Leveraging Virtual Influencer Attractiveness to Green Purchase Intentions in Sustainable Fashion

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Abstract

Technological advancements have significantly impacted modern marketing strategies, with virtual influencers gaining increasing popularity. This study aims to examine the influence of virtual influencers' attractiveness on consumers' green purchase intentions, considering the mediating roles of attitude and brand engagement. A survey was conducted using a sample of 440 Thai consumers aged 18 and above, and the data were analyzed using the PROCESS Macro to explore the relationships between the variables. The results indicate that both attitude and brand engagement fully mediate the relationship between virtual influencers' attractiveness and green purchase intention in a serial manner. However, the attractiveness of virtual influencers does not have a direct effect on purchase intention. The study highlights how the attractiveness of virtual influencers can enhance consumers' positive green attitudes and increase brand engagement, ultimately leading to a higher green purchase intention. The findings contribute to the development of marketing strategies that utilize technology in sustainability businesses and expand the understanding of virtual influencer effects under the Stimulus-Organism-Response (S-O-R) theory.

Keywords: Virtual influencer, Green purchase intention, Brand engagement, Green attitude, Serial mediation

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Introduction

Technology significantly influences the modern advertising model, playing a crucial role that is impossible to ignore. The initial phase was defined by the emergence of Marketing 4.0, an approach that places emphasis on digital and social media marketing. Subsequently, this evolved into Marketing 5.0, which places an intense focus on data and personalization as well as marketing technology (Kotler, Kartajaya, & Setiawan, 2021). Presently, we are transitioning into the phase of Marketing 6.0 (Metaverse), whereby the intent is to construct a simulated realm using AR (augmented reality) and VR (virtual reality) technology to offer novel encounters for consumers (Dwivedi et al., 2022). Moreover, it raises challenges for marketers to develop efficient marketing communication approaches to effectively target consumers (Miao, Kozlenkova, Wang, Xie, & Palmatier, 2022).

Simultaneously, technological advances have given rise to notable innovations such as intelligent and rapidly learning artificial intelligence (AI). In marketing, AI has been instrumental in numerous areas. This study examines the use of AI to create virtual personalities (Avatars) as a communication strategy through social communication media. These virtual personalities, or virtual influencers, are utilized in the presentation or endorsement of products, exerting a persuasive influence on their audience (Franke, Gröppel-Klein, & Müller, 2023; Mustak, Salminen, Plé, & Wirtz, 2021).

Virtual influencers have been well-received by consumers and are gaining attention from both national and international business organizations (Conti, Gathani, & Tricomi, 2022; Hugh Wilkie, Dolan, Harrigan, & Gray, 2022), especially in the rapidly expanding Southeast Asia region of the marketing communications industry (Chaihanchanchai, Anantachart, & Ruangthanakorn, 2024). In Thailand, a virtual influencer named Ai-Ailynn has been introduced as the brand ambassador of Advanced Info Service Public Company Limited, reflecting the growing trend of Virtual Influencer Marketing in the country (Advanced Info Service Public Company [AIS], 2021). This phenomenon has garnered significant interest from modern consumers, who are already familiar with virtual characters from video games and animations. The advantages of virtual influencers include their immunity to emotions, aging, or illness, as well as their ability to control the brand's image and personality at all times. In this study, virtual influencers serve as theoretical stimulators of

stimulus-organ response, influencing internal processes such as consumer attitude and leading to various forms of brand engagement and purchase intention.

Previous studies have clearly demonstrated that influencers, as content creators, play a significant role in influencing the interests of large numbers of consumers on online platforms (Chaihanchanchai et al., 2024; Leung, Gu, & Palmatier, 2022). However, due to technological advancements, a new form of influencer marketing has emerged, known as virtual influencers. This study seeks to examine the influence of virtual influencers on consumers' purchase intentions, specifically focusing on sustainable fashion businesses. The objective is to develop digital marketing strategies that promote environmental sustainability and social responsibility, thereby enhancing the competitiveness of businesses that prioritize these values. The increasing severity of global climate change has significant repercussions for the global population. Since the fast fashion industry is a primary source of greenhouse gas emissions, accounting for 10% of annual global emissions and producing approximately 20% of wastewater (World Bank, 2019), it is crucial to support the sustainable fashion sector and raise consumer awareness.

