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Consumer loyalty toward smartphone brands: The determining roles of deliberate inertia and cognitive lock-in

Consumer loyalty toward smartphone brands: The determining roles of deliberate inertia and cognitive lock-in

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ABSTRACT

Research in commitment–trust perspective overlooks the effect of status quo bias on consumer brand loyalty. This study aims to integrate the bias including consumers' deliberate inertia and cognitive lock-in with consumers' trust and commitment in the perspective. We empirically analyze a research model and hypothetical relationships using structural equation modeling with survey data from smartphone consumers. The results show that the inertia meaningfully and positively enhances consumers' brand loyalty, and the lock-in significantly predicts consumers' deliberate inertia and commitment. The findings significantly advance extant knowledge with the positive effects of deliberate inertia and cognitive lock-in on consumers' brand loyalty.

Key words: Brand loyalty, deliberate inertia, cognitive lock-in, trust, commitment, status quo bias.

1. Introduction

Consumer loyalty is of ultimate importance for a brand's survival and long-term growth, particularly for brands of information and communication technology (ICT) products such as smartphones [56, 84]. Numerous studies devote to conceptualize and operationalize brand loyalty using both attitude-based and behavioral approaches [23, 40, 48, 66, 73, 85], and research has been conducted from the commitment–trust perspective that integrates the explanation and prediction power of attitude–behavioral approaches [7, 22, 40, 47, 48, 67,

80]. Works have identified relational antecedents such as trust [7, 55, 80] and commitment [4, 42, 47] to create and maintain consumers' brand loyalty [56]. However, this research stream may overlook the consumers' psychological determinants that strengthen their brand loyalty, particularly with regard to ICT brand products [12, 43, 52]. Specifically, few studies have investigated the role of individual status quo bias in relation with consumer brand loyalty [38, 46, 63, 75, 77]. Status quo bias is consumers' propensity of continuing an incumbent brand choice rather than seeking alternative actions [75]. Status quo bias is usually shown in the form cognitive lock-in and deliberate inertia – the persistence of an existing behavioral pattern [72].

ICT brand products such as smartphones and tablets are embedded with ICTs (i.e., hardware, software, networks, and applications), which offer multi-functionality and valuable tools for consumers to overcome the limitations of time and space to share information and knowledge and conduct instant communication such as social media and online transactions [40]. As highlighted by Lee, Moon, Kim, and Yi [56], the usability of a smartphone plays a key role on users' trust and brand loyalty; and as such, previous research has focused on the two key attributes of smartphone, perceived ease of use and usefulness [11], neglecting consumers' lock-in effect on smartphone brand loyalty and continuance use. The term "lock-in" or cognitive lock-in refers to consumers' cognitive appreciation or preoccupation resulting from "repeated consumption or use of an incumbent product" [46, 63]. To competently and skillfully use a smartphone or ICT products, consumers must devote time and effort to learn through use experience to develop certain personal brand-specific knowledge and skills to realize and personalize the functionality and benefits of these brand products. Consequently, consumers may be cognitively locked in onto the specific ICT brand products because their knowledge, skills, and usage are brand specific and that may not be transferrable to other brands [46, 59]. As a result, it is likely that consumer loyalty to ICT brands and continuance

intention may be determined by their cognitive lock-in and deliberate inertia, rather than purely influenced by trust and commitment as addressed in the extant literature of consumer loyalty.

Therefore, this study aims to fill this conceptual and empirical void by articulating and examining the effects of consumers' deliberate inertia and cognitive lock-in on brand loyalty toward ICT brand products. We integrate the key concepts from the perspectives of status quo bias and relationship marketing and propose a research model and hypothetical relationships to conceptualize consumers' status quo bias with the constructs of deliberate inertia and lock-in and incorporate consumers' commitment and trust from the commitment–trust perspective in relationship marketing. We empirically test the model and hypotheses by using survey data from smartphone consumers. The statistical outcomes show that the model has strong and significant predictive power for articulating consumers' brand loyalty.

