



Unveiling Indian Consumers' Green Intentions Towards Purchasing Solar Panel: An Empirical Investigation Through The Lens Of Theory Of Planned Behaviour

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Abstract

This empirical investigation delves into Indian consumers' green intentions regarding the purchase of solar panels within the context of sustainability, using the Theory of Planned Behaviour (TPB) as its guiding framework. The study examines the influence of attitude, subjective norms, and perceived behavioural control on consumers' intentions to adopt solar panels. A structured questionnaire survey collected data from 410 participants, with a focus on factors affecting green purchase intentions. The results reveal a significant positive relationship between attitudes and green purchase intentions, highlighting the pivotal role of positive attitudes towards eco-friendly products. Subjective norms were found to have a moderate but still significant influence, emphasizing the relevance of social influences in shaping sustainable consumption decisions. Moreover, perceived behavioural control exhibited a substantial and highly significant impact on green purchase intentions, indicating the importance of facilitating consumers' belief in their ability to engage in green behaviours. These findings offer practical implications for businesses, policymakers, and marketers seeking to promote sustainable consumption in India.

Keywords: Attitude, Green purchase intention, Perceived behaviour control, Solar panel, Subjective norms, Theory of planned behaviour.

Introduction

The global imperative to address climate change and promote environmental sustainability has placed a growing emphasis on understanding and fostering green consumption behaviour among individuals. Within the realm of sustainable consumption,

the adoption of solar panels as an eco-friendly energy source stands as a pivotal decision, bearing profound implications for the reduction of carbon footprints and the transition towards renewable energy sources (Meng et al., 2018). This study delves into the motivations and determinants that underlie consumers' intentions to purchase solar panels, offering valuable insights into sustainable buying behaviour.

The Theory of Planned Behaviour (TPB), introduced by Ajzen in 1991, serves as a comprehensive framework for comprehending and predicting individual behaviours, particularly within the context of sustainability. This theory posits that behaviour, in this case, the sustainable act of purchasing solar panels, is influenced by three key factors: attitude, subjective norms, and perceived behavioural control. Attitude reflects an individual's evaluation of the behaviour, subjective norms encapsulate the perceived social pressure or expectations, and perceived behavioural control pertains to the belief in one's ability to perform the behaviour (Ajzen, 1991).

The application of the TPB to sustainable buying behaviour has yielded valuable insights into the determinants of green consumption. Previous research has demonstrated its effectiveness in predicting consumers' intentions and behaviours related to sustainability (Moser, 2015; Nguyen et al., 2018). While the TPB has been successfully applied to various sustainable buying behaviours, its applicability to solar panel purchases remains relatively underexplored.

This study aims to bridge this gap by investigating the green purchase intentions of consumers in the context of solar panels through the lens of the TPB. Specifically, it examines the impact of attitudes towards solar panels, subjective norms within their social networks, and the perceived behavioural control over solar panel purchases on consumers' intentions. By elucidating the factors that drive green purchase intentions in the solar panel market, this research contributes to a more comprehensive understanding of sustainable consumption behaviour. Furthermore, several investigations have substantiated the disparity between attitude and intention (Ackermann & Palmer, 2014; Iweala et al., 2019; Zhou et al., 2013). They have furnished limited quantitative substantiation concerning the gap between intention and behaviour (Hassan et al., 2016). The overarching objective of this study is to shed light on the pivotal determinants that influence consumers' decisions to adopt solar panels, offering practical implications for businesses, policymakers, and marketers seeking to promote sustainable consumption. As environmental sustainability becomes increasingly central in consumer choices and corporate strategies, a deeper understanding of the drivers of green intentions becomes paramount for fostering a more eco-conscious society.