Advocating for environmental sustainability in the sustainable fashion or eco-fashion business is a highly impactful approach to mitigating environmental issues. This includes promoting ideas that facilitate the shift of fashion items towards ecological equilibrium and social fairness. Sustainable fashion encompasses not only the selection of textiles or materials for fashion products but also the production methods and the lifespan of the goods, with the objective of fostering a healthy environment and advancing global equilibrium. Based on research, urban consumers demonstrate a higher propensity to endorse sustainable fashion, indicating favorable prospects for eco-friendly fashion enterprises (Olwoch, Sonnenberg, Reis, & Taljaard-Swart, 2023).

Despite the growing prominence of virtual influencers in contemporary marketing practices, there is limited research examining their impact on green purchase intentions, particularly within sustainable fashion enterprises. While existing literature has explored influencer marketing and consumer engagement, the specific role of virtual influencers in shaping sustainable consumer behavior remains under-explored. Furthermore, the mediating effects of attitude toward green products (ATGP) and brand engagement (BEGM), as analyzed using the PROCESS macro recommended by Hayes (2018), in this relationship require further investigation. Given the

increasing integration of virtual influencers within the Thai market, this study seeks to address these gaps by employing the Stimulus-Organism-Response (S-O-R) framework to assess their influence on sustainable fashion consumption, thereby contributing to a deeper understanding of this emerging trend. By utilizing the problematization method, we have identified the research question.

Research question 1: How do VIAT, ATGP, BEGM, and GPIT influence each other among Thai consumers?

Research question 2: How do ATGP and BEGM mediate the interaction between VIAT and GPIT?

This paper contains a presentation consisting of a total of 5 sections: (1) introduction, (2) theory and hypotheses development, (3) research method, (4) analysis and results, (5) conclusion and discussion and, (6) limitations, implications, and future research.

Literature Review

Theory of stimulus-organism-response and the virtual influencer attractiveness-attitude-brand engagement-intention gap in green advertisement

The Stimulus-Organism-Response (S-O-R) Theory is a psychological framework for understanding human behavior, particularly in marketing and consumerism. Thorndike (1911) demonstrated that behaviors followed by positive outcomes tend to be repeated, whereas those with negative consequences are abandoned. Initially, the Stimulus-Response (S-R) Theory focused solely on observable behavior, disregarding internal cognitive processes. Watson (1913) emphasized the scientific study of measurable actions, while Skinner (1938) established that behavior is shaped by reinforcement and its consequences.

As the theory evolved, researchers recognized that responses to stimuli involve internal cognitive processing. This led to the incorporation of the organism (O) as a mediating factor in behavioral responses. Tolman (1932) and Lewin (1951) contributed by highlighting cognitive and environmental influences, giving rise to the S-O-R framework, which comprises (1) stimulus, external factors influencing consumer behavior, (2) organism—internal cognitive processes shaping perception and evaluation, and (3) response—observable behavior.

Mehrabian and Russell (1974) further refined the model by identifying three cognitive responses to stimuli: (1) Pleasure—subjective experience of stimuli, (2) Arousal—degree of alertness induced, and (3) Dominance—perceived control over the environment. Both external and internal stimuli can trigger these responses (Sugiarto et al., 2022).

This study employs the S-O-R Theory as a foundational framework for examining consumer behavior in green marketing. In this model, virtual influencer attractiveness (VIAT) serves as the stimulus (S)—an external factor that influences consumer perceptions. This stimulus triggers cognitive and emotional processes within consumers (the organism (O)), shaping their attitude toward green products (ATGP) (Bi & Zhang, 2023; Pick, 2021). These internal responses subsequently translate into observable behaviors (the response (R)), manifesting as brand engagement (BEGM) (Zheng & Xu, *2024)* and green purchase intention (GPIT) (Bi & Zhang, 2023; Koay, Cheung, Soh, & Teoh, 2022; Pick, 2021; Zheng & Xu, 2024).

By applying the S-O-R framework, this study explores how consumers' psychological responses to virtual influencers in the sustainable fashion industry influence their engagement with brands and intent to purchase green products. The proposed research model (Figure 1) systematically examines these relationships, leading to the formulation of the following study hypotheses.