Our study makes significant contributions to the literature of consumers' brand loyalty in three ways. First, the research enriches the extant knowledge by unveiling the effect of consumers' status quo bias on of brand loyalty with empirical evidence in the context of ICT brand products. Second, in addition to what relationship marketing paradigm advocates in the commitment–trust perspective, this study confirms that the consumers' deliberate inertia and cognitive lock-in play significant and strong roles in determining consumer brand loyalty. Third, this study further identifies the most appropriate model that manifests consumers' psychological mechanism and the direct and mediation effects leading to brand loyalty. Together, the findings, as expected, deepen and extend the current understanding of consumer brand loyalty and pave a new avenue to explore other consumer's psychological determinants for building and sustaining consumer brand loyalty.

This paper proceeds as follows. First, we outline the theoretical underpinnings and

discuss the existing literature for the development of our conceptual model and hypotheses. Second, we describe detailed methodology and data collection process of this study, followed by presenting structural equation modeling analysis with survey data from smartphone consumers. Finally, we discuss the research findings and highlight the theoretical and practical implications along with recommendations for further research.

2. Conceptual background and model development

2.1. Consumer loyalty

Oliver [67] proposed one of the well-accepted definitions of consumer loyalty, which refers to the deeply bonded relationship between a brand and its consumers, and consumers' intention to continue to use or repurchase the preferred brand products in the future despite the marketing efforts of competitive brands to lure consumers for brand switching [17, 37, 59]. Oliver [67] particularly advocates a four-stage framework of consumer loyalty – cognitive, affective, conative, and action loyalty. Dick and Basu [13] propose a quadrant framework of loyalty based on the dimensions of attitude and behavior – true loyalty (high attitude, high purchase), no loyalty (low attitude and low purchase), latent loyalty (high attitude, low purchase), and spurious loyalty (low attitude, high purchase). Recent research by Ngobo [64] indicates that there exist only three loyalties by excluding spurious loyalty – no loyalty, latent loyalty, and true loyalty. In fact, these are three levels of loyalty, rather three separate sub-constructs of loyalty. By contrast, within Oliver's [67] framework, the first three stages are within the attitudinal phrase of loyalty, whereas the ultimate stage of loyalty is action loyalty. In line with the view of Fishbein and Ajzen [19], attitude loyalty and action (behavior) loyalty are two related but different constructs; as such, attitudinal loyalty and action loyalty can be conceived as two related but distinct sub-constructs of an overarching conceptualization of consumers' brand loyalty.

According to Oliver [67], action loyalty is defined as a consumer's brand loyal behavior with a conscious control of their intention (or readiness to act), deliberate preferences, and actions to repurchase or reuse a particular brand product or service. Characteristically, an action loyal consumer (1) is a goal-directed person who has a clear objective of his or her actions; (2) behaves volitionally to control the action process and outcomes; (3) has a strong deliberate preference; (4) has confidence in and inertia to rationalize his or her brand choice; and (5) does not change his or her decision easily. Indeed, it is the action loyalty – purchase and re-purchase behaviors lead a brand owner firm's revenue and growth. As such, this study focuses on consumers' action loyalty and extends these characteristics of action loyalty to consumers' use experience of ICT brand products; we define the brand loyalty for ICT brand products as an action loyalty by which consumers have clear deliberate preference to use ones' brand products, have a strong intention to continue using the status quo ICT brand products, and continue to use the brand even if they update or replace their incumbent ICT products.

2.2. Commitment–trust perspective of consumer loyalty

The commitment–trust theory [62] is the most influential concept in the relationship marketing paradigm for building strong and lasting relationship with consumers, which is also essential for consumer loyalty, lifetime value [18], and a firm's long-term success [4]. The relationship can be traced to a basic human desire for positive and sustaining bonds that are beneficial for both parties in a relationship [5]. According to social exchange theory, there are two parties in a relationship that involves a certain type of exchange, which can be either reciprocal or negotiated [20]. In a reciprocal exchange relationship, the two parties trade benefits over a long period of time. This type of relationship is usually an emotional and social one such as community membership or friendship, which is not based on an relational, informal, and social norms [6]. By contrast, negotiated exchanges are economic-based

transactions that involve the exchange of benefit with payment, bound by formal agreement or contracts [6]. Therefore, in essence, the relationship between a brand and its consumers is actually a negotiated exchange relationship. Firms invest in relationship marketing and attempt to transform the negotiated relationship into a reciprocal relationship, which is stronger and longer lasting with consumer loyalty. In such a successful relationship, the key factors identified in the literature are commitment and trust [62].