Literature Review

Theoretical Underpinning - Theory of Planned Behaviour

The TPB posits that individual behaviour, in this case, sustainable buying behaviour, is determined by three key factors: attitude, subjective norms, and perceived behavioural control (Ajzen, 1991). These factors collectively influence an individual's intention to perform a specific behaviour, which, in turn, predicts the likelihood of actually engaging

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in that behaviour. Numerous empirical studies have applied the TPB framework to investigate sustainable buying behaviour. For instance, Sangroya & Nayak (2017) examined the TPB's applicability in predicting consumers' intention to purchase green products, finding that attitude, subjective norms, and perceived behavioural control significantly influenced their intentions. Similarly, Ogiemwonyi (2021) explored the TPB's effectiveness in understanding organic food purchase intentions, concluding that the theory's components played a crucial role in shaping consumer behaviour.

Additionally, the TPB has been employed to explore various sustainable buying behaviours, including green energy adoption (Nguyen et al., 2018), eco-friendly packaging preferences (Rajendran et al., 2019), and sustainable fashion choices (Blazquez et al., 2020). Across these studies, the TPB consistently emerged as a valuable framework for understanding and predicting consumers' intentions and behaviours in the context of sustainability. The Theory of Planned Behaviour provides a robust theoretical underpinning for the study of sustainable buying behaviour. Empirical evidence from various studies demonstrates its effectiveness in elucidating the role of attitudes, subjective norms, and perceived behavioural control in shaping consumer intentions and actions concerning sustainability-related purchases. As sustainability continues to gain importance in consumer choices and corporate strategies, the TPB remains a valuable tool for researchers and practitioners seeking to promote and understand sustainable buying behaviour.

Attitude towards Solar Panels

Attitude, defined as an individual's overall evaluation of an object or behaviour, plays a fundamental role in shaping consumer intentions (Ajzen, 1991). In the context of solar panels, a positive attitude is closely linked to the intention to purchase. Studies have consistently shown that consumers with a favourable attitude towards solar panels, often driven by environmental concerns and perceived benefits such as cost savings and energy independence, are more inclined to express an intention to adopt solar technology (Balcombe et al., 2013; Wolske et al., 2017). Positive attitudes towards solar panels are often a result of increased awareness of their environmental benefits and the belief that they align with personal values (Claudy et al., 2013). Thus, it is evident that attitude significantly influences consumer intentions to purchase solar panels. The following hypothesis is proposed based on this discussion.

H1: Attitude has a significant impact on green purchase intention.

Subjective Norms

Subjective norms refer to the perceived social pressure or expectations from significant others regarding a particular behaviour (Ajzen, 1991). In the context of solar panel adoption, the influence of subjective norms on consumer intentions is noteworthy. Research has found that individuals are more likely to express an intention to purchase solar panels if they perceive that their friends, family, or peers support or endorse the idea (Claudy et al., 2013). Social influence plays a crucial role, as consumers often rely on

the opinions and behaviours of those around them to guide their own decisions (Pickett-Baker & Ozaki, 2008). Therefore, the endorsement of solar panels by social networks can positively impact consumer intentions, highlighting the significance of subjective norms in the decision-making process. On the basis of this discussion, the following hypothesis is proposed.

H2: Subjective norms has a significant impact on green purchase intention.

Perceived Behavioural Control

Perceived behavioural control reflects an individual's perception of their ability to perform a behaviour successfully (Ajzen, 1991). In the context of purchasing solar panels, it encompasses factors such as ease of installation, access to information, and financial feasibility. Studies have shown that consumers are more likely to express an intention to adopt solar panels when they perceive a high level of control over the process (Claudy et al., 2013; Wolske et al., 2017). Factors like government incentives, financial support, and the availability of reliable installation services can positively influence perceived behavioural control, ultimately impacting the intention to purchase solar panels. The following hypothesis is suggested in light of this discussion.

H3: Perceived behaviour control has a significant impact on green purchase intention.

Methods

Research Design

This study employs a quantitative research design to investigate the applicability of the Theory of Planned Behaviour (TPB) in the context of sustainable buying behaviour. The TPB framework comprises three main constructs: attitude, subjective norms, and perceived behavioural control, all of which contribute to consumers' intentions to engage in sustainable buying behaviour. To examine the relationships between these constructs and their influence on intentions, a structured questionnaire survey was administered to a sample of participants.