Hypothesis 1: VIAT has a significant positive effect on ATGP,

Hypothesis 2: VIAT has a significant positive effect on BEGM,

Hypothesis 3: VIAT has a significant positive effect on GPIT.

Additionally, previous studies suggest that other variables, specifically ATGP (Bi & Zhang, 2023; Duong, 2022; Kumar, 2024; R**ū**telion**ė** & Bhutto, 2024) and BEGM (Amankona, Yi, & Kampamba, 2024; Duffett & Maraule, 2024; Hanaysha, 2022; Zheng & Xu, 2024), also influence GPIT. Specifically, ATGP shapes consumers' perceptions and attitudes toward green products, which in turn impacts their intention to purchase such products. Moreover, ATGP has been shown to exert a significant influence on BEGM, as a positive attitude toward green products often leads to greater consumer engagement with sustainable brands (Park, 2022). Based on these relationships, it can be hypothesized that:

Hypothesis 4: ATGP has a significant positive effect on BEGM,

Hypothesis 5: ATGP has a significant positive effect on GPIT,

Hypothesis 6: BEGM has a significant positive effect on GPIT.

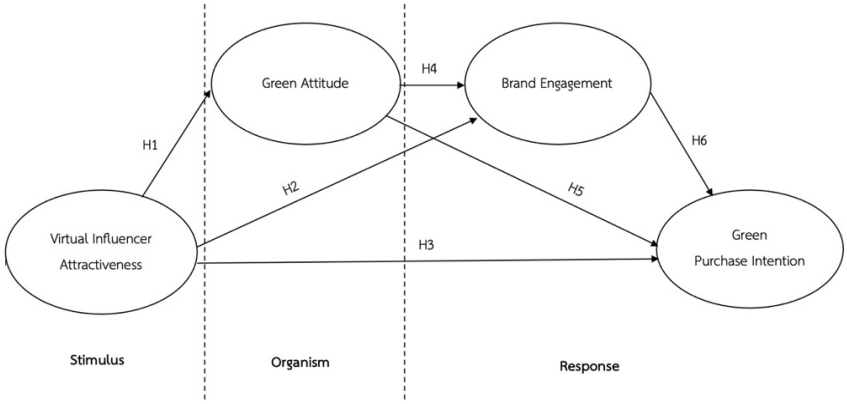

Figure 1 Research Framework

Mediation of green attitude and brand engagement

In the association between VIAT and GPIT, ATGP acts as a mediator variable. The researchers conducted a literature review of a prior study conducted by Bi and Zhang (2023). The study revealed that attitude towards a product acted as a mediator in the connection between parasocial relationships and purchase intention. A study conducted by Kumar (2024) discovered that attitude acted as a mediator in the connection between purchase intention and three other factors: ethical obligation, environmental concern, and subjective norms.

The findings of R**ū**telion**ė** and Bhutto (2024) align with our study, which investigated the mediation effect of attitude on association between purchase intention and three other variables: utilitarian environmental benefits, warm glow benefits, and self-expressive benefits. This suggests that ATGP may act as a mediator in the relationship between VIAT and GPIT in the context of sustainable fashion businesses. Therefore, the study's hypotheses can be expressed as follows:

Hypothesis 7: ATGP mediates the relationship between VIAT and GPIT.

The investigators examined the role of the BEGM mediator in the relationship between VIAT and GPIT. We had a literature review from a previous study by Amankona et al. (2024) that investigated the role of the mediation variable of engagement in the relationship between digital

social responsibility and purchase intention, as well as Ismail, Elsharnouby, and Abd Elaal (2024) that found that engagement had a moderation effect in the relationship between sector reputation and purchase intention. Consequently, we may formulate the following study hypotheses:

Hypothesis 8: BEGM mediates the relationship between VIAT and GPIT.

The attitude towards green products and brand engagement as a serial mediator

The serial mediating variables of ATGP and BEGM play a crucial role in the correlation between VIAT and GPIT. We have reviewed previous literature from the study by Zheng and Xu (2024) on the serial mediation of emotional attachment and social media engagement in the relationship between attractive appearance and purchase intention. It can be observed that there are variables in the hierarchical order that are consistent with this study, including social media engagement, attractive appearance, and purchase intention. Therefore, there is a tendency to align with the hypothesis of this study.

