Journal of Innovation & Knowledge 7 (2022) 100280

Journal of Innovation & Knowledge

https://www.journals.elsevier.com/journal-of-innovation-and-knowledge

Green innovation practices and consumer resistance to green innovation products: Moderating role of environmental knowledge and pro-environmental behavior

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ARTICLE INFO

Article History:
Received 9 July 2022
Accepted 1 October 2022
Available online 7 October 2022

Keywords:
Consumer resistance
Environmental knowledge
Green innovation
Green products
SMEs

JEL Codes:
O3
M0

ABSTRACT

"Green innovation" and "green products" are buzzwords in the current era. However, consumers habitually resist innovative appliances that differ from the conventional ones. This study investigates the influence of green innovation practices on consumer resistance to green innovation products and the moderating influence of environmental awareness and pro-environmental behaviors based on the diffusion of innovation and expectation theories. A cross-sectional online survey of 750 SME employees revealed numerous significant causal associations between green innovation practices and consumer resistance to green product innovation. Additionally, the moderating effect of environmental awareness and pro-environmental behavior was assessed. The results supported the predicted moderating relationships. This study contributes to the body of knowledge for green product manufacturers worldwide and provides key insights to the SMEs. This study also has several theoretical and practical implications as well as the future research prospects.

Introduction

Globally, business groups significantly contribute to the economies of developing countries (Chege & Wang, 2020). However, with rapid economic development, difficulties relating to the environment and pollution, such as waste pollution, vast industrial excess, and severe emissions such as carbon, are increasing daily (Xu et al., 2020). Companies must pay greater attention to environmental management creativity and environmental planning strategies. Thus, firms struggle to foster green innovation practices (Musaad O et al., 2020). However, owing to rising environmental challenges, resource depletion, and environmental stress, green innovation has received much attention from academics in the last decade. (Kawai, Strange, & Zucchella, 2018). Environment knowledge includes the knowledge of product manufacturing, its impact on the environment, and how collective responsibility is required for long-term sustainable development (Kaufmann, Panni, & Orphanidou, 2012).

There is limited research on consumer resistance toward environment-friendly innovative ideas. Few studies have recorded this resistance and its integration with environmental knowledge and behavior. Thus, this study attempts to address this research gap. Consumers encounter with green innovation products is important in implementing consumer behavior. Consumers' resistance can be explained as a hesitancy to try fresher technologies in their elementary form. This is the key reason for market dissatisfaction with innovation, also known as consumer opposition to green innovation. Similarly, it is the main element that stymies or delays the admission of novel technologies (Laukkanen, Sinkkonen & Laukkanen, 2008). According to empirical studies, green innovation practices have a significant failure rate, indicating that many inventions flop due to consumer resistance to green product innovation. Consumers' resistance has been an important concern for commerce, and it will become a major threat in the upcoming era (Abbas, Shahid Nawaz, Ahmad, & Ashraf, 2017; Ahmad, 2021; Haq, Ramay, Rehman, & Jam, 2010; Jam,

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https://doi.org/10.1016/j.jik.2022.100280

Singh, Ng, & Aziz, 2018). Researchers have argued that companies must first recognize the causes of product failures to accomplish innovation inventiveness efficiently. The controversy in research reporting has highlighted the need to explore and highlight the factors that are integrated and that can moderate the controversial relationship between innovation practices and consumer resistance to innovation. Literature concerning environmental knowledge and behavior relevance to consumer resistance to innovation is scarce. Thus, the current study provides a theoretical basis for determining these two constructs as moderators of an existing relationship.