Sample and Data Collection

In this study, a questionnaire served as the main instrument for gathering data. Utilizing the convenience and accessibility of online platforms, questionnaire was made accessible on the Google Forms platform and disseminated through the researchers' social media channels. A combination of purposive and snowball sampling methods was utilized to select and certify a diverse and representative sample. The data used in this investigation was gathered between October and December of 2020. During the survey's duration, 410 responses were obtained, all of which were complete and had no missing values. Informed consent was obtained from all participants, and they were assured of the confidentiality of their responses.

The study questionnaire was organized into three different sections. The initial section invited participants to express their readiness to take part in the survey. In the subsequent section, we employed closed-ended questions that were anchored on a five-

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point Likert scale, encompassing a range from "strongly disagree" to "strongly agree". Finally, the questionnaire's last section collected demographic information from respondents.

Measures

Participants' green purchase intentions towards buying solar panel, subjective norms and perceived behaviour control were assessed using a series of Likert-scale statements adopted from Yadav & Pathak (2017). The items of attitude were taken from the study of Chen (2007).

Participants' Sociodemographic Characteristics

Table 1 displays the demographic traits of the participants. The majority of those who responded were men (52.68%). The age distribution shows that the highest proportion falls in the 29-39 age group (41.46%), followed by 18-28 (27.32%), 40-50 (21.46%), and above 50 (9.76%) age groups. Regarding education, the largest group of participants were graduates (45.85%), followed by post-graduates (32.20%), those with education below graduation level (7.07%), and individuals with education beyond post-graduation (14.88%). In terms of monthly household income, the study participants were divided into different income categories. The largest group (37.07%) had a monthly household income between 20,000 and 40,000. The group with a monthly household income greater than 60,000 represented 14.88% of the participants, with 61 respondents.

Table 1. Demographic Profile of Respondents

Items	Categories	Frequency	Percentage
Gender	Male	216	52.68
	Female	194	47.32
Age	18-28	112	27.32
	29-39	170	41.46
	40-50	88	21.46
	Above 50	40	9.76
	Below graduation	29	7.07
Education	Graduate	188	45.85
	Post-graduate	132	32.20
	Above post-graduation	61	14.88
	Up to 20000	57	13.90
Monthly household income (in Indian rupee)	20000-40000	152	37.07
	40000-60000	140	34.15
	More than 60000	61	14.88

Results

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Evaluation of Measurement Model

Table 2 provides a snapshot of factor loadings for items within distinct constructs, offering insights into the relationships between these items and their respective latent constructs. In this analysis, we find strong support for the effectiveness of the measurement items in capturing the intended constructs. Notably, the Attitude construct exhibits four items (ATT1-ATT4) with factor loadings surpassing 0.795, indicating a robust association between these items and attitudes. Similarly, the Green Purchase Intention construct is well-measured, with GPI1, GPI2, and GPI3 boasting factor loadings exceeding 0.91, signifying a clear link between these items and purchase intention. Perceived Behaviour Control (PBC1-PBC3) also demonstrates strong factor loadings, further validating its effectiveness in gauging individuals' perceptions of control. However, within the Subjective Norms construct, it's important to note that while SBN1 and SBN3 exhibit strong factor loadings, SBN2 has a relatively lower loading, suggesting a somewhat weaker relationship with this construct. Overall, these factor loadings provide valuable information for researchers, confirming the reliability and validity of the items within each construct (Hair et al., 2011). Figure 1 depicts the measurement model of the study.

