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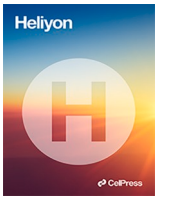

How green intrinsic and extrinsic motivations interact, balance and imbalance with each other to trigger green purchase intention and behavior: A polynomial regression with response surface analysis

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ABSTRACT

This research aims to examine how green extrinsic and intrinsic motivations individually and jointly affect green purchase intention and actual behavior, drawing on the integration of self-determination theory and the theory of planned behavior. Based upon a sample of 4062 consumers in Vietnam, we methodologically adopted a polynomial regression with response surface analysis to shed the light on how a higher degree of eco-friendly consumption intention and behavior is synthesized from the balance between high green extrinsic and intrinsic motivations. Conversely, a large imbalance between green extrinsic and intrinsic motivations will lower the level of environmentally friendly consumption. Additionally, this study indicates that green purchase intention is the most important predictor of green purchase behavior, and that green purchase intention significantly mediates the insolated and joint effects of green extrinsic and intrinsic motivations on eco-friendly consumption behavior.

1. Introduction

Humans' overuse of natural resources and fossil fuels for production and consumption purposes is considered one of the main drivers of climate change, global warming, and a polluted environment [1–5]. This highlights the need for producers and consumers to urgently change their operations, practices, and consumption, and essentially adopt consumption behaviors that are more sustainable and ecologically friendly, in order to minimize the detrimental effects on the environment and to protect our green planet [6–8]. The concept of green or sustainable consumption, which is defined as the optimal usage of services and products to meet basis demands and increase the quality of life while minimalizing the utilization of natural resources and controlling emissions and hazardous waste, without threatening the needs of future generations [9], has increasingly interested both academicians and practitioners, given its important role in achieving sustainable development [10–14]. Kautish, Paul [15] also stated that enterprises seeking sustainable strategies in business markets can benefit from gaining insights into consumers' attitudes toward pro-ecological products and their engagement in sustainable consumption behaviors. Recent works in this domain have thus begun to explain how to promote environmentally friendly consumption by exploring the various antecedents of green purchase intention [6] and how it contributes to

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shaping pro-environmental consumption behavior [16,17]. One primary stream of literature has emphasized the importance of human motivations in boosting different pro-environmental behaviors [18,19], including green consumption [20].

Among existing studies on human motivations for green consumption, the self-determination theory (SDT) [21] has been extensively adopted to explain how the development of consumers' pro-environmental behaviors can be effectively explained through the intrinsic-extrinsic motivation mechanism [18–20,22,23]. Indeed, intrinsically motivated individuals carry out certain actions because they perceive that they are interesting, pleasurable, and satisfactory [21], whereas internalized and identified motivations occur when the action is considered personally important [19]. Extrinsically motivated people practice a certain behavior because it results in expected outcomes, such as monetary rewards [20]. For instance, individuals are intrinsically motivated to buy environmentally friendly products if they find them enjoyable and interesting. In other words, consumers consume environmentally friendly goods or services in order to obtain the natural satisfaction and pleasure derived from the "green" purchasing activity itself [24]. Therefore, intrinsically internalized motives are not rooted in the desire to obtain particular outcomes, which are distinguishable from the actions themselves [19]. When consumers conduct purchase actions to gain economic benefits, such as discounts, gifts, and prizes, or recognition from others, their motivations are extrinsic [23]. In this case, achieving economic benefits is considered by consumers to be an important goal [21].

Although increasing attention is being paid to the human motivations of environmentally friendly consumption, a review of the extant literature has identified four main research gaps. *First*, although the extant literature has mainly highlighted the critical roles of intrinsic and extrinsic motivations in sustainable consumption, prior studies have not reached a consensus on how these motivations can affect consumers' pro-environmental behaviors. For example, Gilal, Chandani [25] argued that extrinsic motivation was found to be positively and strongly related to green consumer behavior, while the relationship between intrinsic motivation and green consumer behavior was weak and insignificant. However, some scholars revealed that both intrinsic and extrinsic motivations play a significant role in developing consumers' green behaviors, especially in the context of Asian cultures [22,24]. *Second and foremost*, previous studies mainly investigated how either intrinsic or extrinsic motivation in isolation affects consumers' sustainable behavior [20,22,26]. None of them attempts to examine how intrinsic motivation complements, balances or imbalances extrinsic motivation in order to trigger pro-environmental consumption. Different kinds of motivations might be related to pro-environmental behavior, and in almost all cases, they rarely work individually, but interact with each other in an intricate manner that might either jointly strengthen or lessen the effect [27]. The complementary, congruent, and incongruent effects of different kinds of motivations on sustainable consumption thus cannot be neglected. *Third*, although extrinsic and intrinsic motivations for pro-environmental consumption have been proposed [19,23], most consumers still express an intention-behavior gap regarding pro-environmental consumption [17]. For instance, consumers might pretend to have the intention to consume environmentally friendly products, but they may not actually behave in a pro-environmental manner [28]. This has been called the "green gap" phenomenon [16], and it can be sufficiently addressed by the theory of planned behavior (TPB) [29]. *Last*, several studies have reported that intrinsic and extrinsic motivations significantly increase consumers' green purchase intention [20]. However, our extant knowledge of how the individual and joint effects of intrinsic and extrinsic motivations indirectly influence green purchase behavior via green purchase intention is scant.

To address the aforementioned research gaps, in this study, we adopted an advanced methodology – polynomial regression with response surface analysis – to provide a nuanced view of the complementary, congruent, and incongruent impacts of green intrinsic and extrinsic motivations on green purchase intention and behavior by displaying the results of polynomial regression analyses in a three-dimensional surface plot. For this purpose, we first draw on the lens of the integration of the SDT [21] and the TPB [29] to examine how consumers' green purchase intention and behavior react when both green intrinsic motivation and green extrinsic motivation increase. Then, we examine how their green purchase intention and behavior respond when both green intrinsic motivation and green extrinsic motivation change but in opposite directions. We also investigate the mediation role of green purchase intention for the individual and the joint effects of green intrinsic and green extrinsic motivations on environmentally friendly purchasing behavior. To specify, the current study seeks to address the research gaps mentioned earlier by providing answers to five particular research questions (RQs).

RQ1. Is the integration of the SDT and the TPB sufficient and effective in exploring green consumption and in bridging the pro-environmental intention-behavior gap among consumers?

RQ2. Can green intrinsic and extrinsic motivations individually affect individuals' green purchase intentions and behaviors?

RQ3. Can green intrinsic and extrinsic motivations be jointly, congruently, and incongruently incorporated with each other to trigger individuals' green purchase intentions and behaviors?

RQ4. What is the underlying mediating mechanism of green purchase intention in the received nuanced influences of two incentives – green intrinsic and extrinsic motivations – and its subsequent impact on individuals' green purchase behavior?

RQ5. What should policymakers and practitioners do to encourage individuals' pro-environmental consumption behaviors, based on their intrinsic and extrinsic incentives?

In the upcoming section, we will provide the theoretical framework and related hypotheses based on the SDT and the TPB. Following that, we will outline the research instrument, sampling procedure, data collection procedure, and data analysis. The results of the hypothesis testing, along with the ensuing discussion and theoretical and practical implications of the research, will be presented in sections 4 and 5, respectively. In the final section, we will conclude the research, highlight its limitations, and provide suggestions for future research.

2. Theoretical background and hypotheses

Drawing upon the lens of the TPB and the SDT, our study examines the individual, joint, balanced, and imbalanced impacts of green intrinsic motivation (GIM) and green extrinsic motivation (GEM) on consumers' green purchase intention, and how this can increase their green purchase behavior as well as address the intention-behavior gap in the pro-environmental consumption research. The SDT has postulated that intrinsic and extrinsic motivations can lead to actual behavior [21,30]. We therefore argue that both GIM and GEM are enablers of consumers' green purchase behaviors. Additionally, in this study, we then discuss how GIM and GEM interact to influence consumers' green purchase intention and behavior based on the motivational aspect, which suggests that the interaction between extrinsic motivation and intrinsic motivation can reduce a certain behavior [30]. Additionally, to gain a more holistic picture of the interaction between GIM and GEM, we scrutinize how congruent and incongruent amalgamation of GIM and GEM affect green purchase intention and behavior by using the powerful approach of polynomial regression with response surface analysis [31,32]. This technique allows us to provide a more nuanced view of the alignment of GIM with GEM, which is valuable for triggering consumers' environmentally friendly consumption behaviors.

