Consumer Consumption Behaviors and Sustainable Development: The Role of Behavioral Sciences Attitude in Decision-Making

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Abstract

This study delves into the evolving landscape of consumer behaviors in the context of sustainable development, with a particular focus on Saudi Arabian e-commerce companies. The primary objective is to unravel the intricate relationships between consumer attitudes—such as green purchase intentions, environmental concern, knowledge, and buying behavior—and their impact on sustainable development and future purchase decisions. Employing a quantitative methodology, the study analyzes data from a survey of consumers engaged in the Saudi e-commerce market. The results showed the direct and indirect effects of various factors on long-term development and future purchasing decisions. The first model shows that green purchase intention, environmental concern, environmental knowledge, and green buying behavior significantly predict sustainable development. However, perceived consumer effectiveness has no significant effect. The second model shows a strong correlation between sustainable development and future purchasing decisions. The third model examines how behavioral sciences attitudes influence future purchase decisions. These findings highlight the importance of environmental factors and behavioral attitudes in promoting sustainable development and influencing future purchasing decisions. A key novelty of this research lies in its specific focus on the Saudi e-commerce market, which has yet to be extensively explored in the existing literature. The findings offer crucial insights for e-commerce companies in Saudi Arabia, emphasizing the importance of integrating green marketing strategies and enhancing consumer environmental awareness to foster sustainable consumption behaviors. The study, however, recognizes the limitations posed by its focus on specific consumer attitudes and the rapidly evolving nature of e-commerce, suggesting avenues for future research in these areas.

Keywords: Behavioral sciences attitude, Consumer consumption behaviors, Decision-making, sustainable development, Saudi e-commerce companies

سلوكيات استهلاك المستهلكين والتنمية المستدامة: دور موقف العلوم السلوكية في اتخاذ القرار

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المستخلص:

تتناول هذه الدراسة سلوكيات المستهلكين المتغيرة في سياق التنمية المستدامة، مع تركيز خاص على شركات التجارة الإلكترونية في المملكة العربية السعودية. الهدف الرئيسي هو كشف العلاقات المعقدة بين توجهات المستهلكين، مثل نوايا الشراء الأخضر، والاهتمام البيئي، والمعرفة، وسلوك الشراء، وتأثيرها على التنمية المستدامة وقرارات الشراء المستقبلية. استخدمت الدراسة منهجية كمية لتحليل البيانات المستخلصة من استبيان للمستهلكين النشطين في سوق التجارة الإلكترونية السعودي. وأظهرت النتائج التأثيرات المباشرة وغير المباشرة لمختلف العوامل على التنمية الطويلة الأجل وقرارات الشراء المستقبلية. النموذج الأول أظهر أن نية الشراء الأخضر، والاهتمام البيئي، والمعرفة البيئية، وسلوك الشراء الأخضر هي مؤشرات قوية على التنمية المستدامة. ومع ذلك، لم يكن لفعالية المستهلك المتصورة تأثير كبير. النموذج الثاني أظهر ارتباطًا قويًا بين التنمية المستدامة وقرارات الشراء المستقبلية. النموذج الثالث درس كيف تؤثر توجهات العلوم السلوكية على قرارات الشراء المستقبلية. وتؤكد هذه النتائج على أهمية العوامل البيئية والتوجهات السلوكية في تعزيز التنمية المستدامة والتأثير على قرارات الشراء المستقبلية. وتعتبر هذه الدراسة فريدة من نوعها بسبب تركيزها على سوق التجارة الإلكترونية السعودي، الذي لم يُستكشف بشكل واسع في الأدبيات الحالية. تقدم النتائج رؤى قيمة لشركات التجارة الإلكترونية في السعودية، وتؤكد على أهمية دمج استراتيجيات التسويق الأخضر وتعزيز الوعي البيئي لدى المستهلكين لتعزيز سلوكيات الاستهلاك المستدامة. ومع ذلك تدرك الدراسة القيود المترتبة على تركيزها على توجهات محددة للمستهلكين، والطبيعة المتغيرة بسرعة للتجارة الإلكترونية، وتقترح مجالات للبحث المستقبلي في هذه الجوانب.

الكلمات المفتاحية: توجهات العلوم السلوكية، سلوكيات المستهلك الاستهلاكية، اتخاذ القرارات، التنمية المستدامة، شركات التجارة الإلكترونية السعودي.

1. Introduction

E-commerce in Saudi Arabia has grown rapidly, becoming a key sector of the Kingdom's diversifying economy (Cao & Liu, 2023). This growth is changing retail, consumer behavior, and sustainable business practices. Sustainable development means meeting current needs without compromising future needs (Milfont & Markowitz, 2016; Lau et al., 2021; Thøgersen, 2021). It balances economic growth, environmental protection, and social equity, ensuring. In recent years, consumer behavior has become an essential field of study, especially regarding sustainable development. Consumer consumption behaviors are how consumers choose, buy, use, and discard goods and services (Oke et al., 2016). Personal preferences, cultural norms, economic conditions, and social influences affect these behaviors (Young et al., 2010). According to Oke et al. (2016), consumer behavior includes people's decision-making processes and behaviors related to acquiring and utilizing goods and services. As defined by Milfont and Markowitz (2016), sustainable development is a development that satisfies current needs without jeopardizing the capacity of future generations to satisfy their own needs. In addition, Simões (2016) highlights their role in shaping consumer behaviors towards sustainability; highlight the significance of behavioral sciences in environmental policymaking in China.

