Available online at www.ijournalse.org

Emerging Science Journal

(ISSN: 2610-9182)

Vol. 8, No. 6, December, 2024

Enterprise Innovation Decision-Making Towards Green and Sustainability from the Perspective of Cognitive Innovation

Thi Anh Phuong Tran [1*], Xinshuo Hou [2]

[1] *Can Tho Campus, FPT University, Can Tho City, 94000, Viet Nam.*

[2] *Business School, Xiangtan University, Xiangtan 411105, China.*

Abstract

Although numerous current studies on green consumption and sustainable enterprise development have been carried out, the majority of them examined the issues from customers' viewpoints. This study aims to explore the mechanism that shapes firm innovation decision-making in the context of green and sustainable development from the perspective of business awareness under the impact of customer expectations. The study conducted an online survey (via Google Forms) with the participation of 301 employees from different enterprises in the Mekong Delta, Vietnam. To restrict the common method biases, Cronbach's alpha was checked by using SPSS to ensure the reliability of the initial scales. Based on a deductive approach and testing hypotheses through evaluating the measurement model and structural model using SmartPLS software, the research results determined the mechanism of forming firm innovation decisions in this study via the impact of customer expectations as a stimulating factor leading to awareness of innovation. Customer expectations were positively associated with perceived marketing innovation. Perceived marketing innovation was not only positively associated with perceived process innovation but also related to firm innovation. Similarly, perceived process innovation was significantly positively associated with firm innovation. In alignment with research findings, significant practical and academic contributions were also proposed.

Keywords:
Enterprise Innovation,
Decision-Making,
Cognitive Innovation,
Mekong Delta.

Article History:

Received:	27	May	2024
Revised:	07	November	2024
Accepted:	11	November	2024
Published:	01	December	2024

1- Introduction

The Mekong Delta (Mekong River Delta) is the southernmost region of Vietnam, also known as the Southwest region. This region comprises Can Tho, Long An, Dong Thap, Tien Giang, Ben Tre, Tra Vinh, Vinh Long, Hau Giang, An Giang, Kien Giang, Soc Trang, Bac Lieu and Ca Mau. The Mekong Delta is shaped like a peninsula, with three sides facing the sea (with a 700-kilometre shoreline), the west bordering Cambodia, and the north abutting Vietnam's Southeast economic zone, the country's largest. The Mekong Delta is located on relatively level terrain, and its network of rivers and canals is widely spread, making it advantageous for waterway traffic throughout the country. The region has an important economic position favourable for socio-economic development and trade with other areas [1]. Furthermore, this territory is located in the southernmost region of the nation, near Cambodia via the Gulf of Thailand, abutting the East Sea with a lengthy shoreline. The goal of economic development in the Mekong Delta in the coming years is to build a key economic region in the Mekong Delta, becoming a dynamic development region with a modern economic structure, contributing to the development of the Mekong Delta region to the economic development of the country [1, 2].

* **CONTACT**: phuongtta2@fe.edu.vn

DOI: http://dx.doi.org/10.28991/ESJ-2024-08-06-013

Due to the rapidly developing economy, businesses in the Mekong Delta are constantly researching and finding solutions to increase the efficiency of their business operations. That is considered a vital condition for all businesses to survive in today's fiercely competitive environment [3]. In addition, improving the operational efficiency of enterprises is an important factor and an inevitable trend to promote competition among enterprises, otherwise, they may be left behind [3]. Last but not least, firm innovation from awareness to operations shows that businesses know how to take advantage of limited resources, thereby maximizing profits and helping the business develop sustainably in the long term [1]. For these reasons, improving business performance has become a top priority for every business, in which, innovation can be seen as a solid foundation to create a premise for sustainable development long-term sustainability [2]. On the other hand, to integrate into the era of globalization and integration, and to keep up with the success of the Industrial Revolution 4.0, Vietnamese businesses in general, and businesses in the Mekong Delta in particular, have been constantly changing and renewing themselves in order to integrate into global development [1]. To increase their competitiveness, most firms in Vietnam, particularly growing ones, have prioritized innovation activities. Innovation serves as a watershed moment for firms looking to establish a presence in the market and compete on a global scale [2]. Recognizing the critical role of improving the Mekong Delta economic region, the Vietnamese government adopted the objectives of developing the regional economy by 2030, including promoting business innovation towards green and sustainable development [4, 5]. On the other hand, Loucks [5] called for decisions related to protecting the common ecosystem and global climate change, with a huge role of innovation in the operational process and practical action in the Mekong Delta region of Vietnam. Based on the above arguments, the urgency of practical research has been clarified as well as the foundation for conducting research related to the mechanism of decision-making for enterprise innovation towards green and sustainability from a cognitive perspective in the Mekong Delta.

In the context of enterprise innovation decision-making towards green and sustainability, specific studies on business innovation decisions from a cognitive perspective are still limited [6], especially in the Mekong Delta, Vietnam. According to Tien et al. [7], there is a conflict in the effort to reconcile the interests of society (society expects a higher quality of life, greener and safer) and business (minimizing costs and maximizing profits) while businesses can only try to come up with the best solutions to ensure benefits for all parties as well as maintain sustainable business development. As a result, these solutions are not always useful and reasonable when considered from an ethical perspective [7]. Along with the challenges of providing feasible solutions related to the green and sustainable development of enterprises, the requirement for synchronization in the perception of innovation of enterprises is a huge research gap to ensure consistency in implementing the common goals of enterprises [8]. However, Russell et al. [6] found that previous studies on corporate innovation (decisions to adopt digital transformation and information systems) often studied its post-rationality without considering the awareness of innovation before adoption.

In addition, innovation can be understood as "the implementation of a new or significantly improved product (goods/service) or process, a new marketing method, or a new organisational measure in practice, in the work organisation or in external relations" [9]. As a result, many international business scholars have asserted that innovation can be classified into four categories: product, process, marketing, and organisational [10-12]. Besides, recent studies related to enterprise innovation decision-making mostly considered decision-making based on data or the processes of business model innovation while customers' expectations from the enterprise viewpoint and enterprise perceptions of innovation were rarely mentioned [13, 14]. On the other hand, customer expectations are often considered in relation to marketing innovation activities (including product design, product-related services, etc.) while innovating marketing activities are only a part of the decision to innovate the business or do not necessarily lead to the decision to innovate the business [15-17]. Therefore, the research gap identified in this case is the relationship between customer expectations and innovation perceptions (e.g., whether marketing innovation perceptions lead to process innovation perceptions) leading to business innovation decisions.