2.1. Theory of planned behavior and green gap

The TPB [29] has been identified as one of the most influential theories of social psychology [16,33]. It provides an appropriate framework to explain individuals' decisions and actions derived from their beliefs and motives [34]. The TPB is considered to be a social cognition paradigm that investigates how reasoned decisions are made when individuals consider the advantages and disadvantages of their actions before making actual decisions [35]. In the TPB model, behavioral intention is identified as the immediate precursor of actual behavior, whereas the three proximal predictors of behavioral intention are: attitude toward behavior (a favorable or unfavorable evaluation of performing a certain action); subjective norms (perceived social pressures related to carrying out a certain action); and perceived behavioral control (perceived ability and feasibility related to conducting a certain action) [36]. The TPB has been validated as a robust model for different domains of human behaviors [35], including green consumption [6,16].

Not all three proximal antecedents of behavioral intention in the TPB are adopted in our present study; we only focus on the intention-behavior link regarding environmentally friendly consumption. The rationale for this is as follows. Not all studies necessarily apply the full TPB framework, since many replicated studies have been performed to test the impacts of the three antecedents of behavioral intention, while neglecting the intention-behavior link in environmentally friendly consumption [17,37]. Moreover, not all consumers who express high intentions to engage in pro-environmental consumption carry out actual green purchase behavior, despite the fact that, based on the TPB framework, the pro-environmental consumption literature has confirmed intention as the most important predictor of actual behavior [16]. In lieu of re-testing the role of the three proximal predictors of behavioral intention, our study therefore attempts to bridge the intention-behavior gap in the TPB model, especially in the realm of sustainable consumption.

Some meta-analyses conducted on different behaviors, such as entrepreneurship and physical activity, have revealed that intention only explains 27 %–48 % of the variance in actual behavior [38,39], leaving a high percentage of variance in actual behavior unsolved. Drawing on the pro-environmental behavior context, the TPB has been widely applied and extended to bridge the green gap in different behaviors, such as purchasing sustainable clothing [17], recycling [37], green vacationing [28], purchasing new energy-saving vehicles [40], or green consumption in general [41]. However, many more studies are needed to close this gap [42], and thus ElHaffar, Durif [16] called for further studies to bridge the intention-behavior gap in environmentally friendly consumption. In the context of Vietnam, thus, it is still a hypothetical assumption that consumers' green purchase intention (GPI) is strongly and significantly correlated with their green purchase behavior (GPB).

H1. GPI is positively and significantly associated with GPB.

2.2. Self-determination theory and individual effects of green intrinsic and green extrinsic motivations

The SDT [21] – a seminal model of human motivation – has been extensively applied to throw critical light on environmentally friendly intentions and behaviors, such as recycling [19], the use of smart green IT devices [24], and reducing the usage of single-use plastics [18]. The SDT proposed that individuals become self-determined in their actions in order to satisfy three fundamental psychological needs: autonomy, relatedness, and competence [43]. Steered by the degree of need satisfaction, motivations were divided into three types in the SDT: intrinsic and extrinsic motivations, and amotivation [44,45]. Consumers' pro-environmental behaviors often serve several certain goals [19] while amotivation is considered the condition of lacking intentionality to behave in a certain manner [46]. Thus, often in the literature only intrinsic and extrinsic motivations are determined as the antecedents of consumers' pro-environment behaviors [19,22,25]. Based on the arguments provided by Deci [30], Li, Bhutto [26] offered two new constructs: green intrinsic motivation (GIM) and green extrinsic motivation (GEM). GIM refers to the motives that are involved in an environmentally friendly behavior that derives from within each of us because it is naturally rewarding and satisfying. On the other hand, GEM refers to carrying out an environmentally friendly action in order to reduce emissions, increase the effectiveness of pro-environmental activities, or conserve natural resources and ecological systems. The existing literature has illustrated that GPI is the outcome of green motivations [20]. Through GPI, consumers can also transform these motivations into environmentally friendly behaviors [25]. However, to the best of our knowledge, there are no prior studies explaining the individual and joint effects of GIM and GEM on consumers' environmentally friendly consumption behaviors, or the mediation role of GPI in these complex relations.

The recent literature on pro-environmental consumption behaviors has furnished evidence for the benefits of different types of

motivations [20,22,26]. These can be categorized into intrinsic and extrinsic factors that influence consumers' environmentally friendly behaviors [24]. Some recent studies have reported that strengthening intrinsic and extrinsic motivations is an efficient means of fostering environmentally friendly behaviors [18,19,26]. Indeed, the positive impacts of intrinsic and extrinsic motivations are reported for several pro-environmental behaviors, such as employees' green creativity [26], the usage of shared bicycles [22], reducing usage of single-use plastic products [18,47], recycling [19], and ecological eating [48]. Generally, in the context of green consumption, Ali, Ashfaq [20] report that consumers have a natural inclination to purchase green products that are enjoyable, satisfactory, and pleasurable. Consumers who are intrinsically motivated to aim for a greener environment, can actually intentionally engage in environmentally friendly consumption due to inner interests in the green environment. For instance, when consumers' interest in environmental conservation surpasses other determining circumstances, such as high price, the unavailability, and the inconvenience, they still intend to actualize their green consumption [47]. In other words, consumers who take pleasure in performing actions that help to conserve the environment can find shopping for environmentally friendly products enjoyable and exhilarating. Conversely, if consumers intend to engage in green consumption behavior because of external rewards, such as coupons, discounts, recognition or admiration, they will be extrinsically motivated to behave in an environmentally friendly manner [26]. Therefore, both GEM and GIM are important for sustainable consumption. We argue that GEM and GIM act as stimulators of consumers' environmentally friendly consumption and facilitate this behavior. It is formally hypothesized that Vietnamese citizens' intentions and behaviors regarding green consumption will be significantly increased when their GEM and GIM are high.

H2. GEM is positively and significantly associated with (a) GPI and (b) GPB.

H3. GIM is positively and significantly associated with (a) GPI and (b) GPB.

2.3. Complementary relationship between green intrinsic motivation and green extrinsic motivation

When the two main constructs in the SDT, intrinsic motivation and extrinsic motivation, were ascertained and defined, academicians began to speculate whether the two can complement each other to trigger an actual behavior [30]. Intrinsic motivation, which is described as the propensity to engage in a certain action for the inner interests, delight, and satisfaction stemming from the action itself [21], has been theorized to be a crucial precursor of sustainable behaviors [19,25]. However, almost all the previous empirical evidence has shown that the maintained effect of intrinsic incentives is not as robust as assumed [47]. Integration with other motivations might therefore be needed to better explain this effect [26]. Moreover, extrinsic motivation is reported to be significantly correlated with pro-environmental behaviors in existing research [19,24]. Yet, it is believed that consumers' environmentally friendly behaviors are only motivated by external rewards for a short time [47]. For example, if consumers react positively to the external rewards of green products, such as discounts or coupons, these behaviors tend to be discontinued if the external reward motivations are removed. It is also widely acknowledged in the pro-environmental literature that extrinsic motivations cannot explain sustainable behaviors sufficiently by themselves. For example, consumers can be more willing to purchase environmentally friendly products because of their inherent interest in this type of product (i.e., intrinsic motivations) [25]. It is thus argued that GIM and GEM are complementary to each other; according to the SDT, it is expected that they will both have a negative two-way interacting impact on green purchase intention and behavior.

The combination of GEM and GIM can lead to a reduction in consumers' eco-friendly consumption. Indeed, the extant literature suggests that intrinsic motivation might be reduced by extrinsic motivations [49]. The attribution theory argues that rewarding individuals for engaging in a certain behavior drives them to attribute their behavior to external rewards rather than to their inner interests in this behavior [50]. In the context of pro-environmental behaviors, although recent studies have proclaimed the effect of the interaction between GEM and GIM on pro-environmental behaviors, the evidence appears to be contradictory and insufficient. For example, Li, Bhutto [26] reported that extrinsic rewards reduce the effects of intrinsic incentives on individuals' green creativity. This was then endorsed by Ali, Ashfaq [20], who indicated that consumers were less inclined to engage in eco-friendly consumption when their extrinsic motivations regarding green purchasing were high. However, Pham, Nguyen [47] argued that intrinsic incentives derived from external rewards can increase the effect of intrinsic motives on sustainable consumption behaviors. This is because external rewards, such as coupons or discounts, can help consumers to more easily make the purchase decision about traditional and green products when pro-environmental consumption is considered a more expensive option. Because of the excessive controlling effects, we argue that consumers who are intrinsically self-directed to perform eco-friendly consumption are less likely to consume green products when external rewards regulate their purchases. Consequently, an understanding of the complementary relationship between intrinsic and extrinsic motivation is needed to offer a more nuanced picture of the roles of these incentives in consumers' pro-environmental behaviors and the following hypotheses are formulated.