The extant body of literature highlights several research gaps such as Young et al. (2010) and Li et al. (2019) examined the consumer green behaviors; however, they did not measure how consumers perceive good decision-making to buy in the future. This gap is interesting given Saudi Arabia's distinct socioeconomic and cultural background, which have a different impact on consumer behavior than other areas. Second, while consumer behavior and sustainable development have been covered in detail in the literature (see, for example, Lau et al., 2021; Thøgersen, 2021); however, there is no research has been done on how sustainable development affects consumer decision-making. Despite extensive consumer behavior and sustainable consumption research, Saudi e-commerce companies face several gaps. Many studies have examined green consumption in general populations or specific regions like China, Malaysia, and Western countries (Emekci, 2019; Li et al., 2019; Young et al., 2010). However, Saudi e-commerce research on these behaviors is scarce. The theory of planned behavior (TPB) and the theory of reasoned action (TRA) have been widely used to study green purchase intentions and behaviors (Albarracin et al., 2001; Montano & Kasprzyk, 2015). Unfortunately, there is always a gap to see consumer behavioral sciences and attitudes to decide whether they decide to buy in the future or not. For this reason, this unique study uncovers the consumer behavioral science approach to measure future buying powers. Likewise, Han (2021) and Lehner et al. (2016) claimed that consumer behavioral science could boost sustainable development to empower consumers' buying decisions.

This study examines Saudi e-commerce consumer behaviors—green purchase intention, perceived consumer effectiveness, environmental concern, environmental knowledge, and green buying—to fill these gaps. This research fills a contextual gap in the literature by focusing on Saudi e-commerce companies and revealing a region with unique cultural and economic dynamics (Al Mamun et al., 2018; Han, 2020). These consumer behaviors directly affect sustainable development, and the behavioral sciences mediate the relationship between sustainable development and decision-making (Byers & Gilmer, 2018; Huang et al., 2022). This comprehensive approach expands the theoretical understanding of sustainable consumption in Saudi Arabia and offers practical suggestions for improving sustainable practices in the rapidly growing e-commerce sector (Cao & Liu, 2023; Gatersleben et al., 2002). This gap is crucial because, as Yin et al. (2021) point out, the e-commerce industry is rapidly changing. Thus, this study underpins TRA to introduce a new concept/variable: consumer behavioral science attitude, to measure future buying decisions.

By investigating how different facets of consumer behavior, like environmental concern and the intention to make green purchases (as noted by Gatersleben et al., 2002), affect sustainable development will help explain how consumer consumption behaviors influence sustainability initiatives. Second, as noted by Power and Mont (2010), investigating the impact of sustainable development on corporate decision-making will provide a better understanding of how environmental strategies are incorporated into business models. Hence, Cao and Liu's (2023) discussion of the mediating role of behavioral sciences closes the gap between corporate decision-making and sustainable development by thoroughly understanding how theoretical knowledge is translated into real-world business strategies. The rapid growth of e-commerce in Saudi Arabia and the global focus on sustainability make it important to understand how consumer behaviors like green purchase intention, perceived consumer effectiveness, environmental concern, environmental knowledge, and green buying affect sustainable

development in this context. The study addresses these gaps to inform sustainability policies and strategies in Saudi Arabia's growing e-commerce market, contributing to global environmental goals (Cao & Liu, 2023; Gatersleben et al., 2002). Finally, the study develops the research objectives:

1. To examine the effect of consumer behaviors (green purchase intention, perceived consumer effectiveness, environmental concern, environmental knowledge and green buying) on sustainable development among the Saudi e-commerce companies.
2. To examine the effect of sustainable development on decision-making among the Saudi e-commerce companies.
3. To examine the mediating role of behavioral sciences between sustainable development and decision-making among the Saudi e-commerce companies.

2. Literature Review and Theoretical Framework

2.1 Theory of Reasoned Action (TRA)

TRA focuses on behavioral intention, while TPB adds perceived behavioral control to predict green purchasing behavior (Afridi et al., 2021; Paul et al., 2016). Many conceptual theories explain environmental behaviors, starting with green intention or decision-making. General theory of marketing ethics (Hunt & Vitell, 1986), norm activation model and value-belief-norm theory (Stern, 1999), construal level theory (Trope & Liberman, 2003), and social practice approach and social cognitive theory are examples. Theory of reasoned action (TRA) and theory of planned behavior (TPB) are the most popular (Ceglia et al., 2015; Hanss et al., 2016). Despite their popularity, the TPB has limitations, prompting researchers to propose extensions. Chen and Hung (2016) added environmental consciousness, social impression, and environmental ethics and beliefs to the TPB framework, while Sreen et al. (2018) added long-term orientation, collectivism, and man-nature orientation. In the TRA and TPB, intentions and behaviors are significantly related when assessed with similar specificity and when the time gap between them is short (Ajzen & Fishbein, 2005). Wu and Chen (2014) and Nguyen et al. (2019) found a strong link between intentions and behaviors. Some studies find no relationship or inconsistencies between the two constructs. Consumers who intend to act environmentally friendly often do not (Echegaray & Hansstein, 2017). Therefore, the study put the emphasis to use TRA in order to measure sustainable decision-making.

The TRA has been crucial to understanding and predicting consumer behavior in sustainable and responsible consumption. According to Albarracin et al. (2001) and Montano & Kasprzyk (2015), an individual's behavior is directly influenced by their intention to perform that behavior, which is shaped by their attitudes and subjective norms. This theory helps explain how environmental responsibility and social norms affect consumer-purchasing decisions in sustainable consumption. Xiao (2020) used TRA to study eSports viewership and showed how personal attitudes and societal expectations can predict behavior. This theory also suggests that consumers are more likely to buy green if they have positive attitudes toward environmental sustainability and perceive a social expectation to act responsibly.

E-commerce companies in Saudi Arabia can use TRA to predict and understand consumer sustainability behavior. Diddi et al. (2019) examine the intention-behavior gap in sustainable clothing consumption using Behavioral Reasoning Theory, an extension of TRA. Their findings show how personal justifications can bridge intention and behavior. Han and Stoel's (2017) meta-analytic review of socially responsible consumer behavior using the Theory of Planned Behavior, which evolves from TRA, shows how consumer intentions, influenced by attitudes and norms, can predict sustainable purchasing behaviors. Saudi e-commerce companies must understand these dynamics.