Recognizing the above theoretical gaps in previous studies, the purpose of this study is to examine the mechanism of forming enterprise innovation decision-making towards green and sustainability via the nexus between customer expectations, perceived innovation (perceived marketing innovation and perceived process innovation), and enterprise innovation decision-making. As a consequence, this study tackled corporate innovation decision-making towards greens and sustainability using the Stimulus - Organism - Response (S-O-R) paradigm [18], in which the stimulus factor refers to customers' expectations, the organism refers to perceived marketing innovation and perceived process innovation, and response refers to enterprise innovation decision-making. The unique point of this research is to clarify the influence of customer expectations on perceived innovation, which clearly shows the relationship between perceived marketing innovation and perceived process innovation, then forms enterprise innovation decision-making from the enterprise viewpoint. The findings also reveal the role of perceived innovation in making decisions towards greens and sustainability and provide significant implications for managers in the context of developing the Mekong Delta region.

The remainder of the study has been separated into five sections. Section 2 is the literature review that identifies prior studies on the subject as well as research gaps to propose a research approach. Section 3 covers the research methods, whereas Section 4 gives the research findings. Section 5 discusses the research findings, while Section 6 presents conclusions, limits, and future research prospects.

2- Literature Review and Hypothesis Development

2-1- Literature Review

S-O-R framework, enterprise innovation decision-making towards green and sustainability, perceived marketing innovation, perceived process innovation, and customers' expectations from the enterprise viewpoint.

The stimulus-organism-response (S-O-R) framework is a psychological paradigm used to describe and explain human behaviour and intentions [18]. Stimuli include social influence, commercial messages, and situational situations [18]. The term "organism" refers to a person or a human's inner processes, which comprise cognitive, emotional, and physiological components that drive actions or behavioural intents [19]. Response is defined as the behavioural or cognitive effects of the interplay of external stimuli with the organism's internal processes [20]. In the context of enterprise innovation decision-making towards green and sustainability, previous studies applying the S-O-R framework mostly focused on green innovation from customers' instead of enterprises' viewpoints [21, 22] while enterprise innovation decision-making was considered to depend on enterprises' perception or managers' perception [23]. Therefore, this is one of the uniqueness of this study in explaining enterprise innovation decision-making via the S-O-R framework.

A systematic review was carefully conducted to provide an adequate explanation for the relationships between enterprise innovation decision-making towards green and sustainability, perceived marketing innovation, perceived process innovation, and customers' expectations from the enterprise's perspective. There were four significant findings were identified.

- Internal factors, external factors, and managers' perceptions were regarded as factors affecting enterprise innovation decision-making [23]. In this approach, the perception process of innovation is mainly based on the manager's perspective while the perception of all members of the enterprise is the foundation for making the right decisions [24]. In addition, this study mentioned "little interest for innovations by customers" and did not clarify the role of customer expectations in forming perceived innovation (perceived marketing innovation and perceived process innovation) [6, 23].
- Another approach to enterprise innovation decision-making, Du et al. [14] indicated that product and process innovations were two dimensions of enterprise innovation decision-making. Product innovation was mainly influenced by customers and process innovation was impacted by suppliers [14, 25, 26]. Although this approach has been taken by many studies, most studies rarely consider the cognitive aspects of innovation (including perceptions of product and process innovations), while decision-making needs much cognitive effort [6, 14, 25, 27, 28].
- Related to the nexus between customer expectations and perceived marketing innovation, almost all studies focused on customer needs or customer satisfaction and product innovation, while marketing innovation was mentioned apart or not mentioned in the relationship of customer expectations due to its wide range (product, price, promotion, and place) [15, 27, 29-31].
- Regarding the nexus between perceived marketing innovation and perceived process innovation in the context of enterprise innovation decision-making, Kahn [32] indicated that innovation was an outcome, process, and mindset. If considered as an outcome, innovation encompasses manufacturing innovation, innovation in processes, innovation in marketing, innovation in business models, supply chain innovation, and organisational innovation [32]. If seen as a process, innovation encompasses both the innovation and product development processes [32]. If innovation is considered a mindset, it includes individual mindsets and organisational culture [32]. Despite the significant contributions of Kahn [32] in explaining enterprise innovation, such as outcome, process, and mindset, this study did not clarify the relationship between them. Marketing innovation was a wide range of alterations in multiple aspects such as product, pricing, distribution (place), and promotion [33]; however, previous studies rarely examined perceived marketing innovation in the relationship between process innovation and enterprise innovation decision-making [6, 32, 33].

Based on the above gaps in literature and research objectives, the research approach was identified by investigating the nexus between customer expectations, perceived marketing innovation, perceived process innovation, and enterprise innovation decision-making towards green and sustainability. By applying the S-O-R framework to modify enterprise innovation decision-making, the novelty of this approach was clarified. Customer expectations refer to the stimulus factor, which is pre-trial views about products or services that serve as standards or reference points for assessing product/service performance [34-36]. Perceived marketing innovation and perceived process innovation refer to organisms, in which perceived marketing innovation is related to the awareness of the adoption of novel approaches to marketing that involve major adjustments in product design/packaging, distribution, promotion, and pricing [33]; perceived process innovation is connected to the recognition of the new work techniques, the real process design occupation, and the adoption of the change in all its complicated technological, human, and organisational parts [37].

Enterprise innovation decision-making towards green and sustainability refers to response, which is considered to be a result of cognitive processes (perceived innovation) via the impact of customer expectations. Additionally, enterprise innovation decision-making towards green and sustainability is built on the benefits of the enterprise via the lens of awareness of marketing innovation and process innovation [38].

2-2- Hypothesis Development

Previous studies showed that feelings of satisfaction/dissatisfaction are caused by an association between one's assessment of product performance and one's expectation level [39]. In other words, the higher the level of meeting customer expectations about services/products, the higher the level of customer satisfaction [35]. According to Basu et al. [40], understanding client expectations and requirements for products/services is a key foundation for marketing innovation strategies connected to products/services as well as the decision-making process [41]. Although there have been few studies investigating the relationship between customer expectations and marketing innovation perceptions, previous research has shown a positive relationship between customer satisfaction and marketing innovation activities related to products/services, where satisfaction refers to the extent to which customer expectations are met [42, 43].

H1: Customer expectations are positively associated with perceived marketing innovation.

H2: Customer expectations are positively associated with perceived process innovation.

H3: Customer expectations are positively associated with firm innovation decision-making towards green and sustainability.

The relationship between cognition and decision-making has been recognized in numerous previous studies [6, 28, 38]. According to Lopez-Fernandez et al. [23], managers' perceptions mediated the relationship between external and internal factors and enterprise innovation decision-making. In line with this, Du et al. [14] insisted that product and process innovations were two dimensions of enterprise innovation decision-making, while Purchase & Volery [33] supposed that marketing innovation was related to a wide range of alterations in multiple aspects such as product, pricing, distribution (place), and promotion. In the research of Kahn [32], enterprise innovation decision-making was not only an outcome but also a cognitive process (a mindset) via a process that comprised the ways and means through which innovation could occur. In light of these findings, this study assumes that perceived marketing innovation is considered as awareness of changes related to product, price, promotion, and distribution; thereby leading to a change in the perception of enterprise process innovation in the context of enterprise innovation decision-making towards green and sustainability. In addition, previous studies have proven the positive effect of perceived process innovation on enterprise innovation decision-making towards green and sustainability [30, 44].