H4. Together, GEM and GIM have a complementarily negative effect on the levels of (a) GPI and (b) GPB.

2.4. Congruence between green intrinsic motivation and green extrinsic motivation

When there is a balance between GEM and GIM, these two kinds of motivation are sustained at equal degrees. A high (or low) degree of congruence means consumers' GEM and GIM are both at high (or low) degrees. On the one hand, when there is an increase in the level of congruence between GEM and GIM, consumers' eco-friendly consumption can be greatly increased, due to the balance in the two incentives. As mentioned above, both GEM and GIM are necessary for the development of environmentally friendly behaviors [20,26]. Individuals' traditional consumption can be constantly refined and reconfigured through green motivations such as GEM and

GIM to create novel purchase behaviors that are environmentally friendly [19]. Thus, the congruent combination of GEM and GIM can facilitate consumers' cognitive processing of renewed consumption to attain the environmental benefits [47]. On the other hand, when consumers' GEM and GIM are both low, it is difficult to motivate them to carry out eco-friendly consumption behaviors, as they fail to renew and reconfigure their traditional consumption, which is often considered much cheaper than the eco-friendly option [51]. This situation can prevent consumers from behaving in an environmentally friendly manner. The complementary aspect illustrates that when consumers possess the necessary green motivations (i.e., GEM and GIM), and when one type of motivation (i.e., GEM) is well balanced with the other (i.e., GIM), the synergy impact of the two complementary motivations triggers and maximizes consumers' eco-friendly consumption. Consequently, we expect that when GEM and GIM increase in a balanced way, the levels of GPI and GPB will increase, and the proposed hypothesis is as follows.

H5. The levels of (a) GPI and (b) GPB are higher when the integration of GEM and GIM is high than when the integration is low.

2.5. Incongruence between green intrinsic motivation and green extrinsic motivation

Not all consumers experience a highly balanced degree of GEM and GIM. It is thus essential to discuss the impact of imbalanced GEM and GIM on eco-friendly consumption. Incongruence (or imbalance) can be exhibited in two directions: high GEM with low GIM, or low GEM with high GIM. We expect that the incongruent (imbalanced) situation when GEM is higher than GIM can be unfavorable or even harmful for developing green consumption. The SDT illustrated that the process of externalization can occur when the limitation of individuals' fundamental psychological needs (i.e., autonomy, relatedness, and competence) not to be sufficient to trigger their own behavior. This can weaken individuals' intrinsic incentives, and then result in partially or even thoroughly externalizing their intrinsic motivations [52]. For example, consumers' attention to acquiring external rewards, such as coupons, discounts, or recognition, can prevent them from further exploring their inner interest in eco-friendly consumption, hindering them from engaging in pro-environmental purchases that are self-rewarding and pleasurable. This ultimately decreases their environmentally friendly purchasing behaviors. Moreover, when inner and outer reasons for a certain behavior are not clear, an individual tends to be fascinated by external rewards and to disregard the inner reasons, which reduces motivation [21,30]. Therefore, we argue that when a strong GEM meets a weak GIM, the positive effect of GIM on GPI and GPB can be transitory because the existing GEM might be outdated (when firms stop programs offering external rewards) and it might therefore not be turned into actual eco-friendly consumption or sustained environmentally friendly behaviors. In other words, when there is an imbalanced increase in GEM and GIM, consumers might lack sufficient incentives to effectively behave in environmentally friendly manner, thereby reducing GPI and GPB. We formally propose the following hypothesis.

H6. The levels of a) GPI and (b) GPB are lower when the incongruence between GEM and GIM integration increases in either direction.

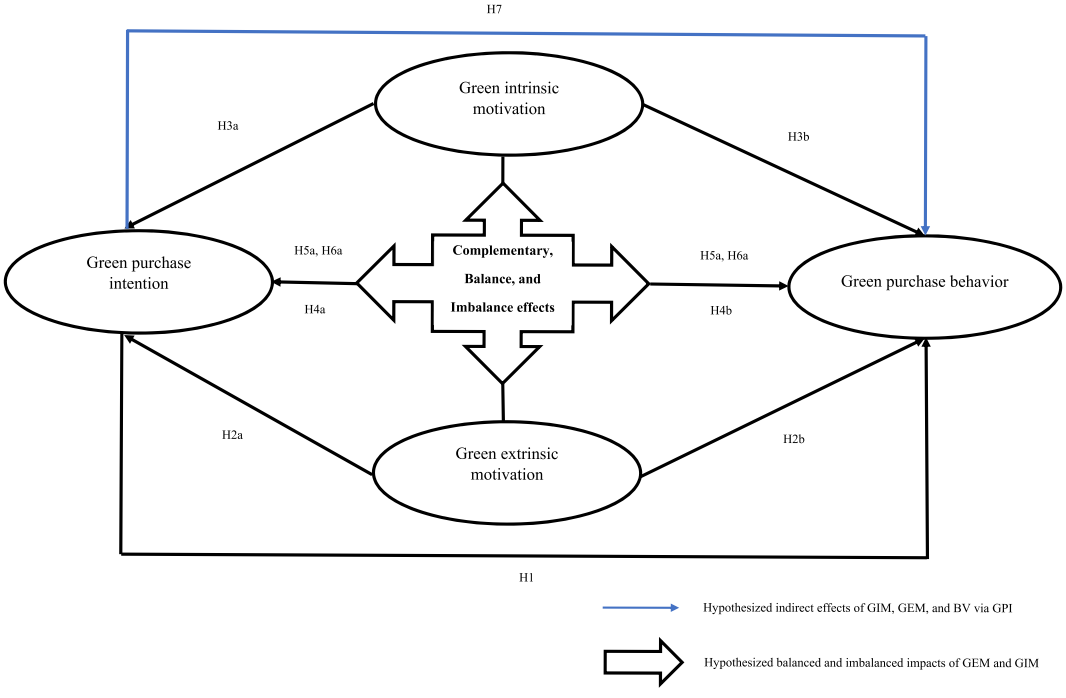

Fig. 1. Hypothesized model.

2.6. Green purchase intention as mediator

If considering green consumption as a rational cognitive process regarding the consumption of eco-friendly products and services, green purchase action can be seen as the outcome of this process. The intention to behave in an environmentally friendly manner is placed at the transition stage of this process when behavioral intention receives the effects of various antecedents, then translates these impacts into actual behavior [41]. Based on the integration of TPB and SDT, some studies have indicated that a behavioral intention can mediate the indirect impacts of motivations on actual behavior [53,54]. As discussed above, GEM, GIM, and the joint effects of both (the block variable) as enablers of GPI are expected to indirectly improve GPB. Indeed, GEM, GIM, and the block variable initially impact intentions to buy green products [20], which in turn can significantly influence GPB. The reasons why GPI mediates the impact of attitude toward green products on GPB are twofold. First, previous research has shown that GPI can mediate the effects of different factors on GPB. These factors can be, for example, attitude toward the environment and subjective norms [41], perceived environmental knowledge and environmental concern [17], and perceived risks and interests [37]. Second, the direct and interactive effects of GEM and GIM on GPI have been reported in some studies [20], while GPI is the most important predictor of GPB [16]. Therefore, it is deduced that GPI can significantly mediate the individual and joint impacts of GEM and GIM on GPB and we propose the following hypothesis.

H7. GPI significantly mediates the individual and joint effects of GEM and GIM on GPB.

The hypothesized model is illustrated in Fig. 1.

3. Research methods

3.1. Research instrument

As illustrated in Fig. 1, four latent variables were created to measure GEM, GIM, GPI, and GPB. All of these latent variables were measured through scale items, which were adapted from prior research and then slightly modified to be suitable for the Vietnamese context. GPB was measured with a four-item construct from Lee [55], while five items were adopted from Chan [56], and Nguyen, Nguyen [57] to measure GPI. On this scale, one reversed question was self-developed and added to avoid response bias. Five items measured GIM and four items measured GEM, derived from Ali, Ashfaq [20] and Li, Bhutto [26]. The scale items of the four latent variables were measured with a seven-point Likert scale, where 1 = "strongly disagree" and 7 = "strongly agree". In addition to the four proposed constructs, some control variables, such as age, gender, education, and monthly income, were included in this study. The used items to measure the constructs are listed in Table 1.

3.2. Sampling procedure

To test the hypotheses in the current research, an online survey was performed between 22 April and June 22, 2022 via Qualtrics, targeting Vietnamese consumers. This sampling method is economical and wide-reaching, and not restricted by time or place. Officially, Vietnam was only back on track for the "new normal" after May 13, 2022, after the success of the COVID-19 vaccine strategy,

Table 1
Measures.