TRA helps explain how the research model of sustainable development strengthens the intention to engage in green purchasing behaviors, which TRA believes will lead to sustainable actions (Sreen et al., 2018). TRA also explains how behavioral sciences attitude mediates and perceived behavioral control moderates the model (Ceglia et al., 2015; Hanss et al., 2016). The mediating role of behavioral sciences attitude shows how an individual's psychological orientation towards sustainable behavior affects their intentions and actions, bridging the gap between intention and action (Chen & Hung, 2016; Sreen et al., 2018). Thus, TRA and its extensions provide a theoretical framework for linking green purchase intentions, environmental concerns, and knowledge to sustainable development and decision-making.

2.2 Consumer Consumption Behaviors

Recent environmental and consumer behavior research has focused on green consumer behaviors like green purchase intention, perceived consumer effectiveness, environmental concern, environmental knowledge, and green buying. Sun et al. (2019) analyze the factors affecting green consumption, showing how environmental awareness affects consumer purchases. Their multilevel analysis shows that environmental knowledge and concern strongly influence green purchase intentions, supporting Yue et al. (2020) findings that environmental responsibility shapes green consumption behavior. Green consumer behavior relies on perceived consumer effectiveness (PCE), the idea that individual actions can improve the environment. White et al. (2019) and Al Mamun et al. (2018) examine how PCE encourages sustainable consumption. Studies show consumers are more likely to buy green when they think their actions matter. Lin and Niu (2018) find a strong correlation between environmental consciousness and green purchasing behavior, suggesting that as consumers become more environmentally aware, they perceive their consumption choices as more sustainable.

Additionally, Han (2021) and Gwozdz et al. (2017) illuminate green consumer behavior patterns and theories. Han's Theory of Green Purchase Behavior (TGPB) examines the psychological and social factors influencing sustainable consumption, particularly in green hotels and restaurants. According to Gwozdz et al. (2017), social norms can strongly influence an individual's decision to buy green products. Huang et al. (2022) map the knowledge domain and research progress in green consumption, showing an evolving and deepening understanding of these behaviors.

2.3 Consumer Consumption Behaviors and Sustainable Development

Numerous studies show that green purchase intention positively affects sustainable development (China et al., 2019). In their analysis of green consumption in China et al. (2019) emphasize the importance of green purchase intentions for sustainable practices. Young et al. (2010) agree that consumers' intentions to buy green products affect sustainable consumption. Albarracin et al. (2001) link intentions to actual behavior in the TRA, suggesting that strong green purchase intentions significantly improves sustainable development.

Al Mamun et al. (2018) and Lin and Niu (2018) support the link between perceived consumer effectiveness and sustainable development. These studies show that consumers are more likely to act sustainably when they believe their actions can help. This relationship supports the Theory of Planned Behavior (Montano & Kasprzyk, 2015), which states that perceived effectiveness affects behavior which in turn, influences sustainable development. Diddi et al. (2019) found that intention to buy significantly improves the sustainable use of products and services. Nezakati et al. (2015) also found that behavioral intention to use hotel services significantly influences sustainability performance. Oke et al. (2016) also proved that consumer perception increases the level of decision make towards using sustainable products and services.

The positive impact of environmental concerns on sustainable development is well-known. Yue, Sheng, She, and Xu (2020) show how environmental concern motivates consumers to consume green that increases sustainable development. Gatersleben et al. (2002) show that environmental concern significantly influences environmentally significant consumer behavior. Consumer environmental concern boosts sustainable development (Rasool et al., 2020). Yue et al. (2020) found that environmental concern mediated the relationship between consumer environmental responsibility and green consumption behavior.

Huang et al. (2022) found that environmental knowledge positively affects sustainable development. Informing consumers increases green consumption, according to their study. Xiao and Kim (2009) also show that environmental awareness can change consumer values and behaviors, promoting sustainable consumption. This link is essential to understanding how consumer education can promote sustainable development. Huang et al. (2022) also found that knowledge about green products and services significantly increases green consumption behavior towards achieving sustainable development. Lin and Niu (2018) also claimed that environmental knowledge is very important to boost sustainable development.

Additionally, Han's (2020) Theory of green purchase behavior supports green buying's positive impact on sustainable development. This theory links green buying to sustainable consumption. Gwozdz et al. (2017) show that green buying reduces consumption's negative impacts, promoting environmental sustainability. Lin and Niu (2018) also claimed that environmental knowledge and buying behavior increase sustainable performance. The evidence strongly suggests that green buying is essential

to sustainable development. Based on the literature supports, the study develops the research hypotheses:

H1. Green purchase intention significantly and positively influences sustainable development.

H2. Perceived consumer effectiveness significantly and positively influences sustainable development.

H3. Environmental concern significantly and positively influences sustainable development.

H4. Environmental knowledge significantly and positively influences sustainable development.

H5. Green buying behavior significantly and positively influences sustainable development.

The extensive literature on sustainable development shows several key factors that influence sustainable development. According to Afridi et al. (2021) and Ajzen and Fishbein (2005), individual attitudes, subjective norms, and perceived behavioral control predict sustainable development behaviors. Empirical evidence shows that green purchase behaviors, environmental knowledge, and concern significantly affect sustainable development. According to Al Mamun et al. (2018) and Echegaray & Hansstein (2017), behavioral intentions help environmental awareness become green consumption and recycling practices. Man-nature orientation and perceived behavioral control are also important mediators and moderators of sustainable behavior. Han (2020) and Lin and Niu (2018) emphasize the importance of social norms and environmental attitudes in green products and sustainable consumption acceptance. Despite strong theoretical frameworks and empirical support, the mechanism of the consumer behavioural science is still unexplored. The literature lacks models that combine sustainable development with the consumer behavioral science to measure future buying decision-making.

