

PERSONALITY TRAITS, SELF-BRAND CONNECTION, AND BRAND LOYALTY TOWARD A VOLUNTARY CARBON OFFSET INITIATIVE: A SELF-CONGRUITY PERSPECTIVE

ĐẶC ĐIỂM TÍNH CÁCH, SỰ GẮN KẾT BẢN THÂN – THƯƠNG HIỆU VÀ LÒNG TRUNG THÀNH THƯƠNG HIỆU ĐỐI VỚI MỘT SÁNG KIẾN BÙ TRỪ CARBON TỰ NGUYỆN: GÓC NHÌN TỪ LÝ THUYẾT TƯƠNG THÍCH BẢN THÂN

Bao Quoc Truong-Dinh¹, Nguyen The Phu², Le Ngoc Phuong Tram^{1*}, Nguyen Bao Nhi¹,
Le Ngoc Nhat Mien¹, Nguyen Hoang Anh Thi¹

¹The University of Danang - University of Economics, Vietnam

²Southern Taiwan University of Science and Technology, Taiwan

*Corresponding author: tramlnp@due.edu.vn

(Received: June 19, 2026; Revised: August 14, 2026; Accepted: August 18, 2026)

DOI: 10.31130/ud-jst.2026.24(8).424E

Abstract - Grounded in self-congruity theory, this study examines how Big-Five personality traits influence self-brand connection (SBC) and subsequent green brand loyalty (GBL) within Grab's voluntary carbon offset initiative in Vietnam. Grab is examined as a service brand adopting an environmental program rather than an inherently green brand. Survey data from 309 Grab users were analyzed using partial least squares structural equation modeling (PLS-SEM) in WarpPLS. The results reveal that extraversion, agreeableness, and openness to experience positively relate to SBC, whereas neuroticism has a significant negative relationship; conscientiousness shows no significant effect. Furthermore, SBC strongly predicts GBL. By elucidating self-congruity in a voluntary carbon offset context, this research advances understanding of personality-driven, pro-environmental consumer behavior and offers practical implications for targeted green marketing.

Key words - Big-Five personality traits; voluntary carbon offset; self-brand connection; green brand loyalty; self-congruity theory; PLS-SEM

1. Introduction

The global urgency of climate change has prompted firms to introduce voluntary environmental programs as part of their green marketing portfolios. Among these initiatives, voluntary carbon offset programs - whereby consumers voluntarily pay a surcharge to neutralize the carbon emissions associated with a transaction - represent a particularly demanding form of pro-environmental behavior. Voluntary carbon markets have expanded rapidly as firms integrate offsetting into their carbon-neutrality and pricing strategies [1], [2]. Unlike purchases of tangible green products, carbon offset participation generates no direct material return for the consumer: the benefit accrues entirely to the environment. This combination of financial cost, intangibility, and altruism makes voluntary carbon offset programs a stringent test of what truly drives sustained brand commitment [3], [4].

A growing body of research has applied the Big-Five personality framework to predict green attitudes, purchase intentions, and general pro-environmental behaviors [3], [5], [6]. However, these studies predominantly adopt attitude-based or intention-based dependent variables suitable for

Tóm tắt - Dựa trên lý thuyết tương thích bản thân (self-congruity theory), nghiên cứu này phân tích tác động của 5 đặc điểm tính cách (Big-Five) đến sự gắn kết bản thân - thương hiệu (SBC) và lòng trung thành thương hiệu xanh (GBL) trong sáng kiến bù đắp carbon tự nguyện của Grab tại Việt Nam. Nghiên cứu tiếp cận Grab như một thương hiệu dịch vụ thực hiện sáng kiến môi trường. Dữ liệu khảo sát từ 309 người dùng Grab được phân tích bằng mô hình PLS-SEM trên phần mềm WarpPLS. Kết quả cho thấy, hướng ngoại, dễ chịu và cởi mở có mối quan hệ tích cực với SBC; tính loạn thần kinh tác động tiêu cực; trong khi sự tận tâm không có ý nghĩa thống kê. Đồng thời, sự gắn kết bản thân – thương hiệu là yếu tố dự báo mạnh mẽ của lòng trung thành thương hiệu xanh. Nghiên cứu mở rộng hiểu biết về hành vi tiêu dùng xanh theo tính cách và đề xuất hàm ý cho tiếp thị môi trường cá nhân hóa.

Từ khóa - Năm đặc điểm tính cách chính (Big-Five); bù trừ carbon tự nguyện; sự gắn kết bản thân-thương hiệu; lòng trung thành thương hiệu xanh; lý thuyết tương thích bản thân; PLS-SEM

one-time or low-involvement decisions. When the consumption act is intangible and offers no material utility - as in carbon offset programs - attitude alone is an insufficient anchor for sustained behavioral commitment [7]. Likewise, research specifically addressing voluntary carbon offsetting has concentrated on consumers' initial propensity to pay and its antecedents - perceived altruistic motives, social norms, perceived effectiveness, and trust in the sponsoring firm [8] - leaving the question of why consumers remain loyal to the brand behind an offset program largely unexplored. Durable loyalty in such contexts is driven instead by identity-based mechanisms: consumers persist in a costly, invisible behavior primarily because it has become part of how they see themselves [9], [10].