Constructs	Indicators	Standardized Loadings
GPB	Green purchase behavior (α = 0.830; CR = 0.833; AVE = 0.555)	
GPB1	When I want to buy a product, I look at the ingredient label to see if it contains things that are environmentally-damaging	0.702
GPB2	I prefer green products over non-green products when their product qualities are similar	0.730
GPB3	I choose to buy products that are environmentally friendly	0.802
GPB4	I buy green products even if they are more expensive than the non-green ones	0.743
GPI	**Green purchase intention (α = 0.873; CR = 0.873; AVE = 0.580)**	
GPI1	I plan to buy green products (organic foods or energy-saving products) in the next month	0.737
GPI2	I am willing to consider switching to other brands for ecological reasons	0.780
GPI3	I am willing to pay more for a product which is healthy or helps protect the environment	0.743
GPI4	I will consider buying green products because they are less polluting	0.765
GPI5	I intend to buy green products in the coming time	0.781
GEM	**Green extrinsic motivation (α = 0.780; CR = 0.786; AVE = 0.553)**	
GEM1	I feel motivated by the recognition I earn from people when adopting green products	0.804
GEM2	I often think about discounts, gifts, and prizes when buying green products	0.642
GEM3	I have to feel that I am saving something from my green purchases	0.775
GIM	**Green intrinsic motivation (α = 0.884; CR = 0.884; AVE = 0.604)**	
GIM1	I enjoy accepting new green ideas and products	0.754
GIM2	I enjoy solving environmental problems through green measures	0.767
GIM3	I enjoy searching for green products that are completely new	0.787
GIM4	I enjoy giving feedback to improve existing green products	0.782
GIM5	I feel excited when I have green products	0.795

Notes: N = 4062.

under which nearly 100 % of Vietnamese people aged above 18 years old were vaccinated with at least two doses of the COVID-19 vaccine [58]. In order to overcome the restrictions of the government's quarantine, social and physical distancing policies, an online survey was therefore believed to be most appropriate [59,60].

3.3. Data collection

The online questionnaire was aimed at consumers aged over 18 years old and it was forwarded through messages, Zalo, Viber, and several other social platforms used in Vietnam. Our study was conducted in accordance with the Declaration of Helsinki, and it received ethical approval from the Department of Research Management, National Economics University, Hanoi, Vietnam, with the reference number CBQT1.2022.21. Moreover, all of the participants provided informed consent to participate in the survey, with the understanding that their involvement was entirely optional and that their answers would be utilized exclusively for academic reasons while also being kept confidential. Ultimately, after eliminating duplicates and abnormal answers, a total of 4062 valid responses were included in our analyses. Among the respondents, 2686 (66.1 %) were female and 1376 (33.9 %) were male. In terms of their age groups, 1565 (38.5 %) of the consumers were aged from 20 to 29 years old, followed by 996 (24.5 %) aged 30 to 39, 995 (24.5 %) aged less than 20, 407 (10.0 %) aged from 40 to 49, 74 (1.8 %) aged from 50 to 59, and 25 (0.6 %) over 60 years old. A large proportion of the respondents held at least a bachelor's degree (2,759, 67.9 %) or higher (296, 7.3 %) while 1009 respondents had a high school degree (24.8 %). The monthly income of 1808 (44.5 %) of the respondents was less than 15 million VND, 1588 (39.1 %) had a monthly income of 16–25 million VND, 450 (11.1 %) had a monthly income of 26–35 million VND, 103 (2.5 %) had a monthly income of 36–45 million VND, and 112 (2.8 %) had a monthly income of over 45 million VND.

3.4. Data analysis

To assess the reliability and validity of the variables under investigation and to test the proposed hypotheses, a three-step analysis was conducted utilizing SPSS 28.0 and AMOS 26.0. The initial step entailed employing Cronbach's alpha and confirmatory factor analysis (CFA) to evaluate the consistency and validity of variables. Following the initial assessment, multiple linear regression, polynomial regression with response surface analysis (PRA), and the PROCESS macro approach (model 4) were employed to test the formulated hypotheses. PRA is an advanced statistical technique that enables the examination of complementary, congruent, and incongruent effects of two predictors on an outcome variable, visually depicted in a three-dimensional (3D) graph [31,61]. This approach has been validated by many recent studies [12,62–65].

4. Empirical analysis

4.1. Scales and validation

To validate the latent variables before performing further analyses, Cronbach's alpha testing and CFA were conducted. The Cronbach alpha score, once the items of a reversed question were deleted (GPI6 "I do not plan to switch to a green version of a product"), was $0.873 > 0.808$ (Cronbach's alpha of GPI construct) whereas its corrected item-total correlation only reached $0.197 < 0.3$. Therefore, GPI6 was removed from the GPI constructs [66]. Then, we conducted CFA, and the results showed that our measurement model fitted well with the dataset. However, the average variance extracted (AVE) of GEM only accounted for $0.499 < 0.5$. Following the recommendation of Malhotra and Dash [67], GEM4 ("I am concerned about how people are going to react to my green products") was removed to improve the AVE of the GEM construct. After deleting the unsatisfactory items, the measurement model demonstrated excellent goodness of fit ($\chi^2 = 959.562$, df = 113, $\chi^2/df = 8.492$, GFI = 0.972, AGFI = 0.962, CFI = 0.979, TLI = 0.975, NFI = 0.976, RMSEA = 0.043). As demonstrated in Table 1, the Cronbach's alpha scores and composite reliability were higher than the threshold value of 0.7, while the standardized loadings of all the scale items were above 0.5, illustrating the high reliability of the latent variables [68]. In addition, all of the AVE values were above 0.5, demonstrating good discriminant validity of the latent variables [66].

Furthermore, in addition to using a reversed question to manage the response bias, statistical checks were also conducted to control the common method bias. First, the collected data were checked utilizing Harman's single-factor test and unrotated factor solution; the cumulative percentage was lower than 50 %. Second, all the scale items of the four constructs were constrained in a single-factor CFA, reporting poor indices of model fit ($\chi^2 = 6138.542$, df = 152, $\chi^2/df = 40.385$, GFI = 0.795, AGFI = 0.744, CFI = 0.860, TLI = 0.842, NFI = 0.857, RMSEA = 0.098). The difference in the standardized loadings was less than 0.2. Common method bias was therefore not a substantial problem in our research.

4.2. Analytic techniques

The polynomial regression with response surface analyses was used in our study to test the formulated hypotheses [32]. This powerful approach allowed us to investigate the extent to which complementary, balanced, and imbalanced combinations of the two predictors (i.e., GEM and GIM) were related to an outcome variable (i.e., GPI or GPB). This was more accurate than traditional regression analysis in explaining the curvilinear relationships between the precursors and an outcome variable [31]. Scale-centered measures were calculated to minimize the potential multicollinearity, and the polynomial regression equations (1) and (2) were presented as follows:

$$GPI = \epsilon_0 + \epsilon_1 GEM + \epsilon_2 GIM + \epsilon_3 GEM^2 + \epsilon_4 GEM \times GIM + \epsilon_5 GIM^2 + e \quad (1)$$

$$GPB = \epsilon_0 + \epsilon_1 GEM + \epsilon_2 GIM + \epsilon_3 GEM^2 + \epsilon_4 GEM \times GIM + \epsilon_5 GIM^2 + e \quad (2)$$

The control variables (age, gender, education, and monthly income) were also included in our analysis. To calculate the slopes and curvatures of the congruence and incongruence lines, as well as their levels of significance, the techniques and software provided by Edwards and Parry [32] and Shanock, Baran [31] were employed in our research. If the high-order terms (GEM^2, GEM x GIM, and GIM^2) are statistically insignificant, GEM and GIM are linearly associated with the dependent variables (i.e., GPI and GPB). On the other hand, if any of the high-order terms are statistically significant, the response surface analyses (3-D graph) can be employed to indicate the impact of the configuration between GEM and GIM on GPI or GPB [32]. A perfect congruence line was included in the response surface plot, which illustrated a perfect congruence (balance) between the two predictors (i.e., GEM = GIM). When GEM and GIM both increased in the same direction (GEM = GIM), the slope and curvature of the perfect congruence line could be calculated by substituting GEM for GIM in equations (1) and (2), yielding $\delta_1 = \epsilon_1 + \epsilon_2$ and $\delta_2 = \epsilon_3 + \epsilon_4 + \epsilon_5$, respectively. Similarly, along the imbalance line, a perfect incongruence line was included in the response surface plot, which demonstrated a perfect incongruence (imbalance) between GEM and GIM. When GEM and GIM both increased in opposite directions (GEM = -GIM), the slope and curvature of the perfect incongruence line could be calculated by substituting GEM for - GIM in equations (1) and (2), yielding $\delta_3 = \epsilon_1 - \epsilon_2$ and $\delta_4 = \epsilon_3 - \epsilon_4 + \epsilon_5$, respectively.