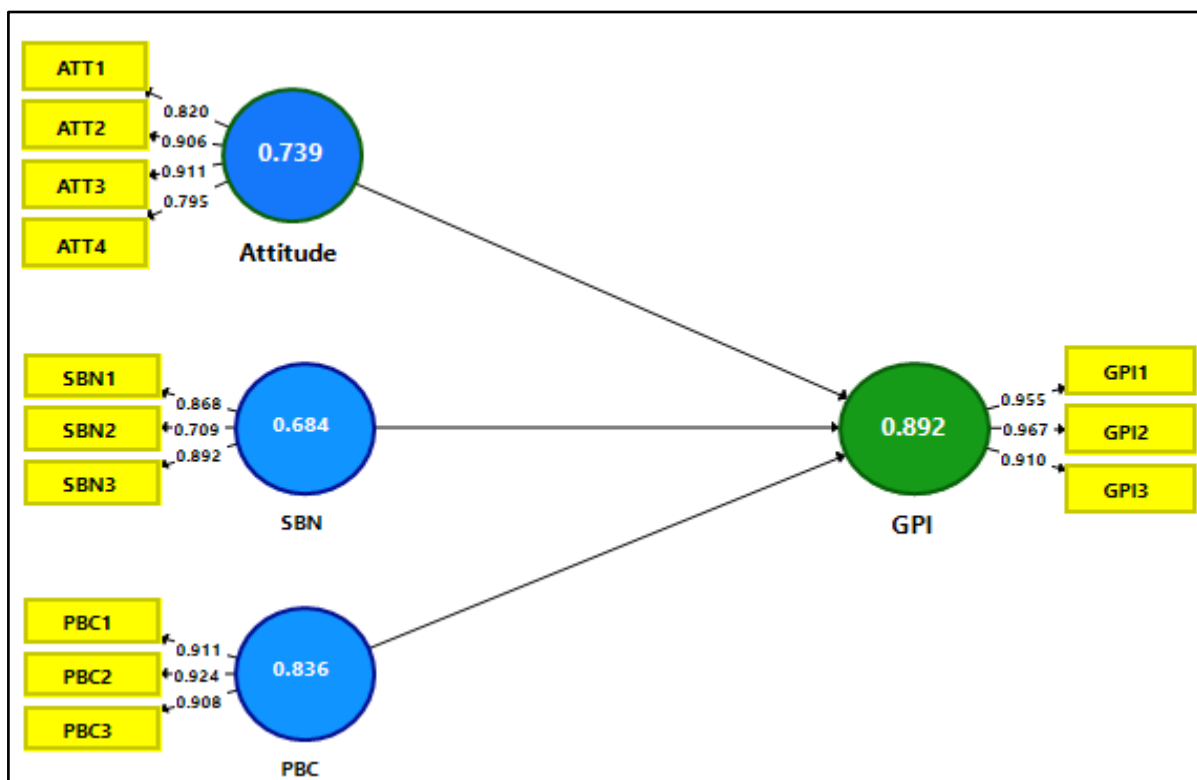


Figure 1. Measurement Model

Table 2 provides critical reliability and validity statistics for latent constructs in a research study, offering insights into the measurement quality. For Attitude, the high Cronbach's Alpha (0.881), Composite Reliability (0.919), and Average Variance Extracted (0.739)

values signify strong internal consistency and convergent validity. Green Purchase Intention exhibits even stronger reliability and validity, with Cronbach's Alpha at 0.939, Composite Reliability at 0.961, and an AVE of 0.892. Perceived Behaviour Control also demonstrates reliability and validity with a Cronbach's Alpha of 0.902, Composite Reliability of 0.939, and AVE of 0.836. However, Subjective Norms, while still reliable, exhibit slightly lower values, indicating moderate internal consistency (Cronbach's Alpha 0.766) and acceptable convergent validity (Composite Reliability 0.865, AVE 0.684). These statistics are essential for researchers to assess the quality of their measurement model and the robustness of their data (Fornell & Larcker, 1981; Hair et al., 2014; Nunnally, 1978).

Table 2. Measurement Model Outcomes

Constructs	Items	Factor Loadings	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Attitude	ATT1	0.82	0.881	0.919	0.739
	ATT2	0.906			
	ATT3	0.911			
	ATT4	0.795			
Green Purchase Intention	GPI1	0.955	0.939	0.961	0.892
	GPI2	0.967			
	GPI3	0.91			
Perceived Behaviour Control	PBC1	0.911	0.902	0.939	0.836
	PBC2	0.924			
	PBC3	0.908			
Subjective Norms	SBN1	0.868	0.766	0.865	0.684
	SBN2	0.709			
	SBN3	0.892			

The HTMT values in the Table 3 are generally lower than 0.9, suggesting that discriminant validity is likely established among the constructs (Henseler et al., 2015). For instance, the HTMT value between Attitude and Green Purchase Intention (GPI) is 0.706, indicating that the correlation between Attitude and GPI is lower than the correlation between items within the same constructs. This pattern is consistent for the other constructs as well. These findings suggest that the constructs of Attitude, Green Purchase Intention (GPI), Perceived Behaviour Control (PBC), and Subjective Norms (SBN) are distinct and can be considered as separate latent variables, supporting the discriminant validity of the measurement model (Henseler et al., 2015).