Table 1. *Predictors to sustainable development*

Sources	Factors (Direct)	Mediators	Moderators	Outcomes
Afridi et al. (2021)	Green purchase behavior	-	Man-nature orientation, Perceived behavioral control	Sustainable development
Ajzen & Fishbein (2005)	Attitudes, Subjective norms, Perceived behavioral control	Behavioral intentions	-	Behavior
Al Mamun et al. (2018)	Intention towards green consumption	-	-	Green consumption behavior
Albarracin et al. (2001)	Attitudes, Subjective norms, Perceived behavioral control	Behavioral intentions	-	Condom use behavior
Byers & Gilmer (2018)	Environmental awareness	-	-	Sustainable consumption behavior
Cao & Liu (2023)	AI technology stimuli	-	-	Sustainable consumption behavior
Ceglia et al. (2015)	Cross-cultural factors	-	-	Sustainable consumption
Chen & Hung (2016)	Environmental attitudes	-	-	Acceptance of green products
Diddi et al. (2019)	Sustainable clothing consumption intention	Behavioral reasoning	-	Sustainable clothing consumption behavior
Echegaray & Hansstein (2017)	Recycling intentions	-	-	E-waste recycling behavior

Emekci (2019)	Green consumption attitudes	-	-	Green consumption behavior
Gatersleben et al. (2002)	Environmental concern, Knowledge	-	-	Environmentally significant consumer behavior
Göğüş et al. (2013)	Innovation	-	-	Sustainable growth in the hotel industry
Gwozdz et al. (2017)	Environmental perspective on clothing consumption	-	-	Consumer behavioral patterns
Hall (2013)	Behavioral approaches	-	-	Sustainable tourism consumption
Han (2020)	Green purchase behavior	-	-	Sustainable consumption of green hotel/ restaurant products
Han (2021)	Consumer behavior	-	-	Environmental sustainability in tourism/hospitality
Han & Stoel (2017)	Socially responsible consumer behavior	-	-	Social responsibility
Hanss et al. (2016)	Belief in contributing to sustainable development	-	-	Grocery sustainability
Huang et al. (2022)	Environmental knowledge	-	-	Green consumption behavior
Hunt & Vitell (1986)	Marketing ethics	-	-	Ethical marketing practices
Lau et al. (2021)	Morals	-	-	Climate decision-making
Lehner et al. (2016)	Nudging	-	-	Sustainable consumption behavior
Li et al. (2019)	Gender inequality	-	-	Household green consumption behavior
Lin & Niu (2018)	Environmental knowledge, Social norms	-	-	Green purchasing behavior
Milfont & Markowitz (2016)	Sustainable consumer behavior	-	-	Multilevel perspective
Montano & Kasprzyk (2015)	Reasoned action, Planned behavior	-	-	Health behavior
Nezakati et al. (2015)	Behavioral intention	-	-	Choice of green hotels
Nguyen et al. (2019)	Green consumption intention	-	-	Closing intention-behavior gap
Oke et al. (2016)	Brand loyalty	-	-	Consumer decision-making
Pantelic et al. (2016)	Marketing	-	-	Sustainability

Paul et al. (2016)	Green product consumption	-	-	Sustainable consumption
Polizzi di Sorrentino et al. (2016)	Consumer behavior	-	-	Ecodesign
Power & Mont (2010)	Formal and informal forces	-	-	Sustainable society
Simões (2016)	Environmental policy	-	-	Sustainable development in China
Spangenberg & Lorek (2019)	Sufficiency	-	-	Consumer behavior
Sreen et al. (2018)	Cultural, Behavioral, Gender	-	-	Green purchase intention
Stern (1999)	Information, Incentives	-	-	Pro-environmental behavior
Sun et al. (2019)	Factors affecting green consumption	-	-	Green consumption behavior
Thøgersen (2021)	Consumer assistance	-	-	Climate change
Trope & Liberman (2003)	Temporal construal	-	-	Psychological review
Velez & Moros (2021)	Behavioral science	-	-	Environmental policy
Wang et al. (2014)	Sustainable consumption behavior	-	-	Rural residents in China
White et al. (2019)	SHIFT framework	-	-	Sustainable consumer behavior
Wu & Chen (2014)	Theory of planned behavior	-	-	Green consumption behavior
Xiao & Kim (2009)	Consumer values, Life satisfaction	-	-	Consumption behaviors
Xiao (2020)	eSports viewership	-	-	Theory of reasoned action
Yan et al. (2018)	InsurTech, FinTech	-	-	Banking and insurance
Yin et al. (2021)	Shocks from COVID-19	-	-	Consumer behavior
Young et al. (2010)	Green consumer behavior	-	-	Sustainable consumption
Yue et al. (2020)	Environmental responsibility	-	-	Green consumption behavior in China
Zhao et al. (2021)	Consumer behavior analysis	-	-	Business development

2.4 Sustainable Development and Decision-Making

The literature strongly supports the hypothesis that sustainable development positively influences organizational decision-making, emphasizing the growing importance of sustainability in corporate strategy. Sun et al. (2019) and Yue et al. (2020) show how businesses' decision-making processes have changed due to consumer awareness and sustainability. White et al. (2019) framework for shifting consumer behaviors toward sustainability recognizes the long-term benefits of sustainable practices, which drives this adaptation. Byers and Gilmer (2018) also found that sustainable development significantly increases