To examine how GPI mediated the individual and joint effects of GEM and GIM on GPB, the block variable approach was used, as per the recommendation of Edwards and Cable [69]. Particularly, to estimate a single coefficient that corresponds to the joint impact of five polynomial terms (GEM, GIM, GEM^2, GEM x GIM, and GIM^2), these terms were combined into a block variable by multiplying the calculated polynomial regression coefficients with the raw dataset. A PROCESS macro (model 4) was then used to estimate the indirect coefficients with a bias-corrected confidence interval of 95 %, and by bootstrapping 20,000 samples.

4.3. Hypothesis testing

The means, standard deviation, and intercorrelation matrix for the variables is presented in Table 2. As expected, the results showed that GEM was positively correlated with both GPI ($r = 0.687$, $p < 0.01$) and GPB ($r = 0.646$, $p < 0.01$), and GIM was positively correlated with both GPI ($r = 0.611$, $p < 0.01$) and GPB ($r = 0.675$, $p < 0.01$). GEM and GIM were also strongly associated with each other ($r = 0.780$, $p < 0.01$), which justifies utilizing polynomial regression and response surface analyses to examine curvilinear impacts [70]. To test the formulated hypotheses, a polynomial regression analysis was conducted. Table 3 displays the parameter estimates and four surface values calculated from the polynomial regression analyses. In order to decrease the potential multi-collinearity, all of the variables were mean-centered in our analyses [62]. Additionally, the inclusion of control variables in our regression analyses enhances its internal validity by mitigating the impact of confounding and other extraneous variables [71]. This practice aids with establishing a correlational or causal relationship between the variables of interest and it minimizes the potential for research bias [72]. Our studies reported that while GPI was significantly controlled by all the demographic variables, such as gender ($\beta = 0.058$, $p < 0.05$), age ($\beta = 0.035$, $p < 0.01$), education ($\beta = 0.056$, $p < 0.05$), and monthly income ($\beta = 0.042$, $p < 0.01$), GPB was only controlled by education ($\beta = 0.044$, $p < 0.05$). GPI was positively and strongly related to GPB ($\beta = 0.653$, $p < 0.001$), supporting H1. GEM was found to be positively related to GPI ($\beta = 0.156$, $p < 0.001$) and GPB ($\beta = 0.056$, $p < 0.01$), respectively, whereas GIM was reported to positively affect GPI ($\beta = 0.536$, $p < 0.001$) and GPB ($\beta = 0.198$, $p < 0.001$), supporting H3a, H3b, H4a, and H4b. It is deduced that GEM interacts with GIM to negatively affect both GPI and GPB. Consistent with H4a, the interaction between GEM and GIM has a negative impact on GPI ($\beta = -0.079$, $p < 0.001$). However, there was no empirical evidence that GEM combined with GIM to negatively affect GPB ($\beta = 0.030$, $p > 0.05$). H4a was therefore supported while H4b was not supported. Fig. 2 presents the plot for the complementary impact of GEMand GIM on GPI. In this figure, GEM serves as a moderator of the relationship between GEM and GIM. The function was plotted for two degrees of the independent variable and moderator: 1 SD above the mean and 1SD below the mean.

Based on the regression coefficients and covariances of the predictor terms, the values for the four surface tests and their level of significance were then calculated. Figs. 3 and 4 present the plots for the three-dimensional response surfaces while panels 3 (A, B) and 4 (C, D) in these figures present the response surface trajectories, along with the perfect congruence line (GEM = GIM) and perfect incongruence line (GEM = - GIM), respectively. H5a and H5b suggested that consumers' GPI and GPB would be higher when both GEM

Table 2
Correlation matrix.

Variables	Mean	S.D.	1	2	3	4	5	6	7	8
1. Gender	1.661	0.473	1							
2. Age	2.280	1.037	−0.031	1						
3. Education	1.825	0.539	0.053**	0.154**	1					
4. Income	1.799	0.930	−0.046**	0.132**	0.113**	1				
5. Green purchase behavior	5.063	1.189	0.099**	0.033*	0.101**	0.063**	1			
6. Green purchase intention	5.134	1.111	0.111**	0.061**	0.101**	0.065**	0.771**	1		
7. Green extrinsic motivation	5.185	1.107	0.115**	0.025	0.096**	0.038*	0.646**	0.687**	1	
8. Green intrinsic motivation	5.070	1.110	0.123**	0.022	0.039*	0.023	0.575**	0.611**	0.780**	1

Notes: N = 4,062, *p < 0.05. **p < 0.01.

Table 3
Polynomial regression results and surface tests.

Variables	Green purchase intention (GPI)				Green purchase behaviour (GPB)			
	Model 1				Model 2			
	β	SE	t	p-value	β	SE	t	p-value
ϵ_0: Constant	−0.334***	0.068	−4.887	<0.001	−0.079***	0.064	−1.252	0.211
Control variables								
Gender	0.058*	0.027	2.181	0.029	0.006	0.025	0.237	0.813
Age	0.035**	0.012	2.889	0.004	−0.018	0.011	−1.587	0.112
Education	0.056*	0.024	2.371	0.018	0.044*	0.022	2.005	0.045
Income	0.042**	0.014	3.104	0.002	0.019	0.013	1.532	0.126
Predictors								
GPI					0.653***	0.015	44.830	0.000
ϵ_1: GEM	0.156***	0.020	7.898	<0.001	0.056**	0.018	3.044	0.002
ϵ_2: GIM	0.536***	0.020	26.541	<0.001	0.198***	0.020	9.763	<0.001
ϵ_3: GEM^2	−0.013	0.012	−1.066	0.286	−0.024*	0.011	−2.182	0.029
ϵ_4: GEM x GIM	−0.079***	0.019	−4.235	<0.001	0.030	0.017	1.731	0.084
ϵ_5: GIM^2	0.062***	0.015	4.276	<0.001	−0.002	0.014	−0.134	0.894
R^2	0.704				0.789			
Adjusted R^2	0.495				0.621			
F Change	442.803***				229.164***			
Surface tests								
Congruence line (GEM = GIM)								
δ_1: Slope ($\epsilon_1 + \epsilon_2$)	0.690	0.030	24.466	0.000	0.250	0.030	9.440	0.000
δ_2: Curvature ($\epsilon_3 + \epsilon_4 + \epsilon_5$)	−0.030	0.030	−1.110	0.267	0.000	0.020	0.162	0.331
Incongruence line (GEM = − GIM)								
δ_3: Slope (ϵ_1 - ϵ_2)	−0.038	0.030	−13.435	0.000	−0.140	0.030	−5.277	0.000
δ_4: Curvature (ϵ_3 - $\epsilon_4 + \epsilon_5$)	0.130	0.030	4.737	0.000	−0.060	0.020	−2.275	0.023

Notes: N = 4,062, all coefficients are unstandardized. *p < 0.05, **p < 0.01, ***p < 0.001.