Consumers are more concerned about the environmental issues of protection. States frequently enact strict environmental policies to reduce emissions bolstered by industries, such as small and medium businesses (SMEs) (Mohsin, Zhou, Iqbal, & Shah, 2018). However, due to their small size, SMEs' addition to environmental degradation is overlooked at the local and national levels in the form of rule (Khan, Jam, Shahbaz, & Mamun, 2018; Sun et al., 2020). According to previous studies, SMEs account for about 70% of the business's general surplus waste and environmental releases of useless material. Consequently, due to pressure from numerous stakeholders, awareness grew, and the state also increased its duty to SMEs to minimize hazard environment impact (Rasheed & Anser, 2017). The practical importance of this study is that it is expected to provide key policy insights for policymakers striving to achieve sustainable development goals, especially those related to environmental awareness and rehabilitation. This study is vital for academic scholars working to determine integrated aspects of environmental management concerning the environmental research domain. Thus, the present study is incremental in examining consumers' attitudes toward green innovation practices and consumer resistance to green innovation products with environment and pro-environment behavior in the context of moderation in Malaysian SMEs. This study addresses research questions on how adoption of innovation practice helps overcome consumer resistance to green innovation. What role is played by environmental knowledge and behavior in this connection?

Two important objectives of the present study were achieved. First, to investigate the influence of green innovation practices adopted by SMEs on consumer resistance to green innovation products. Second, environmental knowledge and pro-environmental behavior moderate consumer resistance to green innovation products among Malaysian SMEs.

Literature review

Theoretical foundation

The current research theme is grounded in multiple innovation and organizational behavior theories. According to the diffusion of innovation theory by Rogers, Singhal, and Quinlan (2014), when a product is at its introduction level, there are some reasons, such as a lack of knowledge about green products and green activities. When green practices are in the initial stage, defects may need to be addressed to improve consumer utility. Furthermore, according to the expectancy theory (Ferris, 1977), until the consumers are fully aware of, know the performance and have motivations, they would like to use and think positively about the innovation. The diffusion of innovation theory and expectancy theory support the basis of the framework investigated in this study (Eagly & Chaiken, 1993).

As approaching evidence advocates, according to these theories, this is not the end of the narrative and consumers are not always as sensible or systematic as they appear to be regarding establishing attitudes. The diffusion of innovation theory has different stages according to the product life cycle, from introduction to decline. During the growth stage, green products are at the highest point of acceptance by consumers (Wang et al., 2020). However, consumers in the laggard stage are mostly resistant to green product innovation. In expectancy theory, customers see different benefits from the product based on environmental knowledge and may show pro-environment behavior. This knowledge helps them shape their attitudes toward green products, which are innovative and helpful in improving the environment (Chen, Chang, & Hsiao, 2022). Similarly, if consumers engage in pro-environmental behaviors, they expect that their attitude toward green innovation products will result in better environmental outcomes for society. The proposed theoretical framework of this study is presented in Fig. 3. Thus, the present study is grounded in the latest theories on innovation, consumers' motivations, and expectations.

Green innovation practices

Green innovation will reduce specific environmental risks, such as CO2 emissions and other consequences of climate change, as well as product usage. Environmental design is defined as creating innovative environmental systems, developing sustainable processes, and applying eco-design principles (Anser, Yousaf, Nassani, Abro, & Zaman, 2020). Several researchers have presented definitions of green innovation in the past (Anser et al., 2020; Wang et al., 2020). A description of ecosystem innovation has been provided. Green innovation involves generating new ideas and promoting creativity in products, services, processes, and procedures (Afridi et al., 2020). The procedure is environmentally friendly and can help reduce environmental dangers.If SMEs adopt green innovation practices, they decrease the consumption of natural resources, follow recycle, reuse, and remanufacture policies, use renewable technologies, produce environmentally friendly products through design and innovation, and use less toxic materials that are harmful to the environment (Mazhar, Jam, & Anwar, 2012; Sanni, Ngah, Karim, Abdullah, & Waheed, 2013; Wang et al., 2020). How the adoption of green innovation practices convinces consumers that it improves environmental quality is a gray area of research. Marketing scholars have paid little attention to this issue. Thus, when marketing green innovation products designed by SMEs, it is vital to explain new features with benefits to consumer utility and their utility to the environment, to create and develop a favorable attitude. According to Hoeffler (2003), truly novel items are associated with higher levels of uncertainty than incrementally new products. Based on the characteristics explained as green innovation practices and reasons for consumer resistance to innovation, it is expected that consumers with less environmental knowledge will resist the development of green innovation products by SMEs. Thus, we propose the following hypothesis:

- **H1:** Green innovation practices are negatively related to consumer resistance to green innovation products.