H4: Perceived marketing innovation is positively associated with perceived process innovation.

H5: Perceived marketing innovation is positively associated with enterprise innovation decision-making towards green and sustainability.

H6: Perceived process innovation is positively associated with enterprise innovation decision-making towards green and sustainability.

Figure 1 shows the conceptual framework of enterprise innovation decision-making towards green and sustainability.

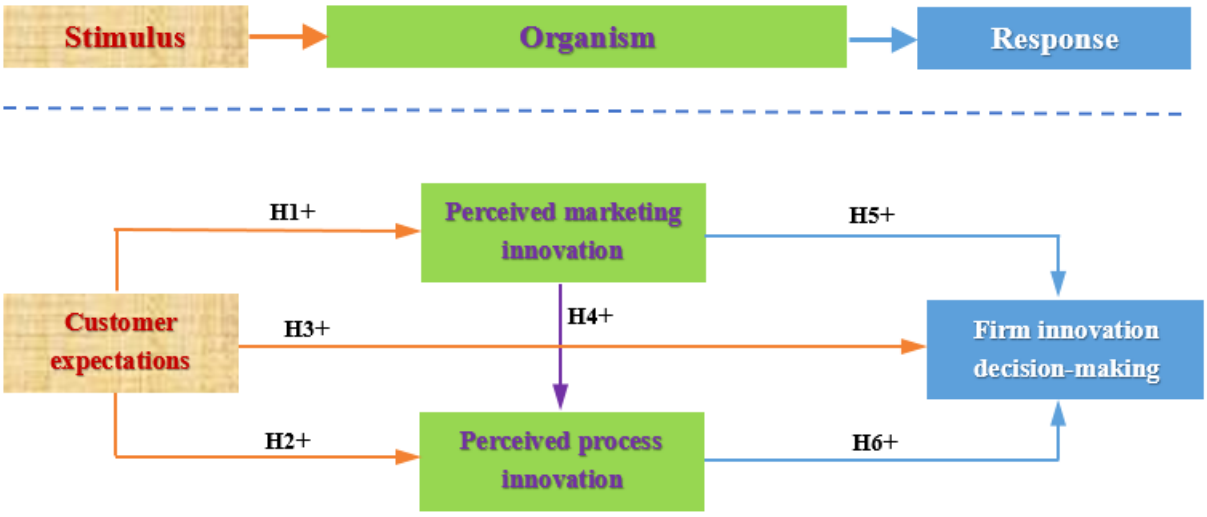

Figure 1. Conceptual framework of enterprise innovation decision-making towards green and sustainability

3- Research Methodology

3-1- Data Collection and Measurement Scales

To avoid interviewer impacts and bias due to social desire, primary data was acquired from current enterprise personnel located in the Mekong Delta of Vietnam by convenience sampling using a virtual form (Google Forms) [45, 46]. In accordance with Barclay et al. [47], the minimum size of the sample should equal ten times the total number of arrows in the latent variable at any location in the PLS structural model. This online questionnaire had over 500 responders, but only 301 of them provided valid responses. Table 1 shows the respondents' profiles. Despite the use of the convenience sample approach, this study deemed current employees to be well-represented in the population.

Table 1. Respondents' profiles

Indicator	Value	N/301	Percentage
Gender	Female	165	54.8
	Male	136	45.2
Age group	17-30	126	41.9
	31-40	74	24.6
	41-50	59	19.6
	>50	42	13.9
Educational level	Intermediate	3	1
	College	8	2.7
	University	235	78.1
	Postgraduate	55	18.2

3-2- Analytical Procedures

In order to avoid the common method bias, Kock & Lynn [53] introduced the whole collinearity test as a comprehensive technique for analysing both vertical and lateral collinearity at one time. If all VIF indexes from a comprehensive collinearity test are smaller than 3.3, the model is devoid of common method bias [53].

Cronbach's alpha was used with the SPSS programme to analyse the scales' reliability, ensuring high internal consistency and reliability (Table 2). Cronbach's alpha values should be greater than 0.6 [54]. The measuring model was analysed using SmartPLS to test convergent validity, composite reliability, and discriminant validity. The authors next recommend using Partial Least Squares Structural Equation Modelling (PLS-SEM) to assess the structural model and validate the hypotheses, which corresponds to analysing the complex connections between the various indirect and direct consequences [55].

Figure 2 shows the flowchart of the research methodology through which the objectives of this study were achieved.