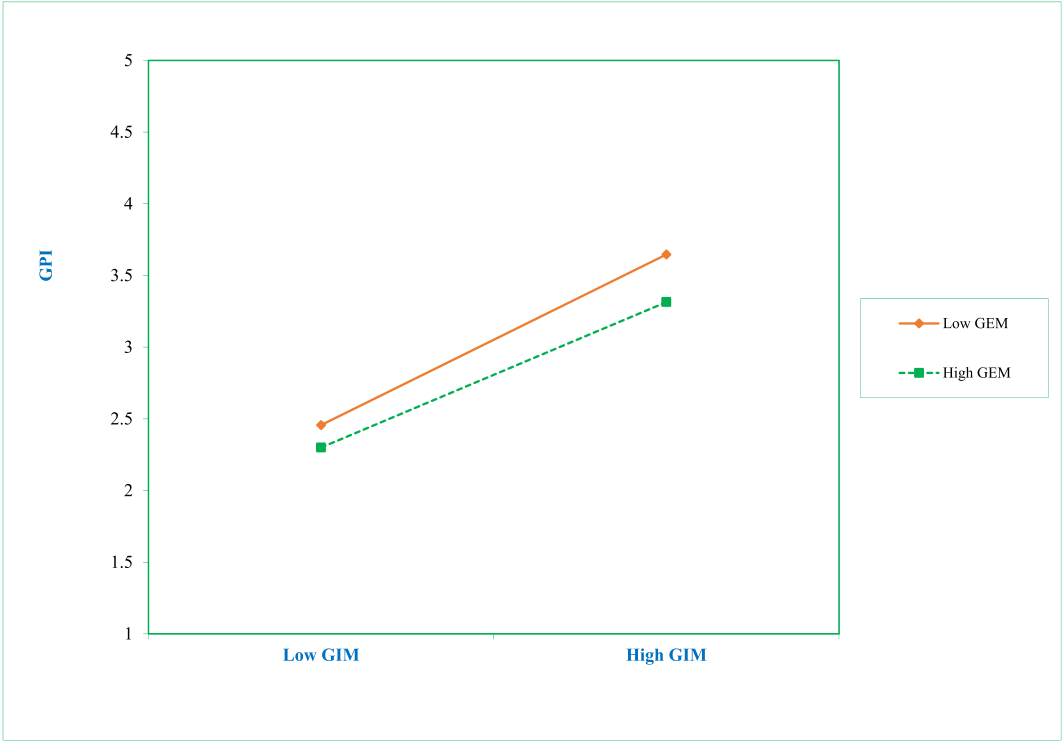

Fig. 2. The complementary effect of GEM and GIM on GPI.

and GIM were high, rather than when they both were low. To test these hypotheses, the surfaces along the GEM = GIM line, which moved from the front to the back corners in the GEM-GIM plane in both figures, were considered. In Table 3, the results of model 1 (independent variable = GPI) show that δ_1 was statistically significant and positive ($\beta = 0.690$, $p < 0.001$) whereas δ_2 was not

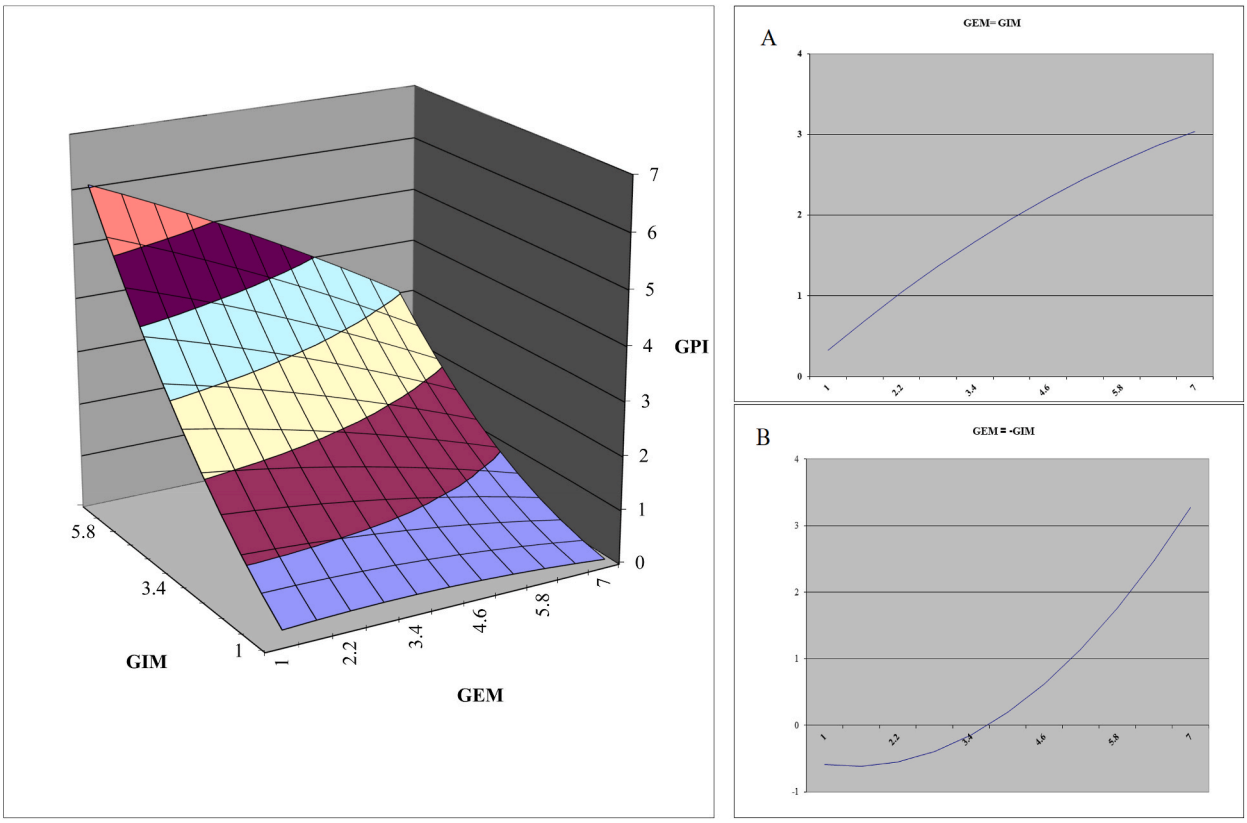

Fig. 3. Response surface for green purchase intention. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

significant ($p > 0.05$). This suggests that there was additive relationship along the perfect balance line (GEM = GIM) as it related to GPI. This also explains why, when GEM and GIM were congruently maintained, GPI increased as both GEM and GIM increased. As presented in Fig. 3, the highest degree of GPI was in the back corner of the chart where GEM and GIM were both high. The lowest level of GPI was at the front of the chart where GEM and GIM were both low. In addition, the results of model 2 (independent variable = GPB) revealed that δ_1 was positive and significant ($\beta = 0.250$, $p < 0.001$) while δ_2 was not significant ($p > 0.05$), indicating that when GEM and GIM were in agreement, the level of GPB could increase as both GEM and GIM both congruently increased. The higher degrees of GPB were found at the back corner along the GEM = GIM line in Fig. 4, where both GEM and GIM were high. H5a and H5b were therefore supported.

H6a and H6b predicted that when the imbalance between GEM and GIM increased, the levels of GPI and GPB would be lower. To test these hypotheses, the surfaces along the GEM = - GIM line, which ran from the left corner to the right corner of the GEM-GIM plane, were examined. In Table 3, model 1 showed that δ_3 was significant and negative ($\beta = -0.038$, $p < 0.001$) while δ_4 was significant and positive ($\beta = 0.130$, $p < 0.001$). A significant and positive δ_4 illustrated a concave surface, which signifies that GPI would decrease more sharply as the imbalance between GEM and GIM increased. Fig. 3 shows that moving from the left to the right corner of the chart, as GEM and GIM become more and more imbalanced, GPI decreases. Moreover, a significant and negative δ_3 showed that GPI was higher when the imbalance was such that GIM was higher than GEM, and vice versa. The results of model 2 showed a significant and negative δ_4, representing a convex surface. In other words, the highest degree of GPB occurred at the back corner when the level of both GEM and GIM was high, followed by the point where GIM was at its highest, and GEM was at its lowest level. A significant and negative δ_3 in model 2 also indicated that GPB was higher when consumers had high GIM with low GEM, and vice versa. Fig. 4 depicts the outcome of imbalance, indicating that moving from the left to right of the graph, as GEM and GIM become more and more incongruent, GPB decreases. As depicted in both Figs. 3 and 4, on the left of the figures where GIM is highly correlated with low GEM, both GPI and are still moderately high, while on the right where GIM is weakly correlated with high GEM, both GPI and GPB are significantly low. The levels of GPI and GPB reduce less when the imbalance is such that GIM is higher than GEM, compared to when GEM is higher than GIM. Thus, H6a and H6b were supported. Finally, the results of the mediation analyses in Table 4 showed that both GEM ($\beta = 0.4378$, 95 % CI [0.4083, 0.4676]) and GIM ($\beta = 0.4574$, 95 % CI [0.4277, 0.4882]) had indirectly strong and positive impacts on GPB through GPI. More importantly, the block variable ($\beta = -0.0227$, 95 % CI [−0.0316, −0.0124]) was found to be indirectly correlated with GPB via GPI. H7 was thus supported.