Similarly to Ismail et al. (2024), this study examines the mediating role of engagement and attitude in the relationship between sector reputation and purchase intention. The study observes the following sequence for the mediating variables: Sector Reputation ⟶ Sector Engagement ⟶ Attitude toward Sector ⟶ Purchasing Stock Intention. In this research, the sequence of the mediating variables is as follows: Virtual influencer attractiveness ⟶ Attitude toward green products ⟶ Brand engagement ⟶ Green purchase intention. Nonetheless, the sequence of these variables tends to link to our study's hypothesis:

Hypothesis 9: ATGP and BEGM serially mediate the relationship between VIAT and GPIT.

Methodology

Sample procedures and data collection

The population in this study consists of consumers aged over 18 years in Thailand. However, the exact population size is unknown. The sample size of 440 cases was determined based on the recommendation by Joe F. Hair, Sarstedt, Ringle, and Mena (2012) for structural equation modeling (SEM). SEM analysis requires a sample size that is 10–20 times the number of observed variables. With four latent variables and 22 observed variables in this study, the

recommended sample size falls between 220-440. Therefore, a sample size of 440 was chosen, which is considered sufficient for reliable SEM analysis.

A structured questionnaire was designed for data collection, consisting of 22 observed variables aimed at assessing consumers' knowledge, attitudes, and purchase intentions regarding eco-friendly products. The questionnaire employed a Likert scale, with responses ranging from "Strongly Agree" to "Strongly Disagree," to measure participants' attitudes and behaviors. The survey was conducted over a one-month period, from April 10th to May 10th, 2024. A nonprobability sampling technique was utilized in this study, meaning that the probability of each unit being selected is unknown. Although the lack of random sampling may limit the generalizability of the findings, this approach was chosen to ensure a sample representative of diverse regions across Thailand.

The sampling process employed a multi-stage sampling method, the first stage involved selecting sample groups at the regional level. Thailand is divided into six regions, each distinguished by unique geographical and cultural characteristics: northern, northeastern, central, eastern, western, and southern. To ensure representative coverage across regions, purposive sampling was employed to select the most densely populated province from each region. The provinces selected were Chiang Mai (Northern), Nakhon Ratchasima (northeastern), Bangkok (Central), Chonburi (Eastern), Nakhon Pathom (Western), and Songkhla (Southern).

In the second stage, data collection within each province was conducted using quota sampling. A total of 440 samples were collected: 74 from both Bangkok and Nakhon Ratchasima, and 73 from each of the remaining provinces: Chiang Mai, Chonburi, Nakhon Pathom, and Songkhla. The third stage involved trained teams utilizing the intercept method to gather data from participants.

The data collected was analyzed using SPSS for descriptive statistics and PROCESS Macro for mediation and moderation analysis. PROCESS Macro was specifically chosen due to its ability to handle complex models involving mediators and moderators, which aligns with the objectives of this study. SPSS was used for initial data cleaning and checking for missing values.

Measures

The study's constructs have been derived from prior research and modified to be applicable to the context for the purpose of assessing four latent variables; virtual influencer

attractiveness (VIAT) from Wiedmann and von Mettenheim (2021), Bi and Zhang (2023), Zheng and Xu (2024), and McCracken (1989); attitude towards green products (ATGP) from Chanda, Isa, and Ahmed (2023) and Duong (2024); brand engagement (BEGM) from Zaichkowsky (1985), Cheung, Pires, and Rosenberger Iii (2021), Riskos, Dekoulou, Hatzithomas, and Papasolomou (2024), and Haverila, Haverila, McLaughlin, Rangarajan, and Currie (2024); green purchase intention (GPIT) from Chanda et al. (2023), Zheng and Xu (2024), and Duong (2024).