Moderating role of environmental knowledge and pro-environmental behavior

Environmental knowledge entails the general knowledge of facts, concepts, and interactions relating to the natural environment and ecosystems (Fryxell & Lo, 2003). It concerns people's knowledge about how products are made, their environmental impact, and how collective responsibility is required for long-term growth. Consumers' green purchase behavior requires collective awareness and friendly attitudes toward green products, and the intention to buy green products is imperceptibly generated (Xu et al., 2022). Consumers are familiar with the greenhouse effect, waste management, hazardous waste, and recycled materials. There is a strong link between environmental awareness and green purchasing behavior (Sadiq, Adil, & Paul, 2021). Businesses involved in environmentally responsible activities have high integrity (Khan et al., 2021). If a consumer is offered information on the causes and effects on the environment, their level of awareness will rise, and they will likely choose green

products for daily activities. Thus, environmental knowledge has been reported as a key external factor influencing consumer resistance toward green innovation products (Huang, Jin, & Coghlan, 2021). Recent research has concluded that rituals and personal image are the strongest barriers to consumer acceptance of innovation (Sadiq et al., 2021; Shahbaz, Tiwari, Jam, & Ozturk, 2014; Waheed, Kaur, Ain, & Sanni, 2015). Additional findings have revealed that environmental concerns reduce the negative impact of value and image building on consumer resistance to green products (Sadiq et al., 2021). Another recent study reported that innovation resistance theory factors are negatively related to the intention to use innovative applications. However, some studies have reported that consumer communication significantly influences innovation resistance factors (Chen et al., 2022). Thus, pointing toward the interactive effects of consumer communication by increasing consumer knowledge may help overcome the resistance among consumers toward green innovation products. Thus, based on evidence from recent literature and theories, this study proposes the following hypothesis:

- **H2:** Environmental knowledge moderates the relationship between green innovation practices and consumer resistance to green innovation products. If environmental knowledge is high, the negative relationship is weak.

Sustainability has become a prominent topic because of widespread environmental degradation. In recent years, environmental problems and their negative influence on society have prompted a movement toward environmental betterment, promoting green industry and consumption to prevent environmental damage (Fryxell & Lo, 2003). Consumer behavior is the root of the change in environmental difficulties; thus, most businesses and consumers face challenges in conserving resources and safeguarding the environment worldwide (Kashi, 2019). The recent increase in environmental quality during the lockdown to prevent the spread of coronavirus (COVID-19) highlights that human actions are the primary cause of environmental degradation. Some recent studies reported that pro-environmental behaviors are valid predictors of employees' environmental performance as it helps shape their attitudes (Ali, Nisar, Abidin, Qammar, & Abbass, 2022; Khan, Jianguo, Ali, Saleem, & Usman, 2019; Waheed, Klobas, & Kaur, 2017). Consumers are the most important participants in green marketing; thus, examining their green consumption habits is critical. Humans are responsible for conserving the environment by limiting their use of natural resources. Consumers must switch from conventional to green products to reduce their environmental impact. Green consumer behavior is a panacea for preventing future environmental devastation. A recent study on consumer innovation resistance factors reported pro-environmental behaviors as key influencers in determining consumer attitudes and resistance toward eco-friendly innovations (Huang et al., 2021). Another study reported similar findings that beliefs and attitudes, and people's political ideologies, are greatly influenced by pro-environmental behaviors compared to social and demographic attributes (Smiley, Chen & Shao, 2022). Another study investigated the adoption of information and communication technology (ICT) as a moderator between energy efficiency-based behavior, intrinsic motivation and green thinking. The study confirmed that pro-environmental behaviors have stronger associations with technology and innovation adoption (Mansoor & Paul, 2022). Thus, leading toward testing the moderating influence of pro-environmental behaviors on green innovation practices and consumer resistance to green innovation products. This notion was also grounded in the theory of innovation diffusion. Thus, the following hypothesis was proposed:

- **H3:** Pro-environmental behavior moderates the relationship between green innovation practices and consumer resistance to green innovation products. If the pro-environmental behavior is stronger, the negative relationship will be weaker.