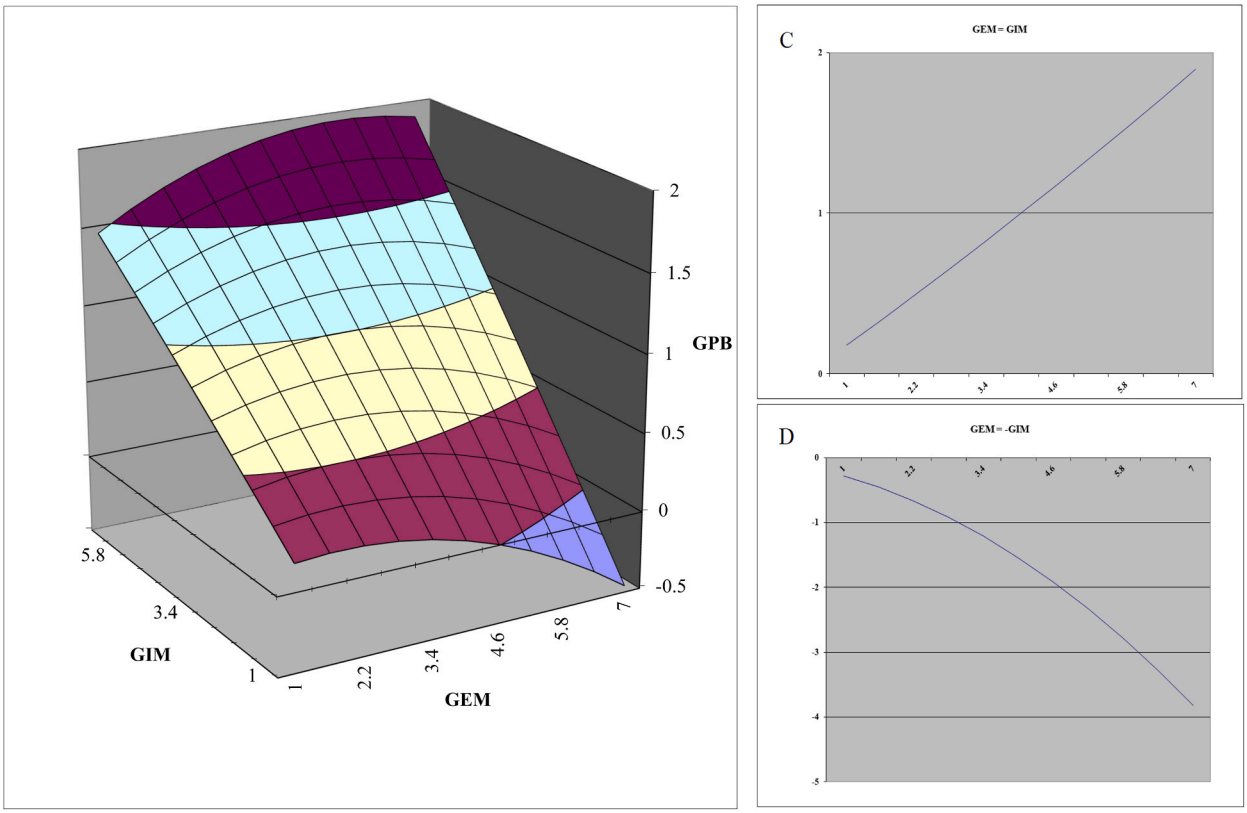

Fig. 4. Response surface for green purchase behavior. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

Table 4
Results of indirect effect test.

Indirect unstandardized coefficients					Indirect effects	BootSE	95 % confidence interval	
							BootLLCI	BootULCI
GEM	→	GPI	→	GPB	0.4378	0.0151	0.4083	0.4676
GIM	→	GPI	→	GPB	0.4574	0.0154	0.4277	0.4882
Block variable	→	GPI	→	GPB	−0.0227	0.0049	−0.0316	−0.0124

Notes: N = 4062 LLCI: Lower degree of confidence interval. ULCI: Upper degree of confidence interval. SE: Standard errors.

5. Discussions

Building on integrating the SDT [21] with the TPB [29], our study explored the individual and joint impacts of two motivations (GEM and GIM) on consumers' pro-environment consumption and examined the intention-behavior gap in green consumption. With a sample of 4062 consumers in Vietnam, the findings showed that consumers' GPI was significantly controlled by age, gender, educational level, and monthly income, while their GPB was significantly related to educational level. This finding was consistent with some prior studies, which also revealed that consumers' demographic variables controlled their pro-environmental intentions and behaviors [12,73,74]. Moreover, the findings also indicated that GPI was the greatest predictor of GPB, allowing us to close the green gap, as suggested by a bank of recent studies [16,28]. Indeed, this discovery aligned with previous research that has highlighted the strong role of GPI in predicting GPB [12,74]. Consumers in advanced economies, where green products are easily accessible, tend to translate their sustainable purchase intention into acting in a pro-environmental manner [75,76]. Nevertheless, there exists a significant gap between GPI and GPB in emerging Asian economies, like Vietnam [12]. Thus, the findings of this study contribute to broadening our horizons related to the "green gap" within the context of one of the most highly dynamic markets in Asia.

Moreover, our findings showed that GEM and GIM individually had positive and strong effects on GPI and GPB. These findings are in line with previous studies [20,22,26]. They also indicated that consumers' pro-environmental behaviors could be individually inspired by intrinsic and extrinsic incentives for purchasing eco-friendly products [19,25]. Our findings also revealed that the interaction between GEMand GIM had a negative impact on GPI, which supported the existence of complementarity in the two forms of

motivations. This was consistent with the finding of [20], who showed that GEM negatively moderated the relationship between GIM and GPI. This posited that external incentives, such as rewards, had a tendency to diminish the internally driven interest or enjoyment in given activities [26]. However, because GEM and GIM are two relatively new constructs recently proposed by Li, Bhutto [26], little is known about whether the integration between the two can reduce GPB, as it does with GPI. It is crucial to acknowledge that while GEM, in forms such as promotions and rewards in marketing, might initially boost consumers' intentions to purchase environmentally friendly products in the short term, these extrinsic incentives can diminish consumers' genuine interest in the environment, resulting in a decrease in their GPI in the long term. This phenomenon may be attributed to the controlling effect of external drivers on human behaviors, which can dampen the impact of internal self-driven motivations [20]. Vietnamese consumers are more likely to purchase environmentally friendly products when they are genuinely interested [12]. Therefore, external rewards, such as discounts or green advertising, may hold little value for consumers who are intrinsically motivated to consider buying green products based on their own genuine interests in environmental concerns [20]. This insight sheds light on the importance of understanding consumers' internal motivations when designing marketing strategies in the Vietnamese market.

In addition, we tested the complementary effect of the two motivations on GPB. Contrary to our expectations, the integration of GEM and GIM was not significantly related to GPB, leading to a need for further investigation by response surface analysis. To provide an additional understanding of the complex interplay between GEM and GIM, response surface analysis allowed us to test how balanced and imbalanced combinations of the two sources of motivations related to consumers' pro-environmental behaviors. This finding indicated an additive model of motivations, where GPI and GPB are increased by the congruent combination of both forms of motivations (GEM and GIM). It also means that consumers' pro-environmental behavior increases when GEM and GIM are sustained to a high degree. In other words, the two forms of motivations could be combined in the bilateral balance relationship, to trigger consumers' environmentally friendly behaviors effectively. Moreover, when the imbalance between GEM and GIM increases in either direction, the degree of both GPI and GPB decreases. The interaction mechanism explained by the SDT [21] can thus be effectively employed to explain why we need to sustain the balance between the extrinsic and intrinsic incentives of consumers; since there is imbalance between the two forms of motivation, consumers tend to reduce their eco-friendly consumption. For example, when consumers only pay attention to external rewards, such as coupons, discounts, or monetary-related benefits, but neglect their inner interests, such as pleasure or satisfaction, they are less likely to perform eco-friendly consumption. Some scholars have put forward an explanation for this phenomenon [30,52]. However, until now, the existing empirical evidence for this phenomenon has been very scant. Finally, although the combination of GEM and GIM was not found to be significantly related to GPB, our findings revealed that these two incentives and their joint effect (the block variable) indirectly increased GPB through GPI, suggesting the importance of extrinsic and intrinsic motivations for pro-environmental consumer behaviors [19,20,47].