Table 3. Discriminant Validity (HTMT)

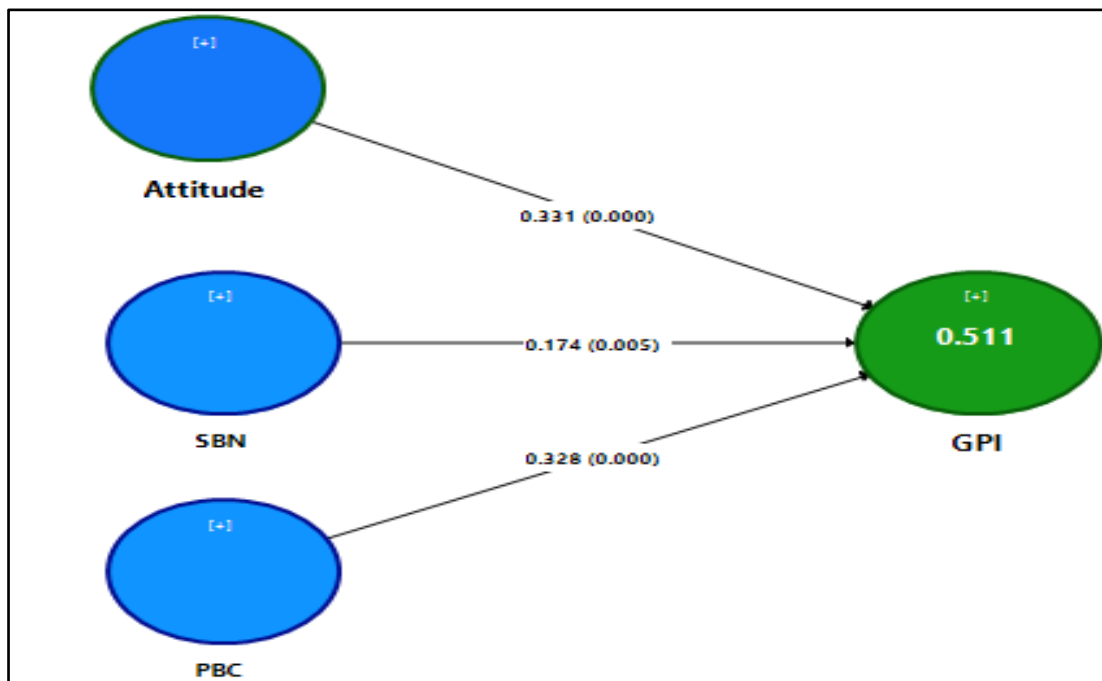
	Attitude	GPI	PBC	SBN
Attitude				
GPI	0.706			

PBC	0.707	0.674	
SBN	0.737	0.627	0.601

Structural Model Evaluation

Prior to testing the hypothesized relationships, the fitness of the structural model (see Figure 2) was analysed. The multicollinearity, explanation power (R^2) and predictive capability (Q^2) of the structural model was tested to ensure that it is fit to the predict the dependent variable i.e., intentions of consumers to purchase solar panels (Hair et al., 2011). The collinearity assessment table provides information on the Inner Variance Inflation Factors (VIF) for the constructs in the study, primarily focusing on their relationships with Green Purchase Intention (GPI). VIF measures the extent to which the variance of the estimated coefficients in a regression model is increased due to multicollinearity. High VIF values indicate a strong degree of multicollinearity, which can make it challenging to interpret the individual effects of predictors in a regression model (Hair et al., 2012).