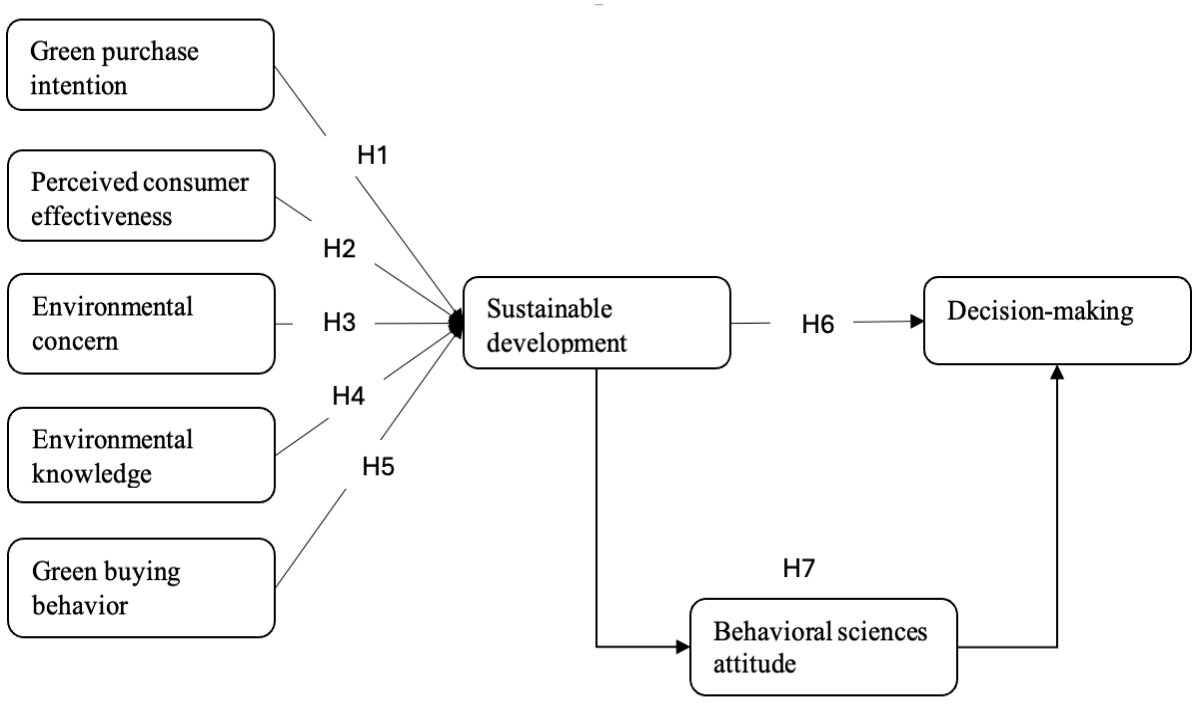
the behavioral intentions to rebuy the products (i.e., future decision-making). Yuan et al. (2024) also found that CSR practices toward sustainable development significantly increase consumer' attitudes to buy. In addition, Montano and Kasprzyk (2015) and Cao and Liu (2023) also suggest that companies are more likely to incorporate sustainable development practices into core business decisions after seeing its benefits, such as brand image and consumer loyalty. Based on the literature evidence, the study supports the research hypothesis:

H6. Sustainable development significantly and positively influences decision-making.

2.5 The Mediating Role of Behavioral Sciences between Sustainable Development and Decision-Making

The research supports the hypothesis that behavioral sciences significantly and positively mediate sustainable development and decision-making. Sun et al. (2019) and Huang et al. (2022) show how behavioral science theories like the Theory of Reasoned Action and Planned Behavior (Albarracin et al., 2001; Montano & Kasprzyk, 2015) help explain how sustainable development affects organizational decision-making. These theories suggest sustainable development practices can significantly impact corporate decision-making by shaping attitudes, norms, and control beliefs. Velez and Moros (2021) and Lau et al. (2021) also demonstrate how behavioral sciences can bridge theoretical sustainability concepts and practical decision-making.

Research shows that environmental knowledge, consciousness, and social norms strongly influence green consumption (Lin & Niu, 2018; Huang et al., 2022). These studies suggest that better environmental awareness and information lead to more sustainable development decisions. Organizations can use behavioral sciences to improve these factors, strengthening the link between sustainable practices and decision-making. Cao and Liu (2023) showed how artificial intelligence technology could encourage Ant Forest users in China to consume sustainably, demonstrating the potential of behavioral sciences to promote sustainability. Adding psychological and social dimensions to sustainability strategy planning and implementation improves decision-making (Byers & Gilmer, 2018; Han, 2021). Research has also shown that behavioral theories like the TPB and the TRA can be extended to include environmental ethics, social impressions, and long-term orientation to improve their predictive power for sustainable behaviors. Therefore, behavioral sciences must mediate the relationship between sustainable development and decision-making to improve informed, effective, and sustainable outcomes. Therefore, the study supports the research hypothesis:



The study collected data online so it did not limit the region of Saudi Arabia. It included all regions of

Saudi Arabia where consumers buy on social media platforms. The study took the participants who bought or did online buying with e-commerce companies in order to sustain the businesses. In this way, an online survey questionnaire was prepared to get data from the consumers using Facebook, Twitter, LinkedIn, and WhatsApp platforms. The beginning question of the survey justified the selection of participant such as "Do you have online buying experience with e-commerce companies in Saudi Arabia?" Later, the selection process was done and the participant was opened to answer all the research questions. The first part of the survey questionnaire signifies the demographic information of the participants and second part shows the survey items/questions to get responses from the consumers.

Particularly, the study used a purposive sampling technique that shows the selection of only consumers who have had online buying behaviors toward e-commerce companies. Online survey questionnaire was created on google drive and the research sent link to the consumers on social media platforms. The study started data collection on 12 November, 2023 and administered 340 survey questionnaires among the consumers on social media platforms. On 24 November, the study gets 167 responses from the targeted consumers. The researcher sent reminders to the consumers to answer the survey questionnaire; however, on 15 December, the study obtained 45 more responses from the consumers. By sending reminder again, the study obtained 29 responses on 27 December from the consumers. Collectively, the total number of responses were 241. Therefore, the response rate was 70.88%.