Self-brand connection (SBC) - defined as the degree to which a consumer integrates a brand into their self-concept [9] - is precisely this identity-based mechanism. When a brand's environmental initiative resonates with a consumer's green self-identity, the brand is internalized as a symbolic extension of the self, generating commitment that transcends transactional logic [11], [12]. SBC has been shown to predict green brand loyalty more strongly than

attitude or satisfaction in sustainability contexts [7], [11]. Yet how stable personality traits shape SBC formation within voluntary carbon offset programs - and how SBC subsequently translates those dispositions into green brand loyalty - has not been empirically examined. This is a meaningful gap: understanding which personality profiles predispose consumers to develop SBC with brands offering intangible environmental programs has both theoretical and strategic importance.

The present study tests a sequential model with two connected sets of direct effects: (1) the influence of each Big-Five personality trait on SBC in the context of a voluntary carbon offset initiative; and (2) the effect of SBC on GBL. Grounded in self-congruity theory [13], [10], the model proposes that stable personality dispositions shape consumers' capacity to connect their self-concept with the environmental associations communicated by a brand initiative, and that this connection subsequently supports loyalty motivated by those environmental associations. Grab's voluntary carbon offset program in Vietnam serves as the empirical context. Importantly, the study does not infer that Grab is inherently a green brand merely because it offers this program; instead, it examines brand responses arising in connection with a specific environmental initiative.

The study makes three contributions. First, it extends personality-green behavior research beyond attitude and intention by examining SBC as an identity-based antecedent of environmentally motivated brand loyalty, addressing calls by Duong [3] and Sun et al. [5] for a deeper understanding of personality-related consumer responses. Second, it positions voluntary carbon offsetting as the empirical context in which the proposed identity mechanism is examined. Carbon offsetting is not modeled as a latent construct; rather, the optional payment provides a transaction component with no direct material or service benefit, making identity-related responses especially relevant. Third, the study provides empirical evidence from Vietnam, an emerging economy with rapidly growing environmental awareness, extending findings predominantly derived from developed-country samples [3], [6].

2. Theoretical framework and hypotheses

2.1. Self-congruity theory and the voluntary carbon offset context

Self-congruity theory [13] proposes that consumers evaluate and choose brands on the basis of the match between the brand's perceived image and their own self-concept. When a brand's identity aligns with how consumers see themselves - or aspire to see themselves - they are motivated to associate with the brand as a means of expressing and reinforcing that self-concept [13], [10]. This congruence-driven motivation produces SBC [9]: the consumer integrates the brand into their self-concept, treating it as a symbolic extension of personal identity. Once established, SBC creates a powerful psychological anchor for loyalty: switching to a competing brand would undermine the consumer's expressed identity, generating cognitive dissonance [10], [14]. Self-congruity theory thus

offers a parsimonious explanation for why brand loyalty, at its most durable, is identity-based rather than transactional.

The voluntary carbon offset program context is relevant to self-congruity theory because the optional offset payment itself provides no tangible product improvement, discount, or service upgrade. This does not mean that consumers' overall use of Grab is free from utilitarian motives, because convenience, price, and service quality may still influence platform choice. Rather, the environmental component of the transaction is primarily symbolic and prosocial: users who opt in pay an additional amount for an environmental benefit that is difficult to observe directly [15]. Because the quality and additionality of carbon credits can also be difficult for consumers to verify [16], responses to the initiative may depend partly on whether the environmental associations communicated by the program resonate with consumers' self-concepts and their relationship with the sponsoring brand [8], [17].

This framing clarifies why SBC is a theoretically relevant construct in voluntary carbon offset research. The carbon offset program is treated as the research context rather than as a construct in the structural model. The study therefore does not estimate consumers' perceived effectiveness, credibility, or quality of the carbon credits. Instead, it examines whether personality traits are associated with SBC after respondents are presented with the initiative and whether SBC is subsequently associated with environmentally motivated loyalty. Attitudes, trust, perceived program effectiveness, and utilitarian evaluations may also influence these responses; their omission defines the scope of the present model rather than implying that SBC is the only possible mechanism.

2.2. Big-Five personality traits

The Big-Five model represents the dominant empirical taxonomy of personality, capturing individual differences across five stable dimensions: Extraversion (EV), Neuroticism (NR), Openness to Experience (OP), Conscientiousness (CC), and Agreeableness (AG) [18], [19]. Each dimension reflects a characteristic pattern of thoughts, feelings, and behaviors that remains relatively consistent across situations and time [20]. Their stability and cross-cultural applicability make them appropriate antecedents for the consumer's self-concept orientation - the stable sense of self from which self-congruity assessments originate.

From a self-congruity perspective, personality traits are relevant because they shape the content and structure of a consumer's self-concept [13]. A consumer who is high in agreeableness, for instance, holds a self-concept oriented around prosocial values; they are therefore likely to perceive strong congruence with a brand that enables collective-benefit behaviors such as carbon offsetting. Conversely, a consumer high in neuroticism may hold an anxious, distrustful self-concept that is incompatible with the identity-affirmation required for SBC formation. The Big-Five thus predicts which consumers are structurally predisposed to perceive self-congruence with a green brand's VCOP - and therefore which consumers are most likely to develop strong SBC.

2.3. Self-Brand Connection and Green Brand Loyalty

SBC is defined as the degree to which an individual has incorporated a brand into their self-concept [9], such that the brand becomes part of how they define and present themselves. It is the psychological state that results when self-congruity theory's predicted matching process succeeds: the consumer does not merely prefer the brand but identifies with it [9], [13]. SBC has been empirically linked to brand loyalty, positive word-of-mouth, and premium price tolerance [10], [14], [21]. In sustainability contexts, SBC has been shown to convert consumers' perceptions of a brand's environmental commitment into durable behavioral loyalty [7], [11], [12].