5.1. Theoretical contributions

The current study contributed to the pro-environmental literature as follows. First, we proposed a theoretical model of eco-friendly consumption through the lens of the integration of SDT [21] and the TPB [29]. This model advanced our current understanding of how different forms of motivations impact consumers' pro-environmental consumption through nuanced interaction mechanisms, using an advanced method, namely polynomial regression, and response surface analysis. The pro-environmental literature had primarily highlighted the process of transferring inner and outer incentives to individuals' eco-friendly behaviors, while almost all of the prior studies focused on investigating these motivations in insolation. To the best of our knowledge, no prior studies have simultaneously examined the complementary, balanced, and imbalanced impacts of extrinsic and intrinsic motivations on individuals' environmentally friendly behaviors. In particular, no previous studies have explored how to balance the degrees of two forms of motivations (GEM and GIM) to help consumers behave in an environmentally friendly manner. This indicated a research gap as we cannot explain why individuals are less likely to carry out eco-friendly behaviors when there are many external rewards available. The findings of this study are therefore among the first to provide empirical evidence to explain this phenomenon and address this gap. The study results indicate that a high congruence between GEM and GIM can increase both GPI and GPB, whereas a high incongruence between the two incentives can lead to a reduction in consumers' GPI and GPB. More importantly, our findings also showed that the levels of GPI and GPB can increase when consumers have high GIM with low GEM than vice versa. These findings thus help address the important gap in pro-environmental literature; they provide an explanation for why many consumers, although they receive just a few external rewards, still sustain their pro-environmental behaviors in order to be self-rewarding (enjoyable and pleasurable). Second, while the extant literature on green consumption has recognized the significance of extrinsic and intrinsic motivations, most of the work up until now has focused on investigating the effects of these incentives on GPI [77,78], while there was a mismatch between intentionality and actual behavior, called the "green gap". Our study thus contributes to the pro-environmental literature by illustrating a strong correlation between intention and behavior in eco-friendly consumption, thus addressing this research gap. Finally, our findings showed the mediation role of GPI in transferring the individual and joint effects of green extrinsic and intrinsic motivations onto consumers' pro-environmental behavior, while prior studies have neglected this mediation effect. Consequently, our research also contributes to the extant pro-environmental literature by indicating the mediating impact of GPT on the linkage between green extrinsic and intrinsic motivations and pro-environmental consumption behaviors.

5.2. Practical implications

The findings of this research offer some practical and managerial insights for policymakers, administrators, and marketing practitioners. The findings of our study provided functional and valuable insights for administrators and marketing practitioners, enabling

them to better understand consumers' incentives to engage in eco-friendly consumption activities and to therefore learn how to satisfy them better. First, our findings indicate that GIM and GEM have significant effects on consumers' intentions and actual behaviors related to acting in a pro-environmental manner. Thus, promoting advertising or messages that inspire intrinsic and extrinsic incentives toward environmentally friendly consumption has the potential to influence consumers to purchase green products. Importantly, identifying a consumer segment that is inherently motivated to engage in environmentally friendly activities can result in a prompt and positive response to green marketing strategies [20]. Moreover, when developing communication strategies, besides external promotions and rewards, it is crucial to consider consumers' intrinsic values and beliefs. These factors can instill a moral sense of responsibility in consumers, leading to pro-environmental purchase behaviors [12]. One effective approach is to create advertisements that activate a sense of deservingness in consumers when they choose to purchase environmentally friendly products. Moreover, recognizing the significance of GIM in driving sustainable consumption, companies should foster a sense of personal satisfaction and environmental consciousness among consumers. This could be achieved through marketing campaigns that emphasize the intrinsic benefits of making environmentally friendly choices, such as feeling good about contributing to a healthier planet.

Second, our findings indicate that the complementarity of GEM and GIM can reduce consumers' GPI. Hence, offering rewards such as coupons, discounts, or bonuses may actually reduce the intention of self-motivated consumers to buy such products [20]. Caution should be exercised when implementing promotions related to green products. It is recommended that marketers should aim to enhance consumers' perception and awareness of the current environmental degradation through their emotions intrinsically. In other words, it is crucial to focus on the GIMs such as the interest and joy that green products can provide to consumers in order to effectively promote the adoption of these products. Third, our findings regarding the congruent and incongruent impacts of two incentives (GEM and GIM) suggest that a high balance of GEM and GIM may be the best combination and maximize the synergistic impact on consumers' eco-friendly consumption. Therefore, a practical implication for policymakers, administrators, and marketing practitioners would be to invest more in advancing and fostering consumers' GEM and GIM in a balanced manner. Moreover, administrators and marketing practitioners should understand that an increase in imbalance between consumers' GEM and GIM will reduce their eco-friendly consumption. Relevant marketing and advertising campaigns therefore should be built in such a way that balances consumers' intrinsic and extrinsic motivations [20,47]. This means that, in addition to providing external rewards such as coupons or discounts to attract consumers, promotional ads and messages related to environmental problems should be used to promote their inner incentives, helping them to recognize that the consumption of environmentally friendly products is self-rewarding, and that they can feel pleasure and satisfaction when using these products [18]. Additionally, our findings support the fact that investing too much in external regards might lead to unexpected results for firms when consumers only pay their attention to monetary benefits but neglect their inner incentives. Recently, Duong [12] also argued that instead of relying on tangible rewards, sales promotions should consider consumers' intrinsic motivations, allowing consumers to experience pleasure and self-gratification by engaging in pro-ecological consumption behaviors. This approach not only reduces costs for companies but also enhances the efficacy of promotional campaigns. Companies can also highlight how their products contribute to the reduction of carbon emissions and other environmental pollutants or emphasize social benefits [79], such as fair trade and worker welfare. By incorporating storytelling techniques, companies can foster stronger intrinsic incentives and thereby encourage more environmentally friendly consumption.

Finally, the evidence from our study demonstrated that developing consumers' intrinsic incentives seems to be more effective when high GIM is combined with low GEM as this still maintains a relatively high level of pro-environmental consumption. Thus, policymakers, administrators, and marketing practitioners should organize education and communication campaigns, which should aim to advance consumers' horizons in terms of environmental and social issues. Educational and communication messages can introduce environmental issues, such as climate change and global warming, then highlight the benefits of sustainable consumption. When consumers' understanding of environmental issues increases, their intrinsic incentives regarding pro-environmental consumption may increase and further encourage them to behave in an environmentally friendly manner.

6. Conclusions

The pursuit of sustainable and environmentally friendly consumption has become an imperative in today's world, driven by growing environmental concerns and societal awareness. Our research delved into the intricate dynamics of green consumer behavior, offering insights into how motivations and intentions intersect to shape pro-environmental consumption. Drawing on the integration of the TPB and the SDT, our study unfolded a multifaceted landscape where the nuanced interplay (congruence and incongruence) between GEM and GIM significantly influences consumers' intentions and behaviors. Consequently, this study has significant implications for both theoretical and managerial aspects.

Theoretically, our findings emphasize the central role of GPI as a strong predictor of GPB. They underscore the importance of fostering eco-friendly intentions to drive tangible environmentally conscious actions. Motivation plays a pivotal role, with both GEM and GIM significantly impacting GPI and GPB. However, it is crucial to strike a balance between external rewards and internal values in order to sustain consumers' intrinsic motivations over time. Surprisingly, the interaction of GEM and GIM did not directly relate to GPB, but maintaining a balanced combination of both motivations maximizes eco-friendly consumption. Imbalances reduce GPI and GPB, highlighting the need for equilibrium. Theoretical contributions include our innovative integration of SDT and TPB, addressing the "green gap", and spotlighting the mediating role of GPI. Practical implications encompass the importance of promoting both intrinsic and extrinsic incentives in marketing, emphasizing the self-rewarding aspects of environmentally friendly consumption, and enhancing consumer understanding of environmental issues. These results have significant practical implications for businesses seeking to promote sustainability. By leveraging intrinsic motivators like personal values and a sense of environmental responsibility, combined with extrinsic rewards and recognition, companies can encourage consumers to embrace green products and services.

Additionally, our research highlights the importance of education and awareness in fostering green intentions.

While this study has provided valuable insights, it is not without limitations. These might create avenues for future studies. Firstly, although this study tested the nuanced moderation impacts of GEM and GIM on consumer' green consumption, the results are only based on data from Vietnam, which is an emerging economy. Further studies should extend the research by examining the research model in a cross-cultural context, which can offer interesting contributions to theoretical and practical perspectives. Secondly, some studies argue that the link between behavioral intention and actual behavior should be measured over time. In other words, a time lag might be required. Therefore, a longitudinal survey could be utilized in further research to observe the process of making a green purchase decision better. Finally, this study only considered the intention-behavior link, but ignored post-purchase behaviors, such as repurchasing behaviors, and consumer satisfaction and loyalty. Future studies can expand their research by adding the factors suggested in the theoretical model.

Data availability statement

Data will be made available on request.

Declaration of interest's statement

The authors declare no conflict of interest.

CRediT authorship contribution statement

Cong Doanh Duong: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. **Thanh Hieu Nguyen:** Conceptualization, Data curation, Funding acquisition, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing. **Hoai Long Nguyen:** Data curation, Methodology, Software, Visualization, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2023.e20886.

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