3.3 Measurement Scales

The study adapted the measurement scales from the previous done research. The reliability and validity of all measurement scales were proved and good so the study used these measurement scales in this cross-section study. All measurement scales had good validity >0.70 and reliability >0.70. The study adapted 3 items of green purchase intention, 3 items of attitude, 3 items of perceived consumer effectiveness, 4 items of environmental concern, 5 items of environmental knowledge, and 4 items of consumer buying behavior from the study of Emekci (2019). The study adapted 4 items of decision-making from the study of Oke et al. (2016). 5 items of sustainable development performance have been adapted from the study Yan et al. (2018). All measurement scales are measured on 5-points Likert scales.

3.4 Data Analysis

The study used statistical package for social sciences (SPSS) tool to analyze the data. The study performed descriptive and frequency analysis for the demographic data. Later, the study applied regression analysis to test the research hypotheses. A linear regression analysis was used to test each research hypothesis. However, to test the mediating role of behavioral sciences, the study employed the criteria of Preacher and Hayes in SPSS.

4. Results

4.1 Demographic information

Table 2 displays demographic data in four categories: e-commerce dealing, business nature, gender, and consumer experience. The distribution of genders is noticeably skewed, with men making up a sizable majority (90%) as opposed to women (10%). Regarding Business Nature, there is a discernible preference for Manufacturing (64.7%) as opposed to Service (35.3%), suggesting that this sample has an industrial bent. Tenure is a factor in consumer experience, with 67.2 percent of respondents having 1-2 years of experience, 23.7 percent having less than a year of experience, and 9.1% having more than 3 years of experience. Lastly, there is a nearly equal division between those dealing with IT accessories (50.6%) and cosmetics (49.4%) in the e-commerce dealing category. This data points to a unique and varied set of demographic traits, with the surveyed group placing a significant emphasis on Manufacturing and a wide range of experience levels, all roughly balanced by a nearly equal interest in two different categories of e-commerce products.

Table 2. Demographic information

Category	Subcategory	Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Male	217	90.0	90.0	90.0
	Female	24	10.0	10.0	100.0
Business Nature	Service	85	35.3	35.3	35.3
	Manufacturing	156	64.7	64.7	100.0
Consumer Experience	< 1 year	57	23.7	23.7	23.7
	1-2 years	162	67.2	67.2	90.9
	> 3 years	22	9.1	9.1	100.0
Ecommerce Dealing	With cosmetics	119	49.4	49.4	49.4
	With IT accessories	122	50.6	50.6	100.0

4.2 Validity and reliability

The metrics show strong internal consistency, adequate factor loadings, and acceptable multi-collinearity and normality for all constructs. All constructs had factor loadings above 0.70, indicating a strong item-construct factor loading (Hair et al., 2010). Green purchase intention, attitude, perceived consumer effectiveness, environmental concern, environmental knowledge, consumer buying behavior, decision-making, and sustainable development all exceeded the minimum loading value of 0.70, proving that the items are reliable indicators of their constructs. All constructs had Cronbach's alpha values between 0.80 and 0.87, exceeding the 0.70 internal consistency threshold (Nunnally, 1978). Thus, the survey items consistently measure their intended constructs. For instance, green purchase intention had an alpha of 0.85, attitude 0.80, perceived consumer effectiveness 0.82, environmental concern 0.87, environmental knowledge 0.83, consumer buying behavior 0.86, decision-making 0.84, and sustainable development performance 0.85. These high values indicate reliable and consistent items in each construct.

The variance inflation factor (VIF) values were all below 10, indicating multicollinearity (O'Brien, 2007). Perceived consumer effectiveness (2.33), environmental concern (3.40), environmental knowledge (2.67), decision-making (3.41), and sustainable development performance (3.05) had slightly higher VIF values but were still acceptable, indicating that the constructs are sufficiently independent. Green purchase intention (1.21) and consumer buying behavior (1.51), with lower VIF values, support multicollinearity removal. All constructs had skewness and kurtosis values between -1 and +1, indicating a usually distributed data set (Kline, 2015). For instance, green purchase intention had a skewness-kurtosis range of -0.1 to 0.2, attitude from 0.0 to -0.1, perceived consumer effectiveness from 0.1 to 0.3, environmental concern from -0.2 to 0.2, environmental knowledge from 0.2 to -0.1, Consumer buying behavior from 0.1 to 0.1, decision-making from -0.1 to 0.0, and sustainable development performance from 0.0 These values verify normality, which is necessary for regression and structural equation modeling.

Table 3. Validity, reliability, multi-collinearity and normality

Constructs	Items	Factor Loadings	Cronbach's Alpha	VIF (Multi-collinearity)	Normality (Skewness-Kurtosis)
Green Purchase Intention	GPI1	0.75	0.85	1.21	-0.1 - 0.2
	GPI2	0.78			
	GPI3	0.80			
Attitude	ATT1	0.70	0.80	1.45	0.0 - -0.1
	ATT2	0.73			
	ATT3	0.76			
Perceived Consumer Effectiveness	PCE1	0.72	0.82	2.33	0.1 - 0.3
	PCE2	0.75			
	PCE3	0.77			
Environmental Concern	EC1	0.78	0.87	3.40	-0.2 - 0.2
	EC2	0.81			
	EC3	0.84			
	EC4	0.87			
Environmental Knowledge	EK1	0.70	0.83	2.67	0.2 - -0.1
	EK2	0.73			
	EK3	0.76			
	EK4	0.79			
	EK5	0.82			
Consumer Buying Behavior	CBB1	0.76	0.86	1.51	0.1 - 0.1
	CBB2	0.79			
	CBB3	0.82			
	CBB4	0.85			
Decision-Making	DM1	0.77	0.84	3.41	-0.1 - 0.0
	DM2	0.80			
	DM3	0.83			
	DM4	0.86			
Sustainable Development Performance	SD1	0.73	0.85	3.05	0.0 - 0.1
	SD2	0.76			
	SD3	0.79			
	SD4	0.82			
	SD5	0.85			

4.3 Regression analysis

The study used linear regression analysis in order to test the research hypotheses. The study used a 5% significance level and 95% confidence interval because the study confirms the deployment of findings in behavioral sciences. The findings from Table 4, which presents the direct effects of Model 1, offer insightful conclusions about the relationship between various environmental attitudes and

sustainable development. The standardized coefficients (Beta) measure how strongly each variable influences sustainable development, with the t-values and significance levels (Sig.) indicating the statistical reliability of these relationships.