Results and discussion

Descriptive statistics and multicollinearity

The demographic characteristics of the participants in this study, consisting of 440 respondents, are summarized in Table 1. The sample includes a diverse distribution in terms of gender, age, education, and monthly income. Specifically, 77.8% of the participants are female, while 22.5% are male. Regarding age, the majority (60.7%) fall within the 18-26 age group, followed by 19.1% in the 27-44 age range. In terms of educational background, 62.7% of respondents have education below a bachelor's degree, while 34.8% hold a bachelor's degree, and 2.5% have higher qualifications. The income distribution shows that 64.5% of participants earn below 10,000 THB per month, with progressively fewer participants earning higher amounts. These demographic details are crucial for understanding the context of the research and ensuring that the sample is representative of the target population. As shown in Table 2, there is no issue of multicollinearity, indicating that the correlations between the variables are below the threshold of 0.80, which ensures the validity of subsequent analyses (Gujarati & Porter, 2009).

Table 1 Demographic data of the participants (*N* = 440)

Variable		F	%	CF
Gender	Male	99	22.5	22.5
	Female	341	77.8	100.0
Age	18-26 years	267	60.7	60.7
	27-44 years	84	19.1	79.8
	45-59 years	59	13.4	93.2
	60 years and above	30	6.8	100.0
Education	Below bachelor's degree	276	62.7	62.7
	Bachelor's degree	153	34.8	97.5

Table 1 Demographic data of the participants (*N* = 440) (Continued)

Variable		F	%	CF
Education (continued)	Above bachelor's degree	11	2.5	100.0
Monthly income	Below 10,000 baht	284	64.5	64.5
(in Thai baht)	10,001-19,999 baht	67	15.2	79.8
	20,000-29,999 baht	33	7.5	87.3
	30,000-39,999 baht	22	5.0	92.3
	40,000 baht and above	34	7.7	100.0

Note: 1 USD = 36.74 THB (exchange rate on April 10, 2024)

Measurement model and confirmatory factor analysis (CFA)

The study employed SPSS 29.0.2.0 (20) and AMOS 18 software to conduct confirmatory factor analysis. Additionally, Cronbach's alpha was utilized to assess the consistency and discriminant validity of the constructs. Prior to examining the measurement model, we assessed the kurtosis and skewness coefficients for the items under the four constructs: virtual influencer appeal, attitude towards green products, brand engagement, and green purchasing intention.

All the skewness values were less than |3|, and all the kurtosis values were less than |8|. This indicates that the data distribution is satisfactory. Our research has verified that the constructions adhere to a normal distribution, which is consistent with findings from earlier studies Podsakoff, MacKenzie, Lee, and Podsakoff (2003). The factor loading study showed 0.691–0.845 (Table 3) is over the recommended threshold of 0.5, as indicated by Joseph F. Hair, Black, Babin, and Anderson (2014).

Table 2 Means, standard deviations and correlations (*N*=440)

Variable	VIAT	ATGP	BEGM	GPIT	Mean	SD
VIAT	-				3.395	1.174
ATGP	0.485**	-			2.948	1.122
BEGM	0.452**	0.780**	-		3.519	0.934
GPIT	0.781**	0.693**	0.758**	-	3.953	0.989

Notes: **, correlation is significant at the 0.01 level (1-tailed); *, correlation is significant at the 0.5 (1-tailed)

VIAT: (Virtual Influencer Attractiveness), ATGP: (Attitude toward Green Product), BEGM: (Brand Engagement), GPIT: (Green Purchase Intention)

Furthermore, the measurement model provided a significant level of fit indices: $\chi^2(128) = 148.822$; $\chi^2/df = 1.161$; GFI = 0.971 > 0.9; AGFI = 0.942 > 0.8; CFI = 0.998 > 0.9; TLI = 0. 996 > 0.9; NFI = 0.983 > 0.9 and RMSEA = 0.019 < 0.08 (Fornell & Larcker, 1981), Cronbach's alpha (0.877-0.942) there are good model fit.

Convergent validity, discriminant validity and common method bias (CMB)

Table 3 shows no validity issue, as AVE (0.572–0.663) and CR (0.870–0.932) for the constructs were significantly higher than the cut-off values of 0.5 and 0.7, respectively, as recommended by Fornell and Larcker (1981), indicating scale validity.

In order to evaluate the presence of common technique bias in the dataset, we utilized Harman's single-factor test. The results showed that one factor explained 45.606% of the overall variation, which is below 50% in accordance with the recommendation of Podsakoff et al. (2003).