Particularly, in the commitment–trust model [62], commitment and trust are the key mediating factors that convey the effects of antecedents on consumer loyalty formation [62, 80] and consumer loyalty is the major positive relationship outcomes [70]. Researchers consider trust and commitment as the key dimensions of consumer relationship quality, which also leads to the expected outcomes of relationship marketing [22, 25, 31, 41]. In particular, trust and commitment are accepted as the determinants of consumers' brand loyalty [42, 47]. Consequently, studies have focused on the factors to enrich the commitment–trust model for consumer loyalty in various contexts [40, 80]. However, this literature overlooks the consumers' psychological factor such as status quo bias, which develops in the use process and consumers' experience, and the effect of the factor on the development and maintenance of consumers' brand loyalty.

2.3. *Status quo bias perspective*

The theory of status quo bias focuses on articulating the reasons why people prefer to maintain the status quo – the continuance of using an incumbent brand product [54, 75]. Both rational and non-rational reasons of consumers' psychological reasoning support the status quo choice [15]. Maintaining the status quo is a rational action because consumers consider the decision factors of costs, status quo values, and risks involved in seeking alternatives. The non-rational psychological reasoning include consumers' perception of averting loss [49] and

avoiding regret [2]. Rational consumers often take a risk aversion attitude in decision-making with regard to brand change, version upgrading, and product switching, particularly, consumers' strong status quo bias present, when a brand product such as a smartphone has a positive value, emotional attachment, personal information, and embedded usages, regardless of the offers of competitive brands and social pressures for a brand change [50, 75, 77].

Kim and Kankanhalli [54] and Samuelson and Zeckhauser [75] categorize three types of status quo bias: cognitive misperception (loss aversion), rational decision-making (net benefits, transition costs, and uncertainty costs), and psychological commitment (sunk costs, social norms, and control). Polites and Karahanna [72] suggest that status quo bias can be considered as a behavior-based, cognitive-based, and affective-based decision preference. Behavior-based status quo bias refers to the users' continued use of the incumbent product without much thought; cognitive-based one denotes consumers' conscious decision to continue using the incumbent product at hand; while affective-based one shows that consumers' have an emotional attachment toward the incumbent product with little intention to switch.

Consumers of ICT products are much cognitively "locked-in" to the incumbent brand products because of prior use experience, which results in the misperception of a loss if switched to new brand products [46, 63]. Thus, cognitive lock-in can be considered as the first type of status quo bias in Samuelson's framework [75]. On the other hand, deliberate inertia is the typical consumers' rational choice in terms of value, benefits, and assurance to continue use of status quo ICT brand products, as the choice reflects consumers' conscious decision, even if a chosen brand is not the best one among available alternatives; hence, it can be seen as the second category of status quo bias – rational decision-making [75]. Thus, following the categorization proposed by Polites and Karahanna [72], both cognitive lock-in

and deliberate inertia are regarded as consumers' status quo bias.

Therefore, building on the effects of status quo bias and commitment–trust perspective upon consumers' continuance use of status quo ICT brand products, we create a model of brand loyalty as depicted in Figure 1. It indicates that consumers' cognitive lock-in influences their trust, commitment, and deliberate inertia. Meanwhile, trust, deliberate inertia, and commitment determine consumers' brand loyalty. These three constructs act as mediators to convey the effect of lock-in on consumers' brand loyalty. In the following section, we elaborate these constructs and hypothesize their causal relationships.