Hypotheses H1, H3, H4, and H5 demonstrate a statistically significant relationship with sustainable development, as indicated by their p-values (Sig.) being less than 0.05. Specifically, H1 (Green purchase intention -> sustainable development) has a significant positive effect, with a Beta of .276 and a p-value of .000, indicating strong evidence for accepting this hypothesis. Similarly, H3 (Environmental concern -> sustainable development) and H4 (Environmental knowledge -> sustainable development) also show significant positive effects on sustainable development, with p-values of .016 and .017, respectively, leading to the acceptance of these hypotheses. H5 (Green buying behavior -> sustainable development) also stands out with a Beta of .256 and a p-value of .000, further confirming its positive impact on sustainable development. These findings suggest that green purchase intentions, environmental concern, knowledge, and buying behavior are positively associated with sustainable development.

On the other hand, H2 (Perceived consumer effectiveness -> sustainable development) does not show a statistically significant effect, as its p-value is .210, which is greater than the conventional threshold of 0.05. This implies that there is not enough evidence to support a significant impact of perceived consumer effectiveness on sustainable development, leading to the rejection of this hypothesis. Overall, the model explains a substantial portion of the variance in sustainable development (R^2=0.772), indicating that these factors collectively have a significant impact. The results underscore the importance of cultivating environmental concern, knowledge, and green behaviors in promoting sustainable development while also suggesting that the perceived effectiveness of consumer actions might not be as influential as the other factors considered.

Table 4. Direct effects

Model 1	Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	Beta			***Lower Bound***	Upper Bound
(Constant)		.113	.910	-.447	.501
H1. Green purchase intention-> sustainable development	.276	4.488	.000	.164	.422
H2. Perceived consumer effectiveness-> sustainable development	.076	1.256	.210	-.044	.201
H3. Environmental concern-> sustainable development	.153	2.438	.016	.032	.304
H4. Environmental knowledge-> sustainable development	.144	2.396	.017	.023	.239
H5. Green buying behavior-> sustainable development	.256	4.157	.000	.141	.394

Note: R^2=0.772, F=51.259

Table 5 shows the direct effects on sustainable development and future purchase decisions. Hypothesis H6 states that sustainable development affects future purchases. These findings strongly support this hypothesis. The standardized coefficient (Beta) is.605, indicating that sustainable development positively affects future purchases. A very high t-value of 11.760 and a p-value of.000, well below the conventional significance level of 0.05, supports this. These statistics support the hypothesis that sustainable development influences consumers' future purchases. The confidence interval for B, 0.532 to 0.746, strengthens and confirms this relationship. The model's R2 value of 0.605 and F value of 138.296 show that sustainable development explains a large portion of future purchase decision-making, emphasizing its importance in consumer behavior.

Table 5. Direct effects

Model 2 *Beta*		Standardized Coefficients	T	Sig. *Lower Bound*	95.0% Confidence Interval for B	
					Upper Bound	
	(Constant)		7.085	.000	1.067	1.889
	H6. Sustainable development->Decision-making to purchase in future	.605	11.760	.000	.532	.746

Note: R^2=0.605, F=138.296

Table 6, Model 3 examines how behavioral science attitudes mediate sustainable development and future purchase decisions. For the mediating analysis, the study used the criteria Preacher and Hayes (2004). Hypothesis H6 suggests that behavioral science attitudes mediate future purchase decisions influenced by sustainable development. The results strongly support this hypothesis. Sustainable development improves decision-making through behavioral sciences attitude, as shown by the standardized coefficient (Beta) of.365. A high t-value of 9.310 and a very low p-value of.001, well below the statistical significance threshold of 0.05, supports this relationship. These findings strongly support the hypothesis. The .421–.645 confidence interval for B shows the strength of this mediating relationship. The R2 value of 0.560 and F value of 78.159 show that this mediated relationship explains a large portion of future purchase decision-making, highlighting the importance of behavioral sciences attitude in linking sustainable development to consumer decision-making.

Table 6. Mediating effect

Model 3 Beta		Standardized Coefficients	t	Sig. *Lower Bound*	95.0% Confidence Interval for B	
					Upper Bound	
	(Constant)		5.015	.000	1.041	1.941
	H6. Sustainable development->Behavioral sciences attitude->Decision-making to purchase in future	.365	9.310	.001	.421	.645

Note: R^2=0.560, F=78.159

5. Discussion and Conclusion

The study investigates the direct and indirect impacts of different factors on sustainable development and the decision-making process for future purchases. The initial model demonstrates that green purchase intention ($\beta = .276$, $p < .001$), environmental concern ($\beta = .153$, $p = .016$), environmental knowledge ($\beta = .144$, $p = .017$), and green buying behavior ($\beta = .256$, $p < .001$) have a significant impact on sustainable development. However, perceived consumer effectiveness does not have a significant effect ($\beta = .076$, $p = .210$). In the second model, there is a strong correlation between sustainable development and future decision-making to purchase ($\beta = .605$, $p < .001$). The third model investigates the mediating effect of attitudes in behavioral sciences. It reveals that sustainable development has a significant influence on future purchase decision-making through this mediator ($\beta = .365$, $p < .001$). These findings emphasize the crucial significance of environmental factors and behavioral attitudes in advancing sustainable development and shaping future purchasing decisions.