A green brand is generally understood as a brand whose identity, positioning, and value proposition include a meaningful and credible commitment to reducing environmental harm. A single environmental program does not, by itself, establish an organization-wide green brand positioning. Accordingly, this study does not classify Grab as an inherently green brand solely on the basis of its carbon offset program. Instead, Grab is treated as a service brand implementing a voluntary environmental initiative. Green brand loyalty (GBL) is operationally defined here as users' sustained preference for and commitment to Grab because of environmental attributes associated with that initiative [22]. Thus, GBL captures environmentally motivated loyalty toward the sponsoring brand, not an a priori judgment that every aspect of Grab constitutes a green brand.

2.4. Hypothesis development

2.4.1. Personality traits and Self-Brand Connection

Extraversion encompasses sociability, assertiveness, and the active pursuit of positive social experiences [23]. Extraverted consumers maintain a self-concept defined partly by social visibility and group membership, leading them to use consumption choices as signals of identity to their networks [15]. In the VCOP context, opting into a carbon offset surcharge is a socially meaningful act that communicates environmental commitment - a form of public self-expression that is congruent with extraverts' identity orientation. When a brand enables this visible green act, extraverts perceive high self-brand congruence, facilitating SBC formation [24]. Consistent with this, Fazli-Salehi et al. [24] found that extraverts form stronger SBC with brands that offer rich identity-expression platforms, and Moisesescu et al. [25] confirmed that extraversion amplifies brand engagement in social settings. Accordingly:

H1: Extraversion is positively associated with self-brand connection.

Neuroticism reflects emotional instability, chronic anxiety, and a tendency toward negative affect [18]. At the level of self-concept, neurotic individuals hold a more fragile and threat-sensitive self-image. Self-congruity requires a stable sense of self from which congruence with a brand can be evaluated; neuroticism undermines this stability. Furthermore, in the VCOP context, where the environmental benefit is abstract and unverifiable by the

consumer, neurotic individuals are disproportionately susceptible to greenwashing doubts - doubts rendered plausible by documented quality concerns in voluntary carbon markets [16] - that prevent the brand from being incorporated into their green self-concept [26]. Garg et al. [27] showed neuroticism negatively affects brand love, and Ebrahimi et al. [26] found it predicts negative brand-related behaviors. We therefore expect:

H2: Neuroticism is negatively associated with self-brand connection.

Openness to Experience encompasses intellectual curiosity, aesthetic sensitivity, and comfort with abstraction and novelty [18], [20]. Open individuals hold a self-concept that is expansive and meaning-oriented - they readily assign symbolic value to experiences and are drawn to ideas that challenge conventional thinking. This self-concept orientation is highly congruent with the green identity dimension of a brand offering a VCOP: carbon offset programs require the consumer to engage with abstract environmental reasoning (emissions, offsetting, global impact) and to find meaning in an intangible contribution [6], [28]. The congruence between an open consumer's meaning-seeking self-concept and a brand that facilitates symbolic environmental action creates the conditions for strong SBC [28]. Accordingly:

H3: Openness to experience is positively associated with self-brand connection.

Conscientiousness is characterized by self-discipline, goal orientation, and adherence to plans and norms [20]. Conscientious individuals hold a self-concept organized around responsibility, duty, and dependability; because environmental protection is readily construed as a normative obligation, conscientiousness has been consistently associated with stronger green attitudes and behaviors [3], [5]. From a self-congruity perspective, a brand that operates a certified carbon offset program projects an image of responsibility, careful planning, and long-term commitment - attributes that mirror the conscientious self-concept. Participating in the program thus allows conscientious consumers to enact their sense of environmental duty through the brand, creating the perceived brand-self congruence from which SBC develops [13]. Accordingly:

H4: Conscientiousness is positively associated with self-brand connection.

Agreeableness reflects prosocial orientation, cooperativeness, and intrinsic motivation to act for others' benefit [20]. Agreeable consumers hold a self-concept defined substantially by prosocial and communal values [24]. Voluntary carbon offsetting is the prototypical expression of this self-concept: it is an altruistic act benefiting the collective with no personal material gain. When a brand enables this act, it becomes deeply congruent with the agreeable consumer's prosocial self-image; the resulting SBC is reinforced each time the consumer participates in the program, as the act reaffirms their identity as a cooperative, environmentally responsible person [17]. Fazli-Salehi et al. [24]

specifically identified agreeableness as a driver of SBC with brands perceived as cooperative and socially responsible. Accordingly:

H5: Agreeableness is positively associated with self-brand connection.

2.4.2. Self-Brand Connection and Green Brand Loyalty

Self-congruity theory predicts that when consumers perceive congruence between their self-concept and environmental associations communicated by a brand initiative, loyalty may follow as a behavioral and attitudinal manifestation of that congruence [13], [10]. SBC operationalizes the degree of identity integration at the individual level: consumers who connect a brand with their self-concept may be motivated to remain loyal because switching can create identity inconsistency [14], [9]. In the voluntary carbon offset context, the optional environmental payment offers no direct improvement in the underlying service, making identity-based responses particularly relevant, although not necessarily exclusive of trust, service quality, or other influences. Lin et al. [12] and Bhardwaj et al. [7] identify SBC as an important predictor of environmentally related brand loyalty. We therefore hypothesize:

H6: Self-brand connection is positively associated with green brand loyalty.