In summary, this research is an incremental advance to build theoretically grounded associations between the two unique constructs of marketing technology and innovation literature. Usually, consumers are reluctant or resistant to innovation due to the natural human tendency to avoid change and uncertainty. Consumers' resistance to innovation has been explained as resistance to extended features of the new innovative product, its usability, the consumption procedure, or its lack of utility felt by consumers (Sun, 2021).

Methodology

Based on a detailed assessment of the literature and the diffusion of innovation theory and expectancy theory, the study's conceptual framework is proposed in Fig. 1, and the hypotheses were considered for empirical testing in the context of Malaysian SMEs. The study population for this consumer research consisted of employees of SMEs categorized based on the number of employees (less than 150) (Moorthy et al., 2012). Therefore, all small firms that met this parameter were considered SMEs in this study. This study used information from the Malaysian Department of Statistics website to obtain the basic contact information of SMEs from the MyKey-II project. Malaysia's SMEs are considered as they are the most emerging and innovative sector in the Malaysian economy. This sector is the backbone of the Malaysian economy and one of the key targets for achieving sustainable development goals for the Malaysian government. Thus, this study considered a sample of Malaysian SMEs for its framework. SMEs listed on the Department of Statistics website were selected randomly based on the available contact details so that researchers could easily access them. Those with no or incomplete contact information were excluded from the study.

The sampling frame was devised based on the available contact information for the SMEs, and the unit of analysis was individual-level managers working in various Malaysian SMEs. Initially, only the management of these SMEs was contacted to obtain their willingness to participate in this research. In the first stage, the authors contacted 500 SME managers, out of which 150 agreed to participate in this research. However, a few refused to participate when asked to provide their employees' email data. Therefore, 100 SMEs participated in this research.

Ethics statement

Studies involving human participants were reviewed and approved by the ethics committee of XXX, Malaysia. The patients provided written consent to participate in the study.

Research approach

This study adopted the qualitative field survey approach. First, SME managers were contacted on a convenience sampling basis, following which they were sent the survey form. According to Moorthy et al. (2012), this approach is considered robust.

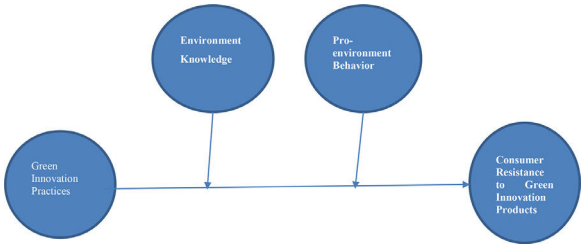

Fig. 1. Theoretical framework of the study.

Participants and procedures

After obtaining formal permission from managers to include their personnel in this investigation, a letter detailing the study's aims was sent to the management of the Malaysian SMEs, requesting their voluntary participation. The identities of the business and its employees were kept private. It was guaranteed that no personal information would be used, published, or shared with a third party throughout the research project. SMEs from three different states, Johar, Penang, and Selangor, were included in this research to capture employees' perceptions regarding the study variables. Researchers assume that all SME employees are users and consumers of products locally produced by other Malaysian SMEs. Thus, employee data was preferred over consumer data to avoid complicated consumer classifications. A total of 1000 employees from 100 SMEs were contacted via email. They were sent a questionnaire and a covering message stating the study's objectives and inquiring about their voluntary willingness to participate in this research. The researchers were able to enlist 820 employees to participate in the study. The language of the online survey was English, and only proficient English users were included in the survey. Further, 70 more respondents were excluded from the study due to poor language proficiency. The data gathering procedure began on January 5, 2022, and 760 valid data were administered on March 10, 2022. More data responses were excluded due to missing values and unengaged responses. In conclusion, the final number of responses was 750, with 80% of the final response rate.