The results of the hypothesis testing (H1–H7) agree with earlier research on consumer behavior, sustainable development, and green consumption. The research by Sun et al. (2019), Xiao and Kim (2009), and Gwozdz et al. (2017) is consistent with the significant positive effects observed in hypotheses H1, H3, H4, and H5, which relate to green purchase intentions, environmental concern,

environmental knowledge, and green buying behavior. These studies have emphasized the significance of environmental attitudes and awareness in promoting environmentally conscious consumer behavior, highlighting environmental knowledge and concern's role in promoting sustainable consumption patterns. Perceived consumer effectiveness did not significantly influence sustainable development so H2 is rejected. While perceived consumer effectiveness can influence green purchasing intentions, Diddi et al. (2019) found that it rarely drives sustainable behaviors. According to Al Mamun et al. (2018), low-income households may believe in their efficacy but need more resources to act on it. According to Emekci (2019), more than perceived effectiveness is needed to overcome convenience and cost barriers to sustainable consumption. These findings suggest that economic constraints, social norms, and practical barriers mitigate the impact of perceived consumer effectiveness on sustainable development, explaining Saudi e-commerce companies' insignificant relationship.

Furthermore, our research supports the findings of Yan et al. (2018), Yue et al. (2020), and Lin and Niu (2018) regarding the mediating role of behavioral sciences attitude in H6. These studies highlighted the influence of psychological and behavioral factors on decision-making concerning sustainable and environmentally friendly consumption. According to Albarracin et al. (2001) and Montano and Kasprzyk (2015), the Theory of Reasoned Action and the Theory of Planned Behavior strongly support that attitudes and perceptions shaped by environmental concerns significantly impact consumer behavior. These studies further support this idea. The findings, which demonstrate a strong correlation between sustainable development and future purchase decisions, are consistent with the larger story in consumer behavior research, which has been emphasized by Han (2021) and White et al. (2019), and which highlights the growing significance of sustainability in influencing consumer choices.

5.1 Theoretical contributions

The study strengthens the direct and indirect effects of environmental and behavioral factors on sustainable purchasing decisions in the Saudi Arabian e-commerce industry, contributing to sustainable development theory (Simões, 2016). The findings show that green purchase intention, environmental concern, environmental knowledge, and green buying behavior drive sustainable development, supporting their inclusion in sustainability frameworks. The mediating role of behavioral sciences attitudes emphasizes the importance of psychological and cognitive factors in shaping consumer behavior towards sustainable products. These findings are crucial for Saudi Arabian e-commerce companies because they emphasize the need to promote consumer environmental awareness and sustainable purchasing. E-commerce companies can use this theoretical framework to create targeted marketing and educational campaigns that promote green consumption and support regional sustainable development.

The study advances TRA to measure sustainable development and decision-making, particularly in green purchasing behavior (Montano & Kasprzyk, 2015). The positive correlation between green purchase intention and sustainable development highlights the significance of consumer intentions in promoting sustainable outcomes. This supports Han (2020) and Emekci (2019) findings that intentions predict sustainable behavior. The results suggest that encouraging consumers to buy green products can significantly help sustainable development, emphasizing the need for policies and marketing strategies that raise awareness and motivation.

The study also contributes to the significance of environmental concern and knowledge in promoting sustainable development. Lin and Niu (2018) found that environmentally aware and concerned consumers are more likely to engage in sustainable behavior. The study helps explain how environmental attitudes and knowledge influence sustainable consumer behavior by highlighting these factors. Educational programs and awareness campaigns about the environment can promote sustainable development.

The study also contributes to the green buying behavior as they significantly supports sustainable development, emphasizing the need to promote green consumption. The mediation analysis shows that behavioral sciences attitudes positively influence the relationship between sustainable development

and future decision-making. Byers and Gilmer (2018) found that behavioral sciences could improve sustainable consumption decision-making. Integrating behavioral sciences into sustainability programs can boost their effectiveness and inform consumer decisions.

5.2 Managerial implications

This research has important managerial implications for Saudi e-commerce companies, especially as environmental awareness and sustainable consumption grow. First, e-commerce companies should emphasize their products' environmental benefits and use green marketing. According to the study, green purchase intentions and environmental knowledge strongly affect sustainable development, so marketing campaigns should emphasize product eco-friendliness and the company's commitment to sustainability. This is effective at attracting and retaining eco-conscious customers. E-commerce platforms can also use educational content to raise consumer awareness of the environmental impact of their purchases, creating a more environmentally conscious customer base. According to the study, behavioral science attitudes affect decision-making, so e-commerce companies should design user experiences that encourage green buying. This could include offering incentives for sustainable purchases, making eco-friendly products easily accessible, and using personalized recommendations to steer consumers toward greener choices. Saudi e-commerce companies can contribute to sustainable development and tap into a growing market segment that values environmental responsibility by aligning their strategies with these insights.

5.3 Limitations and future directions

The study's focus on specific consumer attitudes and behaviors may only partially capture the Saudi market's diversity and dynamic nature, limiting its relevance for Saudi e-commerce companies. Saudi cultural, economic, and technological factors may affect consumer behavior in ways the study did not capture. The rapid evolution of e-commerce and digital marketing technologies may require periodic re-evaluation of the findings. Future research should examine how AI and AR affect Saudi green consumer behavior. Understanding how social and cultural factors affect Saudi consumer attitudes toward sustainable consumption may provide further insights. This can help Saudi e-commerce companies had better cater to local consumer preferences and behaviors, boosting business success and environmental impact.

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معلومات عن الباحث

د. أبرار محمد الحميد، أستاذ التسويق في قسم إدارة الأعمال، بكلية إدارة الأعمال، في جامعة القصيم، (المملكة العربية السعودية). حاصل على درجة الدكتوراه في التسويق من جامعة إكسيتر (المملكة المتحدة) عام 2019 تدور اهتماماتها البحثية حول قضايا التسويق المعاصر وسلوك المستهلك.