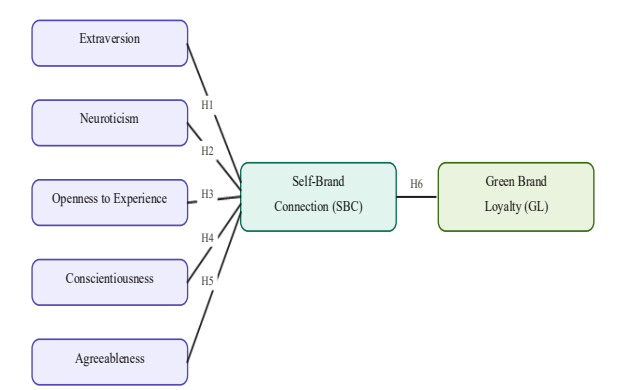


Figure 1. Proposed research model

3. Methodology

3.1. Research context

Grab is a multi-service digital platform whose ride-hailing and delivery activities generate transport-related emissions. The Grab application has offered users an optional carbon offset contribution at the point of transaction, with the proceeds directed toward environmental projects. The surcharge is voluntary and does not provide a discount, loyalty points, or a service upgrade. This study uses the initiative as a bounded research context and does not treat its existence alone as evidence that Grab has an organization-wide green brand positioning. Although the underlying decision to use Grab may remain utilitarian, the optional environmental contribution provides no direct functional benefit to the user and is therefore relevant for examining self-concept-based responses [17].

3.2. Measures and questionnaire

All constructs were measured using established scales adapted for the Vietnamese context. The Big-Five personality traits were measured using a shortened version of the BFI scale from John and Srivastava [19], with five indicators per trait: extraversion (EV), neuroticism (NR), openness to experience (OP), conscientiousness (CC), and agreeableness (AG). SBC was measured with seven indicators adapted from Escalas and Bettman [9], capturing respondents’ perceived connection with Grab after exposure to information about its carbon offset initiative. GBL was measured with four indicators adapted from Chen [22]. The items explicitly framed continued use, preference, resistance to switching, and usage intention in relation to Grab’s environmental attributes. The carbon offset program itself was not specified as a latent variable because the study examines it as the empirical context rather than assessing its perceived credibility, effectiveness, or quality. All items used a seven-point Likert scale (1 = strongly disagree; 7 = strongly agree). The wording reported in the Appendix reflects the brand-specific questionnaire administered to respondents.

The questionnaire comprised five sections: (1) questions recording Grab usage and prior awareness of the carbon offset option; (2) personality trait measurement; (3) a standardized description of Grab’s carbon offset initiative; (4) SBC and GBL measurement; and (5) demographic information. Prior awareness of or previous payment for the offset was not used as an eligibility requirement. The standardized description was shown before the SBC and GBL items so that all respondents evaluated the same initiative. The instrument was translated from English to Vietnamese using a back-translation procedure and pre-tested on 20 respondents to verify linguistic clarity and item comprehension.

3.3. Sample and data collection

A total of 350 respondents were recruited using quota sampling, with gender and age quotas derived from Grab Vietnam’s user-base statistics (Start.io) to improve demographic coverage. Eligibility required respondents to have used Grab at least once during the three months preceding the survey. Prior program awareness was recorded but was not used to exclude respondents, and the survey did not establish confirmed prior payment of the optional carbon offset surcharge. Data were collected through online and face-to-face channels. After removing 41 incomplete or otherwise ineligible responses, 309 valid responses were retained. The final sample comprised 51.8% female and 48.2% male participants and was predominantly aged 18-34 years. The findings should therefore be interpreted as responses of recent Grab users after standardized exposure to program information, rather than as evidence drawn exclusively from confirmed carbon offset purchasers.

3.4. Common method bias assessment

Given the self-report nature of the survey, common method bias (CMB) was assessed using both procedural and statistical remedies. Procedurally, respondent

anonymity was assured, scale formats were varied across constructs, and questionnaire length was minimized to reduce fatigue effects. Statistically, three tests were conducted. First, Harman's single-factor test was applied to all 36 observed indicators: the first extracted factor accounted for only 19.34% of total variance (threshold < 50%), and ten factors jointly explained 67% of variance, indicating that a single dominant factor does not underlie the data. Second, following Kock [29], full collinearity VIF was computed for all latent variables as a more rigorous CMB diagnostic; all values were below 3.3 (range: 1.03–2.87), well below Kock's [29] critical threshold, providing strong evidence against common method contamination. Third, inter-construct VIF values were below 3 (PLS algorithm) and below 5 (bootstrap), confirming the absence of multicollinearity. Collectively, these results indicate that CMB does not pose a serious threat to the validity of the findings.

4. Results

Hypotheses were tested using PLS-SEM in WarpPLS. PLS-SEM was selected because it accommodates non-normal data distributions, is appropriate for moderately sized samples, and is well suited to predictive-oriented research designs [30]. Assessment proceeded in two stages: measurement model evaluation followed by structural model evaluation.