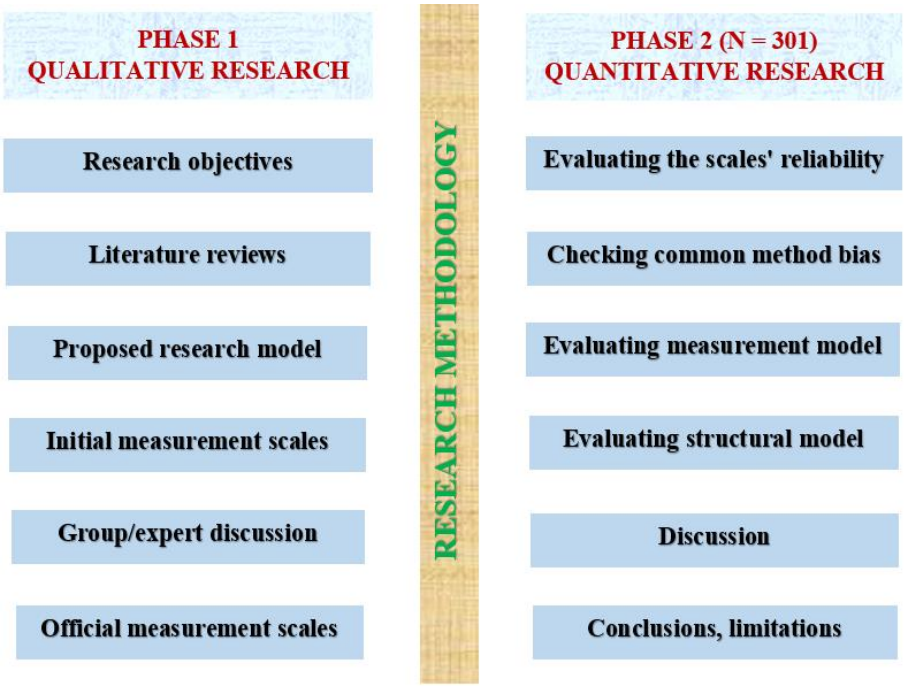

Figure 2. Research design and analytical procedures

Table 2. Measurement instruments

Items	Descriptions	Cronbach's Alpha (α)	Source
Customer expectations (CE)		0.878	
CE1	Products/services have superiority in the context of green and sustainability.		
CE2	Products/services are easily accessible in the context of green and sustainability.		
CE3	Products/services ensure the safety of customers in the context of green and sustainability.		[34-36]
CE4	Products/services meet customer expectations in the context of green and sustainability.		
CE5	Products/services are easy to use in the context of green and sustainability.		
Perceived marketing innovation (PMI)		0.843	
PMI1	Our firm may remember events related to recent product innovations.		
PMI2	Our firm recognizes the need to innovate products to meet customer expectations in the context of green and sustainability.		
PMI3	Our firm recognizes that product innovation increases competitiveness.		
PMI4	Our firm realizes that reasonable product prices increase competitiveness.		[33, 38, 48]
PMI5	Our firm recognizes fluctuations in the prices of products in the same segment.		
PMI6	Our firm recognizes the innovation of promotion and distribution activities that meet customer expectations.		
PMI7	Our firm recognizes the innovation of promotion and distribution activities that enhance competitiveness.		
Perceived process innovation (PPI)		0.850	
PPI1	Our firm recognizes innovation in working methods that can meet customer expectations in the context of green and sustainability.		
PPI2	Our firm recognizes that innovation in working methods can enhance competitiveness.		
PPI3	Our firm recognizes that technological process innovation helps raise customer expectations.		[37, 49, 50]
PPI4	Our firm recognizes that technological process innovation helps improve competitiveness.		
PPI5	Our firm recognizes that process innovation is vital in the context of green and sustainability.		
Firm innovation decision-making towards green and sustainability (FID)		0.865	
FID1	Our firm decided to innovate for the immediate benefit of the business.		
FID2	Our firm decided to innovate for the long-term benefit of the business.		
FID3	Our firm decided to innovate to meet customer expectations.		
FID4	Our firm decided to innovate to improve competitiveness.		[38, 51, 52]
FID5	Our firm decided to innovate because it benefits the community.		
FID6	Our firm decided to innovate because we are well aware of its benefits in business marketing.		
FID7	Our firm decided to innovate because we are well aware of its benefits in enterprise processes.		

4- Research Results

4-1- Method Bias

All items of the initial scales were retained after checking the scales' reliability (Cronbach's Alpha > 0.6) (Table 2). In addition, all VIF values are smaller than 3.3. Hence, the common method bias was avoided and the total remaining items in this study (24 items) were used for analyzing the measurement model.

4-2- Measurement Model

Related to the convergence of measurement scales, the outer loading index should be equal to or higher than 0.6 and the average variance extracted (AVE) should be higher than 0.5 in the exploratory research [54]. However, the item FID1 was eliminated since the outer loading value of FID1 (0.561) was smaller than 0.6. Hence, the convergence of measurement scales was assured (Table 3). Similarly, the validity and reliability of the measurement model were confirmed since all Cronbach's alpha and composite reliability indexes were equal and higher than the threshold of 0.6 [54]. Lastly, the discriminant validity of the measurement model was assured (Table 3) since Heterotrait-Monotrait ratio (HTMT) values were smaller than 1 [56].

4-3- Structural Model

According to the research results in Table 4 and Figure 3, the direct associations between the components of the conceptual model were supported at a significant level of 1%, including H1 (Customer expectations are positively associated with perceived marketing innovation), H4 (Perceived marketing innovation is positively associated with perceived process innovation), H5 (Perceived marketing innovation is positively associated with enterprise innovation

decision-making towards green and sustainability), and H6 (Perceived process innovation is positively associated with enterprise innovation decision-making towards green and sustainability). As a result, the positive influences of customer expectations on perceived marketing innovation (β = 0.462), perceived marketing innovation on perceived process innovation (β = 0.670), perceived marketing innovation on firm innovation decision-making (β = 0.226), and perceived process innovation on firm innovation decision-making (β = 0.541), were identified. On the other hand, the direct association between customer expectations and perceived process innovation was rejected (p = 0.105 > 0.1) as well as the nexus between customer expectations and firm innovation decision-making (p = 0.818 > 0.1). Therefore, H2 (Customer expectations are positively associated with perceived process innovation) and H3 (Customer expectations are positively associated with firm innovation decision-making towards green and sustainability) were not accepted.

Table 3. Outer loadings, reliability, convergent validity, and Heterotrait-monotrait ratio results

Variables	Items	Loading	α	CR	AVE	Heterotrait-monotrait ratio results		
Customer expectations	CE1	0.842	0.878	0.910	0.670			
	CE2	0.811						
	CE3	0.828						
	CE4	0.802						
	CE5	0.809						
Firm innovation decision-making	FID2	0.742	0.883	0.911	0.631	0.351		
	FID3	0.823						
	FID4	0.825						
	FID5	0.748						
	FID6	0.842						
	FID7	0.781						
Perceived marketing innovation	PMI1	0.600	0.845	0.883	0.521	0.527	0.705	
	PMI2	0.707						
	PMI3	0.809						
	PMI4	0.704						
	PMI5	0.719						
	PMI6	0.772						
	PMI7	0.725						
Perceived process innovation	PPI1	0.790	0.851	0.893	0.626	0.428	0.810	0.829
	PPI2	0.799						
	PPI3	0.801						
	PPI4	0.804						
	PPI5	0.761						

According to the initial hypotheses, customer expectations positively impacted perceived marketing innovation as expected (p < 0.01), while they were not associated with both perceived process innovation and firm innovation decision-making (p > 0.1). These findings demonstrate that although businesses understand customer expectations related to green and sustainable innovation, it is not enough to lead to changes in innovation processes as well as business innovation decisions. However, customer expectations drive perceived marketing innovation, which in turn drives process and decision innovation in the firm. Besides, perceived process innovation was significantly associated with firm innovation decision-making (β = 0.541, p<0.01).

Table 4. Direct effects of the structural model

Hypothesis	Path relationships	Estimate	SD	T -value	P value	Result
H1	CE → PMI	0.462	0.065	7.075**	0.000	Accepted
H2	CE → PPI	0.074	0.046	1.622^{n}	0.105	Rejected
H3	CE → FID	0.009	0.040	0.230^{n}	0.818	Rejected
H4	PMI → PPI	0.670	0.050	13.522**	0.000	Accepted
H5	PMI → FID	0.226	0.072	3.117**	0.002	Accepted
H6	PPI → FID	0.541	0.075	7.161**	0.000	Accepted

Note: CE: customer expectations; PMI: Perceived marketing innovation; PPI: Perceived process innovation; FID: Firm innovation decision-making.
SD = standard deviation; **significant at p<0.01; ^{n} not significant.
R^2_{FID} = 0.521, R^2_{PMI} = 0.213, R^2_{PPI} = 0.500.