Measures of the study

A 24-item questionnaire was developed to investigate green innovation practices, consumer resistance to green product innovation, and the moderating influence of environmental knowledge and pro-environmental behavior on Malaysian SMEs employees.

A 7-item scale for green innovation practices was adopted, which included "lower consumption of e.g., water, electricity, gas, and petrol during production/use/disposal." and "recycle, reuse, and remanufacture materials or parts" as items. The results were collected using a "7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

A 5-item scale for consumer resistance to green product innovation was adopted. Items included in this scale were "spending more time to adapt to new functions than before." and "Do not consider this product the first choice." The results were collected using a "7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

A 6-item scale was adopted for environmental knowledge. Items included in this scale are "I make it a point to stay up-to-date about changes in environmental laws and regulations related to this business" and "I put a lot of effort into being aware of the environmental aspects and impacts of my business." The results were collected using a "7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

A 6-item scale of pro-environmental behavior was adopted. The items included in this scale are "I suggest workplace practices that could improve performance." and "I undertake actions that contribute positively to my company's image." The results were collected using a "7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Results

Measurement model

The measurement and structural models were evaluated using SmartPLS3. According to the simulation assessment, participants' gender and marital status significantly impacted consumer resistance to green product innovation; as a result, demographic information was controlled across the research analysis. Demographic profiles are presented in Table 1.

Table 1
Demographic profile.

Demography	Description	No. of Responses	%
Gender	Male	550	73.4
	Female	200	26.6
Marital Status	Married	620	82.6
	Not Married	130	17.4

Table 2
Composite reliability, Cronbach's Alpha and AVE values.

Constructs/Items	CA	Rho-A	CR	AVE
Consumer Resistance to Green Innovation Products	0.826	0.831	0.878	0.592
Environmental Knowledge	0.795	0.870	0.802	0.564
Green Innovation Practices	0.780	0.815	0.816	0.508
Pro-environmental Behavior	0.777	0.873	0.844	0.577

Note: CR=composite reliability; AVE=average variance extracted; CA= Cronbach's alpha.

Furthermore, the measurement model was used to calculate Cronbach's alpha (CA) and composite reliability (CR) to examine the consistency of the data (Raeder, Larson, Li, Kepko, & Fuller-Rowell, 2008). CA and CR values of more than 0.7 were found in all research components, showing that they fulfilled the accuracy criteria (Ramayah, Cheah, Chuah, Ting, & Memon, 2018). The constructs' convergent validity was determined using factor loadings and Average Variance Extracted (AVE) (Ramayah et al., 2018). All factor loadings of the study constructs met the minimum threshold of 0.70 in both experiments, and the AVE was greater than 0.50 (Raeder et al., 2008). The results are presented in Table 2.

Moreover, all the study models demonstrated discriminant validity. According to Fornell and Larcker (1981), discriminant validity is "the amount to which a given latent variable differs from other latent variables." It was calculated by examining the correlation between latent variables and the actual number of AVEs (Raeder et al., 2008). Raeder et al. (2008) recommend using latent components with a value of 0.50 or higher when establishing discriminant validity. According to Raeder et al. (2008), discriminant validity is demonstrated when the square root of AVE is greater than the value of the latent variable. The discriminant validity values for this research are presented in Table 3 below.

Assessment of structural model

Direct hypothesis testing

This section refers to the structural model Raeder et al. (2008) provide regarding evident measurement model linkages. The proposed model uses a structural model to stress the interconnectedness of relationships. The structural model in PLS examines the direct relationship between the offered hypotheses and their t-values and regression coefficients; an indirect effect is the same as a standardized beta value in regression analysis, according to Ramayah et al.

Table 3
Discriminant validity.