4.1. Measurement model

During measurement model assessment, three indicators with outer loadings below the 0.70 threshold were removed: AG4 (0.599), CC2 (0.667), and OP2 (0.674). All retained indicators exceeded the 0.70 threshold. In this app-based environmental-initiative context, AG4 (being cooperative with others) may have elicited a broad interpersonal or socially desirable response that was less discriminating than the other agreeableness items. CC2 (being reliable and someone who can be counted on) emphasizes interpersonal dependability, whereas the retained conscientiousness items more directly reflect task persistence, planning, and carefulness. OP2 (being curious about many different things) is also broader than the retained openness items concerning abstract ideas, creativity, and imagination. These contextual interpretations are tentative and post hoc: the indicators were removed on the basis of the prespecified loading criterion, and their removal does not imply that the underlying facets are theoretically irrelevant. Future research should reassess the adapted wording and content coverage in more diverse samples. Reliability was evaluated through Cronbach's alpha and composite reliability (CR); all alpha values exceeded 0.78 and all CR values (rho_c) exceeded 0.86, surpassing the 0.70 threshold. CR values were consistently higher than corresponding alpha values, confirming robust internal consistency. Convergent validity was confirmed: all AVE values exceeded 0.60, indicating each construct explains more than 60% of the variance in its indicators (Table 1). Discriminant validity was assessed using the heterotrait-monotrait (HTMT) ratio; all HTMT values were below 0.85 (Table 2), confirming that constructs are empirically distinct.

Table 1. Reliability and Convergent Validity

Construct	Cronbach's α	CR (rho_a)	CR (rho_c)	AVE
AG	0.784	0.807	0.859	0.605
GL	0.824	0.836	0.883	0.654
CC	0.817	0.845	0.876	0.640
EV	0.884	0.910	0.914	0.680
NR	0.927	0.974	0.943	0.770
OP	0.796	0.800	0.867	0.621
SBC	0.936	0.936	0.948	0.725

Table 2. HTMT Discriminant Validity Matrix

	AG	GL	CC	EV	NR	OP	SBC
AG							
GL	0.440						
CC	0.679	0.485					
EV	0.487	0.317	0.556				
NR	0.158	0.283	0.087	0.159			
OP	0.670	0.427	0.836	0.606	0.044		
SBC	0.344	0.776	0.356	0.372	0.249	0.360	

4.2. Structural model and hypothesis testing

The structural model demonstrated adequate explanatory power. Adjusted R^2 for SBC was 0.268, and for GL was 0.468, both exceeding the 0.19 threshold recommended by Chin [30].

Table 3. Hypothesis testing results

Hypothesis	Path	β	p -value	Result
H1	EV $\rightarrow$ SBC	0.193	< 0.001	Supported
H2	NR $\rightarrow$ SBC	-0.202	< 0.001	Supported
H3	OP $\rightarrow$ SBC	0.105	0.031	Supported
H4	CC $\rightarrow$ SBC	0.054	0.170	Not supported
H5	AG $\rightarrow$ SBC	0.166	0.001	Supported
H6	SBC $\rightarrow$ GL	0.684	< 0.001	Supported

At p -value ≤ 0.05 (Table 3): H1 was supported (EV $\rightarrow$ SBC: $\beta = 0.193$, $p < 0.001$); H2 was supported (NR $\rightarrow$ SBC: $\beta = -0.202$, $p < 0.001$); H3 was supported (OP $\rightarrow$ SBC: $\beta = 0.105$, $p = 0.031$); H4 was not supported (CC $\rightarrow$ SBC: $\beta = 0.054$, $p = 0.170$); H5 was supported (AG $\rightarrow$ SBC: $\beta = 0.166$, $p = 0.001$); and H6 was supported (SBC $\rightarrow$ GL: $\beta = 0.684$, $p < 0.001$, $f^2 = 0.468$ - exceeding Cohen's [31] large-effect threshold of 0.35).

5. Discussion and conclusions

5.1. Discussion of key findings

The study examined how Big-Five personality traits are associated with SBC and how SBC is subsequently associated with environmentally motivated brand loyalty in the context of Grab's voluntary carbon offset initiative. The results are interpreted through the lens of self-congruity theory [13], [10].

Extraversion (H1) and agreeableness (H5) both positively predict SBC, replicating Fazli-Salehi et al. [24] and extending their findings to the VCOP context. Critically, self-congruity theory reveals distinct mechanisms for each trait. Extraverts hold a socially visible self-concept; Grab's carbon offset program

provides a green identity signal that is congruent with this self-concept, enabling SBC to form through social identity expression [15]. Agreeable consumers hold a prosocial self-concept; the altruistic nature of carbon offsetting - contributing to a public good without personal material benefit [17] - creates deep congruence between their values-based self-concept and the brand's environmental mission, resulting in strong SBC [24].

Openness to experience (H3) also positively predicts SBC, consistent with Matzler et al. [28] and Zhao and Nik Hashim [6]. Through a self-congruity lens, open individuals hold a self-concept oriented toward meaning, novelty, and abstract thinking. Carbon offset programs - which require engagement with invisible environmental outcomes and symbolic reasoning - are congruent with this self-concept, creating the perceptual alignment necessary for SBC formation.

The negative effect of neuroticism (H2) is theoretically relevant in the voluntary carbon offset context. Self-congruity requires a stable, coherent self-concept from which to evaluate brand-self alignment. Neuroticism may destabilize this foundation through anxiety and negative affect [18]. Moreover, the intangibility of carbon offsets may increase susceptibility to greenwashing concerns, potentially amplifying distrust and making environmental associations less likely to be integrated into consumers' self-concepts [26]. This interpretation extends prior findings [27], [26], while remaining subject to the cross-sectional design and the absence of direct measures of greenwashing concern.

The non-significant effect of conscientiousness (H4) is theoretically informative. Self-congruity theory implies that SBC forms when brand identity resonates with the consumer's self-concept. For conscientious consumers, the self-concept is organized around task achievement and norm compliance rather than symbolic identity expression [32]. VCOPs do not provide goal-completion feedback or measurable personal outcomes that would activate this self-concept; the environmental benefit is diffuse and collective. Conscientious consumers may participate in carbon offsetting as an expression of environmental duty, but this participation is norm-driven rather than identity-integrative - it does not generate the symbolic brand-self fusion that SBC captures. This finding establishes an important boundary condition: conscientiousness predicts green behavior generally [3], [5], but not SBC formation in intangible, non-feedback-rich environmental programs.