Hypotheses results

We utilized the PROCESS macro 4.2 with model number 6 (Hayes, 2018) to analyze hypotheses testing. Specifically, we tested the direct hypotheses (H1-H6), mediation hypotheses (H7-H8), and serial mediation hypothesis (H9). The bootstrapping process, which involved 5,000 samples, resulted in the calculation of 95% bias-corrected confidence intervals. The results presented in Table 4 and Figure 2 demonstrate the following relationships:

Table 3 Results of reliability and validity (*N*=440)

Measurement and Items	Factor Loading	Composite Reliability (CR)	Average Variance Etraction (AVE)	Cronbach Alpha
Virtual influencer attractiveness (VIAT)		0.872	0.578	0.898
VIA1	0.691			
VIA2	0.791			
VIA3	0.764			
VIA4	0.798			
VIA5	0.753			
Green attitude (ATGP)		0.873	0.580	0.901
ATG1	0.815			

Table 3 Results of reliability and validity (*N*=440) (Continued)

Measurement and Items	Factor Loading	Composite Reliability (CR)	Average Variance Etraction (AVE)	Cronbach Alpha
Green attitude (ATGP) (Continued)				
ATG2	0.784			
ATG3	0.786			
ATG4	0.723			
ATG5	0.692			
Brand engagement (BEGM)		0.870	0.572	0.877
BEG1	0.704			
BEG2	0.747			
BEG3	0.796			
BEG4	0.771			
BEG5	0.761			
Green Purchase Intention (GPIT)		0.932	0.663	0.942
GPI1	0.791			
GPI2	0.775			
GPI3	0.821			
GPI4	0.815			
GPI5	0.809			
GPI6	0.845			
GPI7	0.840			

Hypothesis 1: VIAT has a significant positive effect on ATGP (effect = 0.745, $p < 0.001$). The results for the M1 variable (ATGP) indicate that this model explains approximately 60.86% of the variance in ATGP (R^2=0.6086), with a statistical significance level, hence supporting H1,

Hypothesis 2: VIAT has a significant positive effect on BEGM (effect = 0.207, $p < 0.001$),

Hypothesis 3: VIAT does not have a significant effect on GPIT (effect = 0.063, $p > 0.05$). Consequently, we rejected H3,

Hypothesis 4: ATGP has a significant positive effect on BEGM (effect = 0.463, $p < 0.001$),

The results for the M2 variable (BEGM) indicate that this model explains approximately 60.12% of the variance in BEGM (R^2=0.6012), with a statistical significance level, hence supporting H2 and H4,

Table 4 Hypotheses Results (*N*=440)

Hypotheses	Research questions	Path	Coefficient	t-test	Supported
H1	RQ1	VIAT⟶ATGP	0.745**	26.097	Yes
H2	RQ1	VIAT ⟶BEGM	0.207**	5.377	Yes
H3	RQ1	VIAT ⟶GPIT	0.063	1.621	No
H4	RQ1	ATGP ⟶ BEGM	0.463**	11.508	Yes
H5	RQ1	ATGP ⟶ GPIT	-0.330**	-7.327	Yes
H6	RQ1	BEGM ⟶GPIT	1.073**	22.821	Yes

Notes: ** p<0.001 or t ≥2.58; * p<0.05)

Hypothesis 5: ATGP has a significant negative effect on GPIT (effect = -0.330, p < 0.001), Hypothesis 6: BEGM has a significant positive effect on GPIT (effect = 1.073, p < 0.001).

The results for the Y variable (GPIT) indicate that this model explains approximately 65.76% of the variance in GPIT (R^2=0.6576), with a statistical significance level, hence supporting H5, and H6.