	CRGIP	EK	GIP	PEB
Consumer Resistance to Green Innovation Products	0.769			
Environmental Knowledge	0.520	0.681		
Green Innovation Practices	0.348	0.267	0.639	
Pro-environmental Behavior	0.405	0.521	0.215	0.691

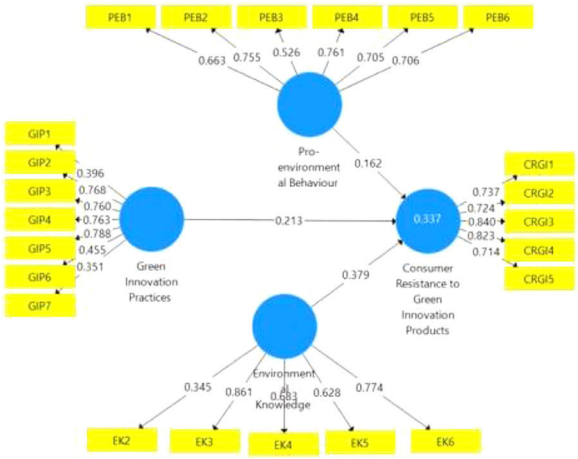

Fig. 2. Structural Model.

Table 4
Hypothesis testing.

H	Path	B-Value	Sample Mean	Standard Deviation	*T* value	*P*-value	
H1	EK -> CRGIP	0.379	0.378	0.060	6.335	0.000	Supported
H2	GIP -> CRGIP	0.213	0.222	0.059	3.616	0.000	Supported
H3	PEB -> CRGIP	0.162	0.169	0.068	2.382	0.018	Supported

Note: EK= environmental knowledge; GIP= green innovation practices; CRGIP= consumer resistance to green product innovation.

(2018). The t-values and beta values of the regression coefficients are used to determine significance; according to Hair, Hult, Ringle, Sarstedt, and Thiele (2017), t-values of more than 1.64 are statistically significant and are then used to make conclusions about the suggested hypotheses. The two main purposes of the model are to examine direct linkages and to verify the projected interactions between components using a structural model. Six possibilities were investigated in this study and are presented in Fig. 2. Table 4 lists the findings from SmartPLS 3.0, including path coefficients, t-values, p-values, and standard errors (Ramayah et al., 2018). They were then employed to determine whether the hypotheses was correct.

In Table 4, the results of environmental knowledge concerning consumer resistance to green product innovation support the hypotheses. Green innovation practices concerning consumer resistance to green product innovation show acceptance of this hypothesis. Pro-environmental behavior is related to consumer resistance to green product innovation, and the results show acceptance of the hypotheses.

Moderator hypothesis testing

According to Ramayah et al. (2018), a study of moderation was used to find which moderator variable influences the success or strength of the link between the independent and dependent variables. This hypothesis is supported by Table 5, which demonstrates that pro-environmental behavior ($B = 0.077$, $P = 0.002$) moderates the association between consumer resistance to green product innovation and green innovation practices. This hypothesis is accepted because of environmental awareness ($B = 0.087$, $P = 0.008$) moderates the association between consumer resistance to green product innovation and green innovation techniques.

Assessment of R2

The coefficient of determination is the second step in examining a structural model (Hair, Ringle, & Sarstedt, 2011). The coefficient of

Table 5
Moderator hypothesis testing.

Path	B-value	(STDEV)	*T*-value	*P* value	Decision
CRGPI * PEB -> GIP	0.077	0.056	3.578	0.002	Supported
CRGPI * EK -> GIP	0.087	0.048	3.534	0.008	Supported

Note: EK= environmental knowledge; GIP= green innovation practices; CRGIP= consumer resistance to green product innovation.

Table 6
Assessment of R square.