The effect of SBC on GBL (H6; $\beta = 0.684$, $f^2 = 0.468$) is the strongest relationship in the structural model and provides direct evidence that identity-based brand connection is associated with environmentally motivated loyalty in the voluntary carbon offset context. Because the optional contribution offers no direct service enhancement, users who connect the initiative's environmental associations with their self-concept may be especially likely to maintain preference for the sponsoring brand [13], [14]. This finding advances Lin et al. [12] and Bhardwaj et al. [7] by demonstrating a strong SBC-loyalty association

in an intangible environmental-program setting. It also complements voluntary carbon offset research focused on initial payment decisions [8]. However, the cross-sectional design and the omission of trust, service quality, and perceived program effectiveness mean that the result should not be interpreted as establishing SBC as the sole cause of loyalty.

5.2. Theoretical implications

This study contributes to the literature on three dimensions. First, it establishes self-congruity theory as the theoretical foundation for understanding personality-driven green brand loyalty in intangible environmental programs. Prior work has largely treated personality traits as predictors of green attitudes or intentions without specifying the identity mechanism through which traits translate into durable behavioral commitment [3], [5]. Self-congruity theory provides this mechanism: traits shape the self-concept's orientation, which determines the degree of perceived congruence with a brand's green identity, and SBC is the psychological state resulting from strong congruence.

Second, the study applies self-congruity theory to a voluntary carbon offset initiative, showing that identity-based brand connection remains relevant when the environmental component of a transaction is intangible and offers no direct functional reward. In this setting, self-congruity does not necessarily replace functional, trust-based, or program-evaluation mechanisms; rather, it provides a theoretically coherent explanation for the strong association between SBC and environmentally motivated loyalty [7], [11].

Third, the non-significant effect of conscientiousness establishes a meaningful boundary condition for self-congruity theory in green consumption: traits that predict green behavior through normative rather than identity pathways do not generate SBC in program contexts that provide no task-relevant feedback. This distinction advances the literature's understanding of when and why personality predicts brand-level identity outcomes versus behavioral compliance.

5.3. Managerial implications

Three practical implications are offered. First, firms should segment green marketing communications by personality profile. For extraverted consumers, social visibility features - shareable impact certificates, community dashboards, social media integration - amplify the identity-signaling value of VCOP participation and strengthen self-brand congruence [25]. For agreeable consumers, messaging should emphasize collective impact and prosocial themes, framing offset participation as a cooperative act [5]. For open consumers, communications should highlight the intellectual complexity and global significance of carbon markets [6]. For neurotic consumers - the most resistant group - firms should invest in transparent reporting, third-party certification, and real-time impact tracking to reduce perceived ambiguity and facilitate the identity integration that SBC requires [26], [16].

Second, given SBC's large effect on GBL ($f^2 = 0.468$), managers should treat SBC as a strategic priority. Investments in identity-reinforcing touchpoints - personalized impact summaries, milestone recognition, green community features - translate directly into durable loyalty [12], [7]. In the VCOP context, every opt-in episode is an identity micro-affirmation: if acknowledged by the brand, it progressively deepens the consumer's self-brand congruence and loyalty anchor.

Third, in the Vietnamese market, where environmental norms are still forming [3], firms should pursue a two-phase strategy: use modest incentives initially to lower the barrier to VCOP participation, then transition communications to identity and community framing once participation is established. This converts habitual participants into identity-committed loyalists, leveraging self-congruity theory's prediction that repeated identity-expressive acts progressively deepen brand-self integration [13].

5.4. Limitations and future research

Several limitations point to future research directions. The cross-sectional design precludes causal inference; longitudinal studies tracking SBC and loyalty across repeated offset interactions are needed. The single-brand, single-country design limits generalizability, and replication across airlines, hotels, delivery services, and other voluntary offset platforms would help establish boundary conditions. Moreover, while the current study bounded its scope to consumer perceptions of carbon offsetting in ride-hailing services, future research could explore high-emission, resource-intensive sectors—such as the built environment and construction—where systematic Life Cycle Assessment (LCA) methodologies are increasingly deployed to substantiate carbon neutrality claims and establish credible environmental benchmarks [33]. Although quota sampling controlled for gender and age, it did not correct for self-selection, recruitment channel, geographic location, or urban-rural residence. The predominance of young respondents, combined with online recruitment, may overrepresent digitally active urban and educated users. Older, rural, and infrequent platform users may differ in platform familiarity, environmental awareness, perceived credibility, and willingness to pay; consequently, the estimates should not be generalized to all Grab users. Future studies should stratify samples by region and urban-rural residence, incorporate education, income, and usage intensity, and consider probability sampling or post-stratification weights. Importantly, prior awareness was recorded but was not an eligibility requirement, and previous payment of the carbon offset surcharge was not established. Because all respondents received a standardized program description before completing the focal measures, the findings reflect responses following controlled informational exposure rather than the experiences of confirmed offset purchasers. Future studies should distinguish users who are unaware of the program, aware nonparticipants, intending participants, and verified prior purchasers. The study also treats carbon offsetting as the research context and does not measure perceived program

credibility, effectiveness, offset quality, environmental knowledge, or greenwashing concern. These variables may mediate or moderate the proposed relationships and should be incorporated in future models. Finally, the present model estimates the direct personality-SBC paths and the SBC-GBL path but does not claim a formally tested mediating mechanism. Future work should prespecify and bootstrap the specific indirect effects of personality traits on loyalty through SBC in WarpPLS, include direct personality-loyalty paths where theoretically appropriate, and compare SBC with alternative mechanisms such as attitude, satisfaction, trust, and service quality.