Figure 2. Structural Model



All the VIF values are below the commonly accepted threshold of 5, which is often used as a rule of thumb to identify problematic multicollinearity. This suggests that multicollinearity is not a significant concern among these constructs, particularly with respect to their relationships with GPI. Therefore, the coefficients estimated in regression models involving these constructs and GPI are likely to be reliable and interpretable without the risk of inflated standard errors due to multicollinearity. In terms of explanatory power, the collective influence of the independent variables accounted for 51.1% of the variance in the dependent variable. This suggests that the model exhibits a

moderate level of explanatory capacity. To assess the predictive capabilities of the model, we employed the blindfolding method within SmartPLS to calculate the Q² statistic. Q² values of 0, 0.25, and 0.5 signify low, medium, and high predictive power, respectively. In the present study, our obtained Q² value of 0.44 indicates a moderate level of predictive power for the structural model (Hair et al., 2014).

The hypotheses testing results (see table 4) offers valuable insights into the relationships between different constructs in the research study. Three hypotheses, H1, H2, and H3, were tested to understand the impact of various factors on individuals' green purchase intentions (GPI).

Table 4. Hypotheses Testing Results

Hypotheses	Relationships	Path-coefficient	Standard Deviation	T Statistics	P Values
H1	Attitude -> GPI	0.331	0.072	4.585	0
H2	SBN -> GPI	0.174	0.062	2.784	0.005
H3	PBC -> GPI	0.328	0.064	5.085	0

H1 examined the relationship between Attitude and GPI. The coefficient for this relationship was found to be 0.331, indicating a positive association. The associated T statistic, calculated by dividing the coefficient by its standard deviation, was 4.585, and the p-value was 0, signifying a highly significant relationship. These results suggest strong empirical support for H1, demonstrating that individuals' attitudes have a substantial and statistically significant positive influence on their green purchase intentions.

Moving on to H2, which explored the impact of Subjective Norms (SBN) on GPI. The coefficient was 0.174, suggesting a positive relationship, although with a smaller effect size compared to H1. The T statistic of 2.784 and a p-value of 0.005 indicate that the relationship is statistically significant but somewhat weaker compared to H1. This implies that subjective norms, while influential, might have a relatively smaller impact on green purchase intentions.

H3 delved into the relationship between Perceived Behaviour Control (PBC) and GPI. The coefficient was 0.328, and the T statistic stood at 5.085, both indicating a strong and statistically significant relationship. The p-value of 0 reaffirms this significance, highlighting that PBC significantly and positively influences individuals' green purchase intentions.

Discussion

The results of the hypotheses testing provide valuable insights into the relationships between key constructs in our study and shed light on the determinants of individuals' green purchase intentions (GPI). These findings have important implications for understanding consumers' decision-making processes and behaviours related to sustainable consumption. Starting with H1, which investigated the relationship between Attitude and GPI, the results reveal a strong and statistically significant positive association. The coefficient of 0.331, coupled with a T statistic of 4.585 and a p-value of 0,

underscores the robustness of this relationship. This outcome underscores that individuals' attitudes towards environmentally conscious purchasing play a pivotal role in shaping their intentions to engage in green consumption. This aligns with previous research emphasizing the central role of attitude in predicting sustainable consumption behaviours (Luchs et al., 2015).

Moving on to H2, the results demonstrate a statistically significant positive relationship between Subjective Norms (SBN) and GPI. Although the coefficient of 0.174 indicates a positive effect, it is notably smaller compared to H1. The T statistic of 2.784 and a p-value of 0.005 signify statistical significance but also suggest that subjective norms might have a relatively weaker influence on green purchase intentions. Nonetheless, this result underscores the relevance of social influences in shaping sustainable consumption decisions, in line with the theory of planned behaviour (Ajzen, 1991). H3 explored the link between Perceived Behaviour Control (PBC) and GPI, revealing a strong and statistically significant positive relationship. The coefficient of 0.328, along with a T statistic of 5.085 and a p-value of 0, emphasizes the substantial impact of perceived control over one's behaviour on green purchase intentions. This finding supports the idea that individuals are more likely to engage in sustainable consumption when they believe they have the necessary control and resources to do so (Chi & Zheng, 2016).