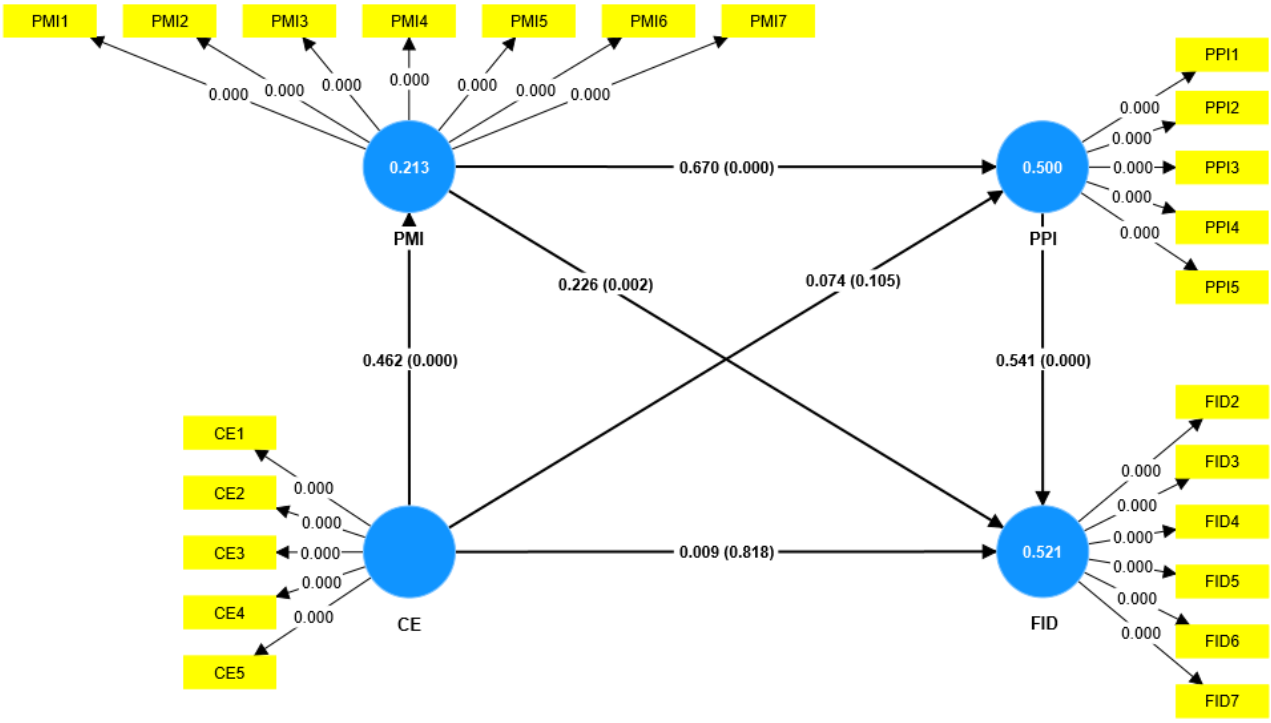

Figure 3. Direct effects of the structural model

Similar to direct effects, the indirect results of the interplay between customer expectations, perceived innovation, and decision-making are presented in Table 5. All the positive associations were supported at a significant level of 1% except the relationship of CE → PPI → FID ($p > 0.1$). Based on these findings, the mediating role of perceived marketing innovation is significant due to its positive impacts on both perceived process innovation and firm innovation decision-making ($\beta_{CE \rightarrow PMI \rightarrow FID} = 0.104$, $\beta_{CE \rightarrow PMI \rightarrow PPI \rightarrow FID} = 0.167$, $\beta_{CE \rightarrow PMI \rightarrow PPI} = 0.309$. In addition, the mediating role of perceived process innovation under the impacts of perceived marketing innovation on firm innovation decision-making was also emphasized ($\beta_{PMI \rightarrow PPI \rightarrow FID} = 0.104$).

Table 5. Indirect effects of the structural model

Relationships	Estimate	SD	T -value	P value	Result
CE → PMI → FID	0.104	0.038	2.767**	0.006	Accepted
CE → PMI → PPI → FID	0.167	0.031	5.442**	0.000	Accepted
CE → PMI → PPI	0.309	0.047	6.623**	0.000	Accepted
PMI → PPI → FID	0.362	0.050	7.184**	0.000	Accepted
CE → PPI → FID	0.040	0.026	1.523[n]	0.128	Rejected

Note: SD = standard deviation; **significant at p<0.01; [n] not significant.

5- Discussion

According to the research findings, this study validated a holistic conceptual model to clarify the mechanism of shaping enterprise innovation decision-making towards green and sustainability. This mechanism can be considered in two periods: (1) the direct effects of stimulus factor on organism and response, and (2) the direct effects of organism on response. In the first period, customer expectations were regarded as a stimulus factor, which was positively associated with perceived marketing innovation ($\beta = 0.460$, $p < 0.01$). In other words, the higher the level of enterprises' recognition of customer expectations, the higher they perceived marketing innovation. Nevertheless, customer expectations were not associated with both perceived process innovation ($p = 0.105 > 0.1$) and firm innovation decision-making ($p = 0.818 > 0.1$). In the second period, perceived marketing innovation was associated with not only perceived process innovation ($\beta = 0.670$, $p < 0.01$) but also firm innovation decision-making ($\beta = 0.226$, $p < 0.01$). In addition, perceived process innovation has a significant association with firm innovation decision-making ($\beta = 0.541$, $p < 0.01$). The more enterprises were aware of marketing and process innovation, the more they would promote business innovation. In short, the mechanism of shaping enterprise innovation decision-making towards green and sustainability in this study stemmed from customer expectations (from the enterprise viewpoint) to the enterprises' perception of innovation in marketing

related to many adjustments towards product, price, placement, and promotion ($\beta_{CE \rightarrow PMI \rightarrow FID} = 0.104$, $p < 0.01$; $\beta_{CE \rightarrow PMI \rightarrow PPI \rightarrow FID} = 0.167$, $p < 0.01$; $\beta_{CE \rightarrow PMI \rightarrow PPI} = 0.309$, $p < 0.01$), leading to the perception of innovation in processes to adapt to the requirements of adjustments towards product, price, placement, and promotion, and then forming firm innovation decision-making ($\beta_{PMI \rightarrow PPI \rightarrow FID} = 0.362$, $p < 0.01$).