Lời cảm ơn: This research is funded by Funds for Science and Technology Development of the University of Danang under project number B2023-DN04-09.

REFERENCES

- [1] P. Gil-García, A. Haro-de-Rosario, M. d. C. Valls-Martínez, and C. Caba-Pérez, "The path to neutrality: Evaluating carbon offsetting strategies among Spanish corporations," *Sustainable Development*, pp. 1–20, 2026. <https://doi.org/10.1002/sd.70829>
- [2] G. Wan, X. Jiang, J. Hua, Y. Cao, and D. Li, "The role of voluntary carbon offsetting in advancing firm's carbon neutrality and pricing strategies in the presence of eco-conscious consumers," *Computers & Industrial Engineering*, vol. 213, p. 111762, 2026.
- [3] C. D. Duong, "Big Five personality traits and green consumption: Bridging the attitude-intention-behavior gap," *Asia Pacific Journal of Marketing and Logistics*, vol. 34, no. 6, pp. 1123–1144, 2022.
- [4] S. Tawde, R. Kamath, and S. H. R. V., "'Mind will not mind' - Decoding consumers' green intention-green purchase behavior gap via moderated mediation effects of implementation intentions and self-efficacy," *Journal of Cleaner Production*, vol. 383, p. 135506, 2023.
- [5] Y. Sun, S. Wang, L. Gao, and J. Li, "Unearthing the effects of personality traits on consumers' attitude and intention to buy green products," *Natural Hazards*, vol. 93, pp. 299–314, 2018.
- [6] N. Zhao and N. M. H. Nik Hashim, "Crafting global green consumption: The role of personality traits and experiential marketing in the beverage industry," *Journal of Global Information Management*, vol. 33, no. 1, Art. 376487, 2025.
- [7] A. Bhardwaj, N. Gupta, and S. Wadhawan, "Self-brand connection and brand loyalty as an outcome of sustainable cause-related marketing: A conceptual framework," in *Sustainable Development Goals: The Impact of Sustainability Measures on Wellbeing*, vol. 113B, Emerald Publishing Limited, 2024, pp. 75–90.
- [8] B. Q. Truong-Dinh, T. T. Nguyen, T.-C. F. Cheng, and J. M.-S. Cheng, "Effects of consumer perceptions on carbon-offset payment through mediating and moderating mechanisms," *Transportation Research Part D: Transport and Environment*, vol. 115, p. 103584, 2023.
- [9] J. E. Escalas and J. R. Bettman, "You are what they eat: The influence of reference groups on consumers' connections to brands," *Journal of Consumer Psychology*, vol. 13, no. 3, pp. 339–348, 2003.
- [10] S. Y. Y. Cheng, T. B. White, and L. N. Chaplin, "The effects of self-brand connections on responses to brand failure: A new look at the consumer-brand relationship," *Journal of Consumer Psychology*, vol. 22, no. 2, pp. 280–288, 2012.
- [11] C. M. Jung and W.-M. Hur, "How do customers' perceptions of corporate social responsibility contribute to sustainable customer citizenship behaviors? The mediating mechanisms of corporate brand pride and self-brand connection," *Corporate Social Responsibility and Environmental Management*, vol. 29, no. 5, pp. 1676–1688, 2022.
- [12] J. Lin, A. Lobo, and C. Leckie, "The role of benefits and transparency in shaping consumers' green perceived value, self-brand connection and brand loyalty," *Journal of Retailing and Consumer Services*, vol. 35, pp. 133–141, 2017.
- [13] M. J. Sirgy, "Self-concept in consumer behavior: A critical review," *Journal of Consumer Research*, vol. 9, no. 3, pp. 287–300, 1982.