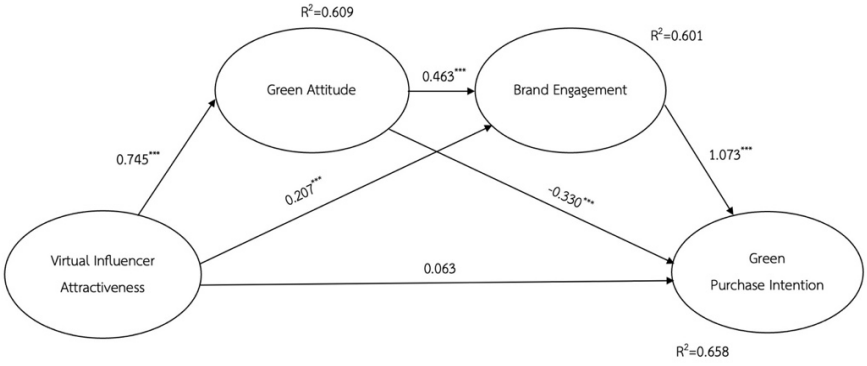

Figure 2 Hypotheses Results

The findings presented in Table 5 indicate that ATGP played a partial mediating role in the association between VIAT and GPIT, thus verifying hypothesis 7 (effect = -0.246, p < 0.001, VAF=0.603). According to BEGM partially mediated the relationship between VIAT and GPIT, confirming hypothesis 8 (effect = 0.222, p < 0.001, VAF=0.543).

Table 5 Results of mediation analysis (*N*=440)

	Mediation paths	Indirect effects	LLCI	ULCI	*p*-value	Mediation
H7 RQ2	VIAT⟶ATGP⟶GPIT (VAF = 0.603)	-0.246	-0.314	-0.181	<0.001	Partial
H8 RQ2	VIAT ⟶BEGM⟶GPIT (VAF = 0.543)	0.222	0.140	0.306	<0.001	Partial
H9 RQ2	VIAT ⟶ ATGP ⟶ BEGM ⟶ GPIT (VAF = 0.906)	0.370	0.2891	0.4598	<0.001	Full Sequential

Notes: VAF>0.8 (full mediation), VAF=0.2-0.8 (partial mediation), and VAF<0.2 (no significant mediation)

Furthermore, hypothesis 9 is validated, demonstrating a substantial fully mediated impact of ATGP and BEGM on the association between VIAT and GPIT (effect = 0.370, p < 0.001, VAF = 0.906). The study employed the variance-accounted factor (VAF) to illustrate complete mediation resulting from a total indirect effect of 84.52%, as described by Joseph F. Hair et al. (2014).

Conclusion and Discussion

Using the outcomes of statistical tests, we may provide an explanation for research question 1: How do VIAT, ATGP, BEGM, and GPIT influence one another among consumers in Thailand? The data is presented in the following manner:

VIAT has a statistically significant impact on both ATGP (Bi & Zhang, 2023; Pick, 2021) and BEGM (AlFarraj et al., 2021; Zheng & Xu, 2024); hypotheses 1 and 2 were supported. Nevertheless, VIAT has not yet directly influenced GPIT, rejecting hypothesis 3. This non-significant finding could be attributed to several factors. Firstly, the attractiveness of virtual influencers, while important, might not be sufficient on its own to trigger a green purchase intention among consumers. Previous research suggests that environmental attitudes and motivations play a more significant role in shaping purchase behavior (AlFarraj et al., 2021; Koay et al., 2022). Additionally, the participants in this study may have been influenced by other external factors, such as financial constraints, which limit their willingness to invest in sustainable products despite a positive perception of virtual influencers. Another possible explanation is that the impact of influencer attractiveness on purchase intentions may vary depending on the type of product being

marketed, with green products potentially requiring a stronger focus on environmental values than what attractiveness alone can provide. Therefore, further research should explore the role of other potential mediators, such as trustworthiness and expertise, which may be more closely tied to green purchase behavior.

This phenomenon can be explained by the fact that attractiveness alone lacks the potency to induce an environmentally friendly purchase intention (AlFarraj et al., 2021; Koay et al., 2022). The statistical analysis reveals that ATGP and BEGM play a critical role in this study's model. In accordance with the concepts of the source of credibility model, it may be necessary to incorporate additional motivational factors such as trustworthiness, expertise, and attractiveness (Ohanian, 2013).

The study found that ATGP has a significant impact on both BEGM (H4) (Park, 2022) and GPIT (H5) (Bi & Zhang, 2023; Duong, 2022; Kumar, 2024; Rūtelionė & Bhutto, 2024), suggesting that individuals with a positive attitude towards green products are more inclined to develop brand engagement. This leads to a stronger intention to purchase environmentally friendly products, supporting hypothesis 6. Hypothesis 6 proposes that a higher level of consumer engagement with a brand will have a greater influence on their intention to purchase green products (Amankona et al., 2024; Duffett & Maraule, 2024; Hanaysha, 2022; Zheng & Xu, 2024). Despite a statistically significant association between ATGP and GPIT, the negative coefficient of standard regression indicates that a rise in one ATGP variable will lead to a drop in the value of the GPIT variable. This study necessitates a further examination and investigation of the phenomenon.