	R^2
Consumer Resistance to Green Product Innovation	0.337

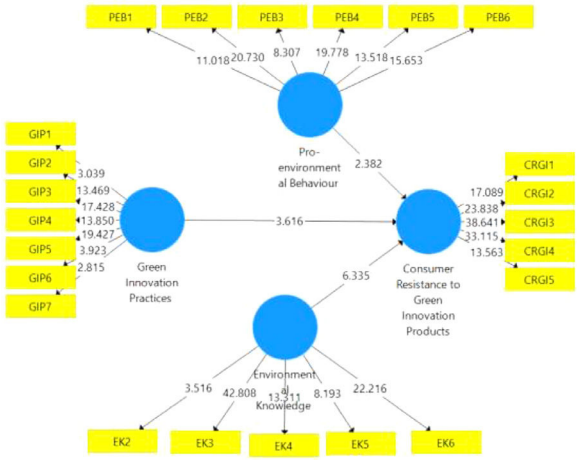

Fig. 3. PLS bootstrapping.

determination represents the variance in endogenous constructs caused by external construction (Hair et al., 2011). R2 is a number spanning from 0 to 1. Furthermore, according to Chin (1998)), R2 values of 0.13 are weak, 0.33 are moderate, and 0.67 are high. Table 6 shows the coefficient of determination for the endogenous constructs. PLS bootstrapping with the structural model is shown in Fig. 3.

Discussion

This study aimed to determine whether there was a link between green innovation practices and consumer resistance to green innovation products and whether environmental knowledge and pro-environmental behavior had a moderating effect on Malaysian SME employees. The study findings supported all hypotheses.

The present study's results show a strong and significant association between green innovation practices and consumer resistance to green innovation products, supporting Hypothesis 1. This association is unique and has contributed fresh empirical evidence in the literature related to these two constructs. However, based on the theoretical resemblance of this idea, the results are consistent with the predictions and findings (Hoeffler, 2003; Sun, 2021; Wang et al., 2020). Similarly, Hypothesis 2 proposes that environmental knowledge moderates the relationship between green innovation practices and consumer resistance to green innovation products. The results reveal a significant moderation of environmental knowledge in predicting consumer resistance to innovative green products. Furthermore, the negative relationship was weaker for a higher level of environmental knowledge. Again, this evidence is fresh to the literature because of the unique theoretical notions investigated in this study. However, it can still be matched with the conceptual

consistency of recent studies (Chen et al., 2022; Huang et al., 2021; Sadiq et al., 2021).

This study also proposed and tested pro-environmental behavior as a moderator between green innovation practices and consumer resistance to green innovation products. Hypothesis 3 was also supported by the findings of the current research that in the case of a higher level of pro-environmental behaviors, the existing negative relationship between the two constructs was weaker. This empirical evidence is novel because of its unique investigation, and its theoretical basis is consistent with recent studies (Huang et al., 2021; Mansoor & Paul, 2022; Smiley et al., 2022). Furthermore, this study helped advance the literature on consumer resistance to innovation, green innovation, environmental knowledge, and pro-environmental behavior, with additional evidence from the Malaysian SME sector. Such unique associations have never been previously investigated in the literature.

Theoretical implication

This study contributed to several theoretical advancements in the knowledge related to environmental management, marketing, and innovation. First, it unifies two distinct theories, diffusion of innovation and expectancy theories, into a single paradigm. The application and integration of these two famous theories in a single framework is a major incremental theoretical advance in current research. Such theoretical advances are scarce in the literature on green marketing and consumer innovation resistance. Second, customer aversion to new technologies or products can impact the spread of green products. Furthermore, depending on their use, consumers may have varying levels of resistance to different product offerings or advancements. Such key theoretical insights have opened ample avenues for theoretical exploration in literature. Third, this study is incremental to the body of knowledge by bridging theoretical gaps between consumer resistance to digital innovation, green innovation practices, environmental knowledge, and pro-environmental behavior constructs. Fourth, a major contribution of the study is to propose and test the moderation of environmental knowledge, and pro-environmental behaviors in a unique theoretical association pitched in the present study. This enlarged relationship study is a new theoretical contribution that has benefited from the empirical data from the unique context of Malaysian SMEs. Finally, this study is one of the earliest attempts to bring together and integrate green activities into a cohesive theoretical framework that includes consumer resistance to innovation.