In addition, this study emphasized the significant contributions related to theoretical aspects when approaching firm innovation decision-making towards green and sustainability under the S-O-R model. This research is considered a case study in the context of green and sustainable business innovation, in which the research results have shown the suitability of the model in explaining the decision-making mechanism of enterprise innovation under the strong influence of social context (customer expectations) and the cognitive processes (perceived innovation) ($R^2 = 0.521$). Furthermore, these results are the appropriate response to the call for a comprehensive model to conceptualize decision-making under the contextual influences of Bruch & Feinberg [28]. On the other hand, the indicators of the measurement scales related to firm innovation decisions were developed based on the benefits of the decisions while most previous studies often considered decisions based on behavioural intentions (the outcomes of behaviours or behavioural intentions) [17, 57, 58]. This study also reaffirmed the role of awareness in the human decision-making process when faced with the impact of environmental factors, especially in the field of green and sustainable development, which was a top concern of current researchers [59, 60].

Compared to the previous studies related to firm innovation towards green and sustainability, this study offered a novel and unique approach to conceptualising customer expectations and innovation perceptions from an enterprise viewpoint in shaping firm innovation decision-making, while Tu & Wu [61] indicated that green product and process innovations were the main drivers of green innovation, or Lopez-Fernandez et al. [23] found that little concern for innovations by customers and leaders' perceptions were key factors in enterprise innovation decision-making. According to the research results, perceived innovation (perceived marketing innovation and perceived process innovation) was consistent with the research of Kahn [32] when considering innovation as a mindset. Nevertheless, this study is unique in that it not only considers innovation as a change in individual employee perception but also considers innovation perception in marketing and processes under the influence of customer expectations. Thus, this study is a synthesis in considering innovation as mindset, outcome and process.

In terms of practical contributions, this research has provided a unique mechanism for the decision-making process of business innovation towards green and sustainable development that no previous research has conducted in the context of the development of the Mekong Delta region, Vietnam. Based on the research results, making enterprise innovation decisions was a process that originated from innovation awareness (including marketing and process innovation awareness), although the decision-making process completely did not have a direct relationship with customer expectations about products and services, through innovation awareness, this factor had a significant impact. Besides, the mediating role of marketing innovation awareness was very significant since it related to awareness of product, distribution, price, and promotion aspects. Although marketing innovation awareness has a direct positive impact on corporate innovation decisions ($\beta = 0.226$), its impact through perceived process innovation is much greater ($\beta = 0.670$). Overall, perceived marketing innovation was considered to be at a lower level than process innovation (the outcome of perceived marketing innovation was the perception of process innovation), so it would have less impact on corporate innovation decisions than perceived process innovation ($\beta = 0.541$). In line with this, the following practical implications were proposed:

- Enhance the perception of the current workforce about enterprise product and service features such as ease of use, the safety of the product or service, etc.
- Update and study customer trends and customer expectations about products/services in a green and sustainable context.
- Enhance sharing and training of human resources on aspects related to product, price, distribution and promotion to raise awareness of the need for innovation.
- Take advantage of the region's unique advantages to train and improve innovative thinking about products and ways to reach customers in the context of green and new technology.
- Build the enterprise's own specific processes and share the need for change to fit the new context.
- Integrate both marketing and process awareness within the framework of customer expectations through corporate innovation research activities.
- Focus on developing innovation awareness for businesses, especially following the world's general goal to protect the environment and ensure sustainable development.

6- Conclusion

Based on the original purpose of the research, the results were successful in modelling the innovative decision-making mechanisms of businesses in the context of green and sustainable development. The study also pointed out the limitations of previous studies related to practical and theoretical contexts when comparing them with current research results. As a result, this is a typical study and has great value in explaining the mechanism of forming business innovation decisions in the Mekong Delta region, which has its own unique characteristics. The research has reaffirmed the role of current businesses in recognising customer needs, leading to the formation of innovative perceptions about marketing and processes to improve business innovation decisions. In addition, this study makes significant contributions both theoretically and practically to green and sustainable development in the current period for Vietnam and the region in general and the Mekong Delta in particular. Based on the research results, business managers and policymakers can come up with better strategies in ensuring harmony between social benefits and business benefits in synchronizing business innovation awareness.

In relation to its great contributions to practice and theory, the study also faced some shortcomings. First, the cross-sectional study can have some common method bias. Second, this study stood on the enterprise viewpoint related to customer expectations, so it could be affected by other external and internal factors such as competitive pressure, perceptions of organisational innovation, etc. Lastly, the emotional aspects were not mentioned in this study; therefore, this should be explored in future research.

7- Declarations

7-1- Author Contributions

Conceptualization, T.A.P.T.; methodology, T.A.P.T.; software, T.A.P.T.; validation, T.A.P.T. and X.H.; formal analysis, T.A.P.T.; investigation, T.A.P.T. and X.H.; resources, T.A.P.T.; data curation, T.A.P.T. and X.H.; writing—original draft preparation, T.A.P.T.; writing—review and editing, T.A.P.T. and X.H.; visualization, T.A.P.T.; supervision, T.A.P.T.; project administration, T.A.P.T.; funding acquisition, T.A.P.T. All authors have read and agreed to the published version of the manuscript.

7-2- Data Availability Statement

The data presented in this study are available on request from the corresponding author.

7-3- Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

7-4- Institutional Review Board Statement

Not applicable.

7-5- Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

7-6- Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

8- References

[1] Nguyen, Q. C., & Ye, F. (2015). Study and evaluation on sustainable industrial development in the Mekong Delta of Vietnam. Journal of Cleaner Production, 86, 389–402. doi:10.1016/j.jclepro.2014.08.087.

[2] Vietnamese Government. (2017). Resolution No.120 on sustainable development of Mekong delta in adaptation to climate change. Available online: https://vanban.chinhphu.vn/default.aspx?pageid=27160&docid=192249 (accessed on July 2024).

[3] Teece, D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. Strategic Management Journal, 28(13), 1319–1350. doi:10.1002/smj.640.

[4] Vietnamese Government. (2020). Approving the Mekong Delta Regional Planning for the period 2021 - 2030, with a vision to 2050. Available online: https://vanban.chinhphu.vn/?pageid=27160&docid=205414 (accessed on November 2024).

[5] Loucks, D. P. (2023). Meeting Climate Change Challenges: Searching for More Adaptive and Innovative Decisions. Water Resources Management, 37(6–7), 2235–2245. doi:10.1007/s11269-022-03227-9.

[6] Russell, K., O'Raghallaigh, P., McAvoy, J., & Hayes, J. (2020). A cognitive model of digital transformation and IS decision making. Journal of Decision Systems, 29(Sup1), 45–62. doi:10.1080/12460125.2020.1848388.