- [14] L.-M. Van Der Westhuizen, "Brand loyalty: exploring self-brand connection and brand experience," *Journal of Product & Brand Management*, vol. 27, no. 2, pp. 172–184, 2018.
- [15] J. Berger and C. Heath, "Where consumers diverge from others: Identity signaling and product domains," *Journal of Consumer Research*, vol. 34, no. 2, pp. 121–134, 2007.
- [16] A. Valiergue and V. Ehrenstein, "Quality offsets? A commentary on the voluntary carbon markets," *Consumption Markets & Culture*, vol. 26, no. 4, pp. 298–310, 2023.
- [17] J. Andreoni, "Impure altruism and donations to public goods: A theory of warm-glow giving," *The Economic Journal*, vol. 100, no. 401, pp. 464–477, 1990.
- [18] P. T. Costa and R. R. McCrae, *Revised NEO Personality Inventory and NEO Five Factor Inventory: Professional Manual*. Odessa: Psychological Assessment Resources, 1992.
- [19] O. P. John and S. Srivastava, "The Big-Five trait taxonomy: History, measurement, and theoretical perspectives," in *Handbook of Personality: Theory and Research*, 2nd ed. New York: Guilford Press, 1999, pp. 102–138.
- [20] R. R. McCrae and P. T. Costa, "The structure of interpersonal traits: Wiggins's circumplex and the five-factor model," *Journal of Personality and Social Psychology*, vol. 56, no. 4, pp. 586–595, 1989.
- [21] J. F. McManus, S. W. Carvalho, and V. Trifts, "The role of brand personality in the formation of consumer affect and self-brand connection," *Journal of Product & Brand Management*, vol. 31, no. 4, pp. 551–569, 2022.
- [22] Y. Chen, "Towards green loyalty: driving from green perceived value, green satisfaction, and green trust," *Sustainable Development*, vol. 21, no. 5, pp. 294–308, 2013.
- [23] J. Wilt and W. Revelle, "Extraversion," in *Handbook of Individual Differences in Social Behaviour*, M. Leary and R. Hoyle, Eds. New York: Guilford Press, 2008, pp. 57–82.
- [24] R. Fazli-Salehi, I. M. Torres, R. Madadi, and M. Á. Zúñiga, "The impact of interpersonal traits (extraversion and agreeableness) on consumers' self-brand connection and communal-brand connection with anthropomorphized brands," *Journal of Brand Management*, vol. 29, no. 1, pp. 13–34, 2022.
- [25] O. I. Moisesescu, O. A. Giță, and F. A. Herle, "Does one size fit all? The role of extraversion in generating electronic word-of-mouth through social media brand page engagement," *Psychology & Marketing*, vol. 42, no. 7, pp. 1827–1847, 2025.
- [26] E. Ebrahimi, F. Sadeghvaziri, and S. S. Abyaneh, "The dark side of consumer-brand relationship: Do ideal self-congruence, brand attachment and personality factors affect negative consumer behaviors?" *Interdisciplinary Journal of Management Studies*, vol. 13, no. 2, pp. 289–315, 2020.
- [27] R. Garg, J. Mukherjee, S. Biswas, and A. Kataria, "An investigation into the concept of brand love and its proximal and distal covariates," *Journal of Relationship Marketing*, vol. 15, no. 3, pp. 135–153, 2016.
- [28] K. Matzler, S. Bidmon, and S. Grabner-Kräuter, "Individual determinants of brand affect: the role of the personality traits of extraversion and openness to experience," *Journal of Product & Brand Management*, vol. 15, no. 7, pp. 427–434, 2006.
- [29] N. Kock, "Common method bias in PLS-SEM: A full collinearity assessment approach," *International Journal of e-Collaboration*, vol. 11, no. 4, pp. 1–10, 2015.
- [30] W. W. Chin, "The partial least squares approach to structural equation modeling," *Modern Methods for Business Research*, vol. 295, no. 2, pp. 295–336, 1998.
- [31] J. Cohen, *Statistical Power Analysis for the Behavioral Sciences*, 2nd ed. New York: Routledge, 1988.
- [32] J. U. Islam, Z. Rahman, and L. D. Hollebeek, "Personality factors as predictors of online consumer engagement: an empirical investigation," *Marketing Intelligence & Planning*, vol. 35, no. 4, pp. 510–528, 2017.
- [33] N. V. Son, P. N. Thinh, L. T. Phong, and B. L. Khanh, "Towards carbon neutrality in construction projects based on life cycle assessment," *The University of Danang - Journal of Science and Technology*, vol. 22, no. 11C, pp. 115–117, 2024.

APPENDIX: SCALE ITEMS

Extraversion [19]

- EV1. I see myself as someone who is talkative.
- EV2. I see myself as someone who is full of energy.
- EV3. I see myself as someone who generates a lot of enthusiasm.
- EV4. I see myself as someone who has an assertive personality.
- EV5. I see myself as someone who is outgoing and sociable.

Neuroticism [19]

- NR1. I see myself as someone who can be moody.
- NR2. I see myself as someone who can be tense.
- NR3. I see myself as someone who worries a lot.
- NR4. I see myself as someone who is temperamental.
- NR5. I see myself as someone who gets nervous easily.

Openness to Experience [19]

- OP1. I see myself as someone who has an active imagination.
- OP2. I see myself as someone who is curious about many different things. [removed: outer loading = 0.674]

- OP3. I see myself as someone who has a philosophical nature.
- OP4. I see myself as someone who is deep, a complex thinker.
- OP5. I see myself as someone who is inventive and creative.

Conscientiousness [19]

- CC1. I see myself as someone who does a thorough job.
- CC2. I see myself as someone who is reliable and can always be counted on. [removed: outer loading = 0.667]

- CC3. I see myself as someone who perseveres until the task is finished.

- CC4. I see myself as someone who does things efficiently.

- CC5. I see myself as someone who makes plans and follows through.

Agreeableness [19]

- AG1. I see myself as someone who is helpful and unselfish with others.

- AG2. I see myself as someone who has a forgiving nature.

- AG3. I see myself as someone who is generally trusting.

- AG4. I see myself as someone who is cooperative with others.

- [removed: outer loading = 0.599]

- AG5. I see myself as someone who is considerate and kind to almost everyone.

Self-Brand Connection [9]

- SBC1. Grab reflects who I am.

- SBC2. I can identify with Grab.

- SBC3. I feel a personal connection to Grab.

- SBC4. I use Grab to communicate who I am to other people.

- SBC5. I think Grab helps me become the type of person I want to be.

- SBC6. I consider Grab to be 'me' (it reflects who I am).

- SBC7. Grab suits me well.

Green Brand Loyalty [22]

- GL1. I am willing to continue using Grab because of its environmentally friendly features.

- GL2. I prefer Grab over other brands because of its environmental performance.

- GL3. I rarely consider switching to another brand due to Grab's environmental care.

- GL4. I intend to continue using Grab because it is environmentally friendly.