainability has an operational aspect that leads into market

segments through packaging and broader supply chain activities. However, this should not be tunnel-visioned through the need to meet perceived requirements of the market only but also should be extended by societal actors expecting extended social performance from the activities of the industry.

Sustainable packaging meets environmental, economic, and societal needs by rationalizing and maintaining packaging usage by driving efficiency and continued innovation. This delivers a reduced impact by packaging—both at the societal and environmental levels. If sustainable packaging highlights and demonstrates the environmental indicators that customers look for within these products, then it should make the purchasing decision easier to make. The research questions raised to underpin and frame the level and type of research are specific in nature. They are at the principal quest of packaging innovation: one in particular switch into assessing customer reaction and acceptance of these eco-innovations from the perspective of market position and trends. A modern society is characterized by concerns related to natural resources, national income, human health, and the environment. Through facing these concerns, industries need to assess the integration of sustainable solutions into day-to-day management that do not compromise current requirements but offer long-term resilience and sustainability.

Implications for Industry Practice

The findings of this study offer significant practical implications for marketers, businesses, and policymakers in Saudi Arabia regarding sustainable packaging and consumer engagement. Firstly, businesses should develop targeted marketing strategies that emphasize environmental education, highlighting the positive impacts of sustainable packaging to enhance brand image and foster consumer loyalty, even if such concerns do not directly drive immediate demand. Given that cost awareness has been shown to influence consumer satisfaction, companies should focus on presenting sustainable packaging as cost-effective, offering competitive pricing and value propositions to encourage selection.

Additionally, the study's findings suggest that positive portrayals of sustainable packaging can significantly shape consumer attitudes; thus, brands should invest in storytelling and communication strategies that connect their products to sustainability values. Tailoring marketing messages to different consumer segments is crucial, as those concerned with environmental issues may require distinct messaging compared to cost-driven consumers. Furthermore, businesses should engage the public through community initiatives that promote sustainability, as the lack of direct public influence calls for platforms that facilitate advocacy and action among consumers. Cultural sensitivity is also essential, as aligning marketing strategies with local values and norms can enhance acceptance and encourage consumer advocacy for sustainable practices. Lastly, the study highlights the necessity for ongoing research into consumer behavior surrounding sustainable packaging; companies should invest in market research to remain attuned to changing consumer attitudes and preferences.

Furthermore, companies should focus on changes in production and transformation processes and substantially new approaches at all company levels in order to reduce the ecological consequences of their activities. These changes can not only create a more sustainable environment but will also benefit the company. The results on factors related to how companies can apply better sustainable strategies provide a more complete understanding of consumer behavior, which consequently helps clarify which goals companies can use to improve product innovation. The quality of the research and methodology used to clarify consumer behavior has taken giant steps in the last ten years and generated some interesting tools. Marketers and researchers can use those to take advantage of the emphasis on deep research in a way that can help companies.

Traditional research on consumer behavior has not resulted in any significant conclusions stating that directing communication, distribution, and strategy decisions, and once the purchase motivation has been identified, little is possible within the company's most important decision-making areas. However, it is possible to make internal changes such as seeking to understand how consumers make purchase decisions or, as a response, companies implement changes in the manner in which products are developed with the objective of increasing consumer satisfaction. Marketing strategies are made taking the target public into

consideration. Even a simple adaptation taking the specific attributes of a product into consideration can enhance the positioning of the product.

Future Research Directions

Future research should focus on the role of sustainable packaging within the framework of Sustainable Consumption and Production (SCP), emphasizing its ability to bridge consumer needs with environmental priorities. Expanding studies to include diverse demographics across Arab countries could provide culturally specific insights and support the development of responsive packaging strategies. Understanding the consumer characteristics driving demand for sustainable packaging can help businesses effectively segment target audiences and design tailored green products. Moreover, exploring the impact of socially responsible business practices on trust and authenticity could enhance brand loyalty and consumer engagement.

Additionally, future research should move beyond recyclability and minimal packaging to investigate the design elements of sustainable packaging, such as color, shape, and branding, and their influence on consumer preferences. Longitudinal studies could track how attitudes toward sustainable packaging evolve over time, while experimental research could evaluate marketing strategies like eco-labelling and consumer education campaigns. Finally, examining supply chain implications will be crucial to identify collaborative approaches among manufacturers, retailers, and policymakers for reducing environmental impact while maintaining operational efficiency and aligning production processes with market demand and sustainability goals.

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