[7] Tien, N. H., Van Tien, N., Mai, N. P., & Duc, L. D. M. (2023). Green entrepreneurship: a game changer in Vietnam business landscape. International Journal of Entrepreneurship and Small Business, 48(4), 408–431. doi:10.1504/IJESB.2023.130829.

[8] Gagnon, D. A., Moore, G. M., & Shanmuganathan, G. D. (2014). Factors Mediating between Employee Strategy Awareness and Commitmentto Organizational Success. Journal of Management and Sustainability, 4(4), 24. doi:10.5539/jms.v4n4p24.

[9] OCDE. (1997). Proposed Guidelines for Collecting and Interpreting Technological Innovation Data. In the Measurement of Scientific and Technological Activities. OCDE: Paris, France. doi:10.1787/9789264192263-en.

[10] Atalay, M., Anafarta, N., & Sarvan, F. (2013). The Relationship between Innovation and Firm Performance: An Empirical Evidence from Turkish Automotive Supplier Industry. Procedia - Social and Behavioral Sciences, 75, 226–235. doi:10.1016/j.sbspro.2013.04.026.

[11] Kalkan, A., Bozkurt, Ö. Ç., & Arman, M. (2014). The Impacts of Intellectual Capital, Innovation and Organizational Strategy on Firm Performance. Procedia - Social and Behavioral Sciences, 150, 700–707. doi:10.1016/j.sbspro.2014.09.025.

[12] Lee, R., Lee, J. H., & Garrett, T. C. (2019). Synergy effects of innovation on firm performance. Journal of Business Research, 99, 507–515. doi:10.1016/j.jbusres.2017.08.032.

[13] Andersen, T. C. K., Aagaard, A., & Magnusson, M. (2022). Exploring business model innovation in SMEs in a digital context: Organizing search behaviours, experimentation and decision-making. Creativity and Innovation Management, 31(1), 19–34. doi:10.1111/caim.12474.

[14] Du, J., Love, J. H., & Roper, S. (2007). The innovation decision: An economic analysis. Technovation, 27(12), 766–773. doi:10.1016/j.technovation.2007.05.008.

[15] Bohlmann, J. D., Spanjol, J., Qualls, W. J., & Rosa, J. A. (2013). The interplay of customer and product innovation dynamics: An exploratory study. Journal of Product Innovation Management, 30(2), 228–244. doi:10.1111/j.1540-5885.2012.00962.x.

[16] Mahmoud, M. A., Hinson, R. E., & Anim, P. A. (2018). Service innovation and customer satisfaction: the role of customer value creation. European Journal of Innovation Management, 21(3), 402–422. doi:10.1108/EJIM-09-2017-0117.

[17] Truong, N. T., Dang-Pham, D., McClelland, R. J., & Nkhoma, M. (2020). Service innovation, customer satisfaction and behavioural intentions: a conceptual framework. Journal of Hospitality and Tourism Technology, 11(3), 529–542. doi:10.1108/JHTT-02-2019-0030.

[18] Mehrabian, A., & Russell, J. A. (1974). An Approach to Environmental Psychology. The MIT Press, Massachusetts, United States.

[19] Tran, T. B. Y., Nguyen, N., Greenland, S., & Saleem, M. A. (2024). Unrestricted tobacco marketing prompts young adults to smoke in an emerging market: a study of emotional responses. Journal of Strategic Marketing, 32(5), 575–589. doi:10.1080/0965254X.2023.2268667.

[20] Liu, Y., Cai, L., Ma, F., & Wang, X. (2023). Revenge buying after the lockdown: Based on the SOR framework and TPB model. Journal of Retailing and Consumer Services, 72, 103263. doi:10.1016/j.jretconser.2023.103263.

[21] Rivas, A. A., Liao, Y. K., Vu, M. Q., & Hung, C. S. (2022). Toward a Comprehensive Model of Green Marketing and Innovative Green Adoption: Application of a Stimulus-Organism-Response Model. Sustainability (Switzerland), 14(6), 3288. doi:10.3390/su14063288.

[22] Chiou, T. Y., Chan, H. K., Lettice, F., & Chung, S. H. (2011). The influence of greening the suppliers and green innovation on environmental performance and competitive advantage in Taiwan. Transportation Research Part E: Logistics and Transportation Review, 47(6), 822–836. doi:10.1016/j.tre.2011.05.016.

[23] Lopez-Fernandez, M. C., Serrano-Bedia, A. M., & Gómez-López, R. (2016). Determinants of innovation decision in small and medium-sized family enterprises. Journal of Small Business and Enterprise Development, 23(2), 408–427. doi:10.1108/JSBED-02-2015-0028.

[24] Milkman, K. L., Chugh, D., & Bazerman, M. H. (2009). How Can Decision Making Be Improved? Perspectives on Psychological Science, 4(4), 379–383. doi:10.1111/j.1745-6924.2009.01142.x.

[25] Cabagnols, A., & Le Bas, C. (2002). Differences in the Determinants of Product and Process Innovations: The French Case. Innovation and Firm Performance, 112–149. doi:10.1057/9780230595880_6.

[26] Geng, L., Shi, X., Zu, L., Chai, M., & Xing, J. (2021). Importance Calculation of Customer Requirements for Incremental Product Innovation. Frontiers in Psychology, 12, 633472. doi:10.3389/fpsyg.2021.633472.

[27] Ayinaddis, S. G. (2023). The Relationship between Service Innovation, Customer Satisfaction, and Loyalty Intention in Emerging Economies: An Evidence from Ethio Telecom. Journal of the Knowledge Economy, 14(4), 4045–4063. doi:10.1007/s13132-022-01025-7.

[28] Bruch, E., & Feinberg, F. (2017). Decision-making processes in social contexts. Annual Review of Sociology, 43, 207–227. doi:10.1146/annurev-soc-060116-053622.

[29] Bortoluzzi, G., Kadic-Maglajlic, S., Arslanagic-Kalajdzic, M., & Balboni, B. (2018). Innovativeness as a driver of the international expansion of developing markets' firms: Evidence of curvilinear effects. International Marketing Review, 35(2), 215–235. doi:10.1108/IMR-11-2015-0258.

[30] El-Kassar, A. N., & Singh, S. K. (2019). Green innovation and organizational performance: The influence of big data and the moderating role of management commitment and HR practices. Technological Forecasting and Social Change, 144, 483–498. doi:10.1016/j.techfore.2017.12.016.

[31] Ramirez, F. J., Parra-Requena, G., Ruiz-Ortega, M. J., & Garcia-Villaverde, P. M. (2018). From external information to marketing innovation: the mediating role of product and organizational innovation. Journal of Business and Industrial Marketing, 33(5), 693–705. doi:10.1108/JBIM-12-2016-0291.

[32] Kahn, K. B. (2018). Understanding innovation. Business Horizons, 61(3), 453–460. doi:10.1016/j.bushor.2018.01.011.