Practical Implications

The practical implications drawn from the results of this study have the potential to guide businesses, policymakers, and marketers in promoting sustainable consumption behaviours among consumers. These implications are based on the relationships established between attitudes, subjective norms, perceived behaviour control, and green purchase intentions (GPI) in the hypotheses testing results. Given the strong and highly significant relationship between Attitude and GPI (H1), businesses and marketers should focus on shaping and enhancing consumers' positive attitudes towards environmentally friendly products and practices. This can be achieved through various means, such as communication campaigns emphasizing the benefits of green products, highlighting the environmental impact of choices, and creating positive associations with eco-friendly brands. These initiatives can help drive consumers' intentions to make green purchases (Luchs et al., 2015). The substantial and significant impact of Perceived Behaviour Control (PBC) on GPI (H3) suggests that facilitating consumers' belief in their ability to engage in green behaviours is crucial. Businesses can provide practical solutions and resources that make sustainable choices more accessible and convenient for consumers. For example, offering eco-friendly alternatives, providing clear instructions on how to use green products, and reducing barriers to sustainable choices can enhance PBC and, consequently, GPI (Huamán-Pastorelli et al., 2020). While the effect size is smaller compared to Attitude and PBC, the influence of Subjective Norms (SBN) on GPI (H2) remains statistically significant. This implies that social influences matter in shaping green consumption intentions. Policymakers and businesses should consider leveraging social norms and peer pressure positively. Promoting and celebrating sustainable

behaviours within communities and social networks can help reinforce the significance of eco-friendly choices (Ajzen, 1991).

Marketers should adopt integrated marketing strategies that encompass attitude-building, enhancing perceived behaviour control, and leveraging subjective norms. This holistic approach can maximize the impact of these determinants on GPI. Integrated campaigns that align positive messaging, product accessibility, and social influence can create a more compelling environment for sustainable consumption (Luchs et al., 2015).

Conclusion

In summary, this study has provided valuable insights into the determinants of green purchase intentions (GPI), revealing the significant influence of attitudes, perceived behaviour control, and subjective norms on consumers' environmentally conscious decision-making. The robust findings underscore the importance of cultivating positive attitudes towards green products and practices, facilitating consumers' beliefs in their ability to make sustainable choices, and acknowledging the role of social influences. These insights hold practical implications for businesses, policymakers, and marketers seeking to promote sustainable consumption behaviours. As environmental challenges persist, understanding the factors driving GPI becomes increasingly crucial for fostering a more eco-conscious society. While this study contributes substantially to this understanding, the complexity of consumer behaviour warrants further research to explore additional variables and contextual factors shaping sustainable consumption. In conclusion, this research highlights the significance of attitude-building initiatives, enhancing perceived behaviour control, and leveraging subjective norms as key strategies in encouraging consumers to make greener choices and contributing to a more sustainable future.

Limitations and Future Research Directions

While this study provides valuable insights, it is essential to acknowledge its limitations. First, the research relied on self-reported data, which may be subject to social desirability bias. Future studies could benefit from incorporating behavioural measures to validate findings. Additionally, the study's context and sample demographics might limit the generalizability of results. Expanding the research to diverse populations and settings would enhance its external validity. Finally, the study focused on three key determinants; exploring other potential factors influencing green purchase intentions could provide a more comprehensive understanding of sustainable consumption behaviours.

Future research should consider several avenues for further investigation. Firstly, longitudinal studies could provide insights into the dynamics of sustainable consumption behaviours over time. Secondly, examining the mediating and moderating effects of variables, such as environmental knowledge or personality traits, could offer a deeper understanding of the relationships identified in this study. Additionally, exploring the role of marketing strategies, such as eco-labelling and green advertising, in influencing green purchase intentions could be valuable for businesses and policymakers. Finally, given the

evolving nature of sustainability issues, staying attuned to emerging trends and their impact on consumer behaviour should remain a priority in future research.

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