Practical implications

Regarding practical implications, this study's findings imply that when developing innovative green products for customers, managers should consider green innovation practices and techniques while considering the psychological and attitudinal factors to manage consumer resistance to new technology or product change and innovation. First, managers should be influenced by the reduced potential market for current products if the green product and actual product offer many similar characteristics and thus have greater stability. Marketers are responsible for creating environmental knowledge in their target market and use pro-environmental behaviors as role models to overcome consumers' resistance to new technology and innovation in green products. The key elements of innovation by Malaysian SME were green product innovation, green innovation practices, and the moderating impact of environmental knowledge and pro-environmental behavior. Therefore, the present study may provide key insights that consumer resistance to green product innovation, environmental knowledge, and pro-environmental behavior are linked in determining the success of any green product innovation. Therefore, managers, marketers, and design specialists are encouraged to work together to improve the physical, social, and psychological value of green products for the consumer. Finally, if consumers are more resistant to innovative green products, managers should be mindful that new green products may not be adopted as quickly as predicted to determine the success or failure of green products.

Limitations and future directions

Like other studies, this study has substantial shortcomings that must be considered in future research attempts. The present survey was conducted among Malaysian SMEs' employees for several reasons. For example, actual consumers may not be aware of the green innovation practices adopted by SMEs. Moreover, it was not convenient to identify if consumers are using some SME products of SMEs and its environmental knowledge is related to those SMEs products or not. Therefore, considering employees as consumers solved the purpose and matched the study objectives. Future studies should consider two different samples in a single study, one from employees and another from consumers separately to analyze comparative differences in attitudes and behaviors of both categories as consumers. As this study is based solely on SME data, its generalization to larger companies and FMCGs is limited. Comparative research on SMEs and large companies may help answer many unanswered questions. Second, the data were collected in a cross-sectional format despite the likelihood that future researchers may use a longitudinal study design for a better causal association. As the adoption of green innovation practices is more frequent in industrialized nations for consumer resistance to green product innovation, experts should investigate variables that may mediate the impacts in additional research to acquire more significant outcomes in managing consumer resistance to technology and innovation. Finally, future studies can collect a large amount of data for research for more accurate results. Additionally, a comparative study of developing and developed countries may highlight the differences in consumer attitudes and behaviors as well as environmental knowledge differences between the two dynamic settings.

Conclusion

The emergence of sustainable development goals by the United Nations charter and member countries' commitment to preserve and promote environmental awareness and knowledge to shape the environmental behavior of individual society members is a key aspect of this era. In this scenario, addressing the issue of consumer resistance to green innovation products becomes vital for SMEs producing environmentally friendly green products. The empirical findings of this study demonstrate the significance of linkages between green innovation practices and consumer resistance to green product innovation, as well as environmental knowledge and pro-environmental behavior, which have emerged as significant moderators of this unique relationship in the Malaysian SMEs setting. This study has addressed the emerging issue of consumer resistance to green product innovation with a unique academic research construct of green innovation practices that is attracting the attention of academics and practitioners in the given theoretical and policy landscape. This study also highlights the importance of green innovation practices for SMEs' success of SMEs. By contrast, to adopt green innovation practices in the modern day, businesses, in general, and SMEs, in particular, must remodel their policies and rebuild their marketing tactics to overcome customer resistance to green product innovation. The major findings of this study instill confidence in business leaders, SME owners, and entrepreneurs by demonstrating that effectively managing consumer resistance has a bright future for businesses and that management support in applying green innovation practices is beneficial for product acceptance among consumers. This study

establishes a solid foundation for policymaking and managing consumer resistance to green innovation products using various theoretical and practical insights into Malaysian SME employees.

Declaration of Competing Interest

There are no conflict of interests to declare.

Role of the funding source

No funding was received for this study.

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