Hypothesis 5 demonstrates that Attitude toward Green Products (ATGP) has a significant negative effect on Green Purchase Intention (GPIT), indicating an inverse relationship between these two variables. This phenomenon may be attributed to the higher prices of sustainable fashion products compared to conventional items. The majority of our sample consists of individuals earning less than 10,000 baht per month, suggesting that a positive attitude toward green products alone may be insufficient to foster green purchase intention.

In the context of research question 2, How do ATGP and BEGM mediate the interaction between VIAT and GPIT? The following is an explanation of the results of the statistical tests.

ATGP plays a role as partial mediation in the relationship between VIAT and GPIT (H7) (Bi & Zhang, 2023; Kumar, 2024; Rūtelionė & Bhutto, 2024), which means that VIAT can influence GPIT

partially through changes in ATGP. However, there are still some influences that do not pass through ATGP. Similarly, BEGM serves as a partial mediator in the association between VIAT and GPIT (H8) (Amankona et al., 2024; Ismail et al., 2024). This implies that VIAT has the ability to transfer its effect to GPIT by means of alterations in BEGM to some extent, while also exerting certain impact that is not dependent on BEGM.

Furthermore, ATGP and BEGM function as full sequential mediators in the relationship between VIAT and GPIT (H9). This implies that VIAT has the ability to transfer its impact to the GPIT by modifying two specific variables, namely ATGP and BEGM. These two variables play a crucial role in the connection between VIAT and GPIT. According to the research conducted by Zheng and Xu (2024) and Ismail et al. (2024), despite the slightly different sequencing of the variables in their studies, it is clear that the variables in Hypothesis 9 hold significant importance and can be sequentially linked to promote environmentally friendly purchasing intentions. Therefore, the study supported eight hypotheses and rejected one.

The findings indicate that the attractiveness of virtual influencers alone does not have a significant impact on green purchase intentions. In this study, the model emphasizes the importance of considering attitudes towards green products and brand engagement as full serial mediators. However, the impact of attitude towards green products and brand engagement on the relationship between virtual influencer attractiveness and green purchase intention is partial. This demonstrates the significance of the model in studies that examine serial mediation.

Limitation, implications and direction for future studies

The primary limitation of this study lies in the use of data collected from a specific group of individuals in Thailand, within the context of sustainable fashion. Sampling from only one province in each of the six regions may not provide sufficient evidence for generalizing the results to the broader population. This limitation, along with potential sampling bias due to the limited geographic and demographic diversity of the sample, could contribute to a more complex process of interpreting how virtual influencer attractiveness influences green purchase intentions. It may also explain why virtual influencer attractiveness does not have a direct and statistically significant effect on green purchase intentions.

Despite this, the findings align with the Stimulus-Organism-Response Theory, where the attractiveness of virtual influencers functions as the stimulus, while attitudes towards green

products act as the organism. The response is reflected in the levels of consumer engagement with brands and their intentions to make green purchases**.** These results have practical implications for businesses, suggesting that employing virtual influencers in advertising campaigns can effectively promote environmentally responsible purchase intentions**.** Firms focused on sustainability can enhance their competitive advantage by prioritizing marketing elements that drive green purchase behavior.

Furthermore, future research should explore a broader range of factors beyond mere attractiveness when examining virtual influencers in advertising. Investigating the model of source credibility—particularly trustworthiness and expertise—could offer valuable insights for refining marketing strategies. Additionally, expanding research to include other industries such as beauty, health, food, technology, and tourism would enhance our understanding of virtual influencers' effectiveness across diverse consumer sectors. The impact of virtual influencers in the technology sector, particularly in promoting sustainable technologies and addressing environmental concerns, should also be explored. Comparing virtual influencers with traditional influencers in various product categories could reveal their unique advantages and limitations in advertising.

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