[33] Purchase, S., & Volery, T. (2020). Marketing innovation: a systematic review. Journal of Marketing Management, 36(9–10), 763–793. doi:10.1080/0267257X.2020.1774631.

[34] Olson, J. C., & Dover, P. A. (1979). Disconfirmation of consumer expectations through product trial. Journal of Applied Psychology, 64(2), 179–189. doi:10.1037/0021-9010.64.2.179.

[35] Sheth, J. N., & Mittal, B. (1996). A framework for managing customer expectations. Journal of Market-Focused Management, 1(2), 137–158. doi:10.1007/bf00128687.

[36] Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1993). The nature and determinants of customer expectations of service. Journal of the Academy of Marketing Science, 21(1), 1–12. doi:10.1177/0092070393211001.

[37] Gyngell, P. (1994). Process Innovation: Reengineering Work through Information Technology. European Journal of Information Systems, 3(3), 244-246. doi:10.1057/ejis.1994.28.

[38] Tran, T. D., Truong, T. D., Pham, T. Van, & Pham, D. H. (2024). Cognitive Competency, Problem-Solving Skills and Decision-Making: A Case Study of Students' Extracurricular Activities in the Distribution Chains Sector. Journal of Distribution Science, 22(2), 71–82. doi:10.15722/jds.22.02.202402.71.

[39] Ojasalo, J. (2001). Managing customer expectations in professional services. Managing Service Quality: An International Journal, 11(3), 200–212. doi:10.1108/09604520110391379.

[40] Basu, R., Lim, W. M., Kumar, A., & Kumar, S. (2023). Marketing analytics: The bridge between customer psychology and marketing decision-making. Psychology and Marketing, 40(12), 2588–2611. doi:10.1002/mar.21908.

[41] Stock, R. M. (2011). How does product program innovativeness affect customer satisfaction? A comparison of goods and services. Journal of the Academy of Marketing Science, 39(6), 813–827. doi:10.1007/s11747-010-0215-4.

[42] Lee, C. Y., Tsao, C. H., & Chang, W. C. (2015). The relationship between attitude toward using and customer satisfaction with mobile application services: An empirical study from the life insurance industry. Journal of Enterprise Information Management, 28(5), 680–697. doi:10.1108/JEIM-07-2014-0077.

[43] Nwachukwu, C., & Vu, H. M. (2022). Service Innovation, Marketing Innovation and Customer Satisfaction: Moderating Role of Competitive Intensity. SAGE Open, 12(2), 21582440221082144. doi:10.1177/21582440221082146.

[44] Zhou, K. Z., Brown, J. R., & Dev, C. S. (2009). Market orientation, competitive advantage, and performance: A demand-based perspective. Journal of Business Research, 62(11), 1063–1070. doi:10.1016/j.jbusres.2008.10.001.

[45] Hulland, J., Baumgartner, H., & Smith, K. M. (2018). Marketing survey research best practices: evidence and recommendations from a review of JAMS articles. Journal of the Academy of Marketing Science, 46(1), 92–108. doi:10.1007/s11747-017-0532-y.

[46] Sengabira Ndereyimana, C., Lau, A. K. W., Lascu, D. N., & Manrai, A. K. (2022). Luxury goods and their counterfeits in Sub-Saharan Africa: a conceptual model of counterfeit luxury purchase intentions and empirical test. Asia Pacific Journal of Marketing and Logistics, 34(6), 1222–1244. doi:10.1108/APJML-03-2021-0184.

[47] Barclay, D., Higgins, C., & Thompson, R. (1995). The partial least squares (PLS) approach to casual modeling: personal computer adoption ans use as an Illustration. Technology Studies, 2, 285-309.

[48] Cruz-Ros, S., Garzón, D., & Mas-Tur, A. (2017). Entrepreneurial competencies and motivations to enhance marketing innovation in Europe. Psychology and Marketing, 34(11), 1031–1038. doi:10.1002/mar.21042.

[49] Blaug, M. (1963). A Survey of the Theory of Process-Innovations. Economica, 30(117), 13. doi:10.2307/2601709.

[50] Varbanov, P. S., & Seferlis, P. (2014). Process innovation through Integration approaches at multiple scales: A perspective. Clean Technologies and Environmental Policy, 16(7), 1229–1234. doi:10.1007/s10098-014-0837-1.

[51] Carroll, J. S., & Johnson, E. J. (1990). Decision research: A field guide. Sage Publications, New York, United States.

[52] Hess, J. D., & Bacigalupo, A. C. (2011). Enhancing decisions and decision- making processes through the application of emotional intelligence skills. Management decision, 49(5), 710-721. doi:10.1108/00251741111130805.

[53] Kock, N., & Lynn, G. S. (2012). Lateral collinearity and misleading results in variance-based SEM: An illustration and recommendations. Journal of the Association for Information Systems, 13(7), 546–580. doi:10.17705/1jais.00302.

[54] Hair, J., Hult, G. T., & Ringle, C. (2021). Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R: A Workbook. In Structural Equation Modeling. Springer Nature, Cham, Switzerland. doi:10.1007/978-3-030-80519-7.

[55] Hair Jr, J., Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). A primer on partial least squares structural equation modeling (PLS-SEM). Sage Publications, New York, United States. doi:10.1007/978-3-030-80519-7.

[56] Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115–135. doi:10.1007/s11747-014-0403-8.

[57] Kumar, A., Shankar, A., Agarwal, R., Agarwal, V., & Alzeiby, E. A. (2024). With enterprise metaverse comes great possibilities! Understanding metaverse usage intention from an employee perspective. Journal of Retailing and Consumer Services, 78, 103767. doi:10.1016/j.jretconser.2024.103767.

[58] Sahu, A. K., Padhy, R. K., & Dhir, A. (2020). Envisioning the future of behavioral decision-making: A systematic literature review of behavioral reasoning theory. Australasian Marketing Journal, 28(4), 145–159. doi:10.1016/j.ausmj.2020.05.001.

[59] Prakash, S., Sharma, V. P., Singh, R., Vijayvargy, L., & Nilaish. (2023). Adopting green and sustainable practices in the hotel industry operations - an analysis of critical performance indicators for improved environmental quality. Management of Environmental Quality: An International Journal, 34(4), 1057–1076. doi:10.1108/MEQ-03-2022-0090.

[60] Tan, J., & Solangi, Y. A. (2023). Assessing impact investing for green infrastructure development in low-carbon transition and sustainable development in China. Environment, Development and Sustainability, 1–24. doi:10.1007/s10668-023-03678-z.

[61] Tu, Y., & Wu, W. (2021). How does green innovation improve enterprises' competitive advantage? The role of organizational learning. Sustainable Production and Consumption, 26, 504–516. doi:10.1016/j.spc.2020.12.031.