[Insert Figure 1 about here]

2.4. *Cognitive lock-in*

Cognitive lock-in is likely one of the important barriers that inhibit consumers from switching to other brands because consumers have invested a lot of cognitive resources in learning and using a specific ICT brand product. According to the cognitive load theory [76, 79], information processing relies on the working memory to a certain extent. Automatic, intuitive processing requires little demand on working memory, whereas deliberate, conscious, and rational processing is more effortful and higher demanding on working memory. The repeated use of a brand of ICT products for a time period creates personal knowledge and use skills. This is the form of personalized “brand-specific training” [78]. When using the same brand of ICT brand products, consumers automatically and intuitively know and perform their tasks, which can bypass their working memory. When facing unfamiliar brands of the ICT products, the demand on information processing and working memory could be high; thus, it takes time and efforts to learn and perform the same tasks. As such, brand-specific knowledge and skills are difficult to transfer from one brand to alternative brands [68].

As suggested by Sénécal, Fredette, Léger, Courtemanche, and Riedl [78], consumers develop cognitive lock-in when they can process information and perform tasks intuitively after certain practice. This lock-in effect can be much strong when an individual has intensively used ICT products such as a smartphone and formed a strong sense of familiarity and personal preference. This is particularly the case when the consumers have stored complicated data, information, and various applications in the ICT products and has formed a certain dependency on the products. However, existing literature is limited with regard to the effects of lock-in on consumer trust and commitment to a brand of ICT products; it is likely that a consumer who is cognitive locked-in to a ICT brand will have a high dependence on and tendency to trust and commitment to the brand and accomplish his or her goals and tasks [46, 74]. This study therefore proposes the following hypotheses:

H1: Cognitive lock-in has a positive effect on consumers' trust in a brand of ICT products.

H2: Cognitive lock-in has a positive effect on commitment to a brand of ICT products.

Cognitive lock-in may be another powerful factor that fosters consumers' deliberate inertia of using incumbent brand of ICT products, although the literature has revealed several driving forces of inertia, including individual differences [72], consumers' habit [72, 82], perceived norms [29], knowledge [28], education, training, and personal innovativeness [24]. In their study of organizational members' inertia in social capital, Maurer and Ebers [60] identified cognitive lock-in as one of the major determinants of inertia. They explained that owing to cognitive lock-in with shared identity and the logic thinking with existing external ties, the members lack motivation or capacity to change, which results in inertia [60]. Further, the recent study in health care sector by Heiss et al. [39] shows that inattention and switching

costs are the major sources of inertia. Similarly, in the smartphone service context, Gray, D'Alessandro, Johnson, and Carter [28] show that consumers' lack of knowledge or awareness of competing offers leads to inertia, and they argue that consumers' inertia can be a result of consumer cognitive lock-in. Indeed, when consumers are cognitively locked-in to the incumbent brand, they lack motivation to search for alternatives and pay little attention to alternative brands and benefits. As a result, consumers' cognitive lock-in may lead to their deliberate inertia. Thus, we posit that:

H3: Cognitive lock-in has a positive effect on consumers' deliberate inertia to a brand of ICT products.

2.5. Trust, deliberate inertia, and commitment

Trust is the cornerstone of an exchange relationship [16]. Trust is usually defined as a trustor's confidence in the trustee's trustworthiness – ability, benevolence, and integrity including reliability and creditability [25, 61, 62]. Trust reflects a consumer's positive experience in a prior relationship and manifests his or her forward expectation of the future relationship. Research on the effects of trust on the continuity of a long-term relationship and brand loyalty is evident. Crosby et al. [10] affirm that the relationship between trust and quality can be developed through continuous use of trustworthy products. Morgan and Hunt [62] stress enduring trust as the key mediator of relationship continuity. Hess and Story [42] find that trust in a brand leads to positive outcomes. Previous research has indicated that trust is an important predictor of consumer brand loyalty [56, 80]. Thus, this research follows this reasoning logic and proposes the effect of trust on consumers' brand loyalty in the following hypothesis:

H4: Trust has a positive effect on consumer loyalty to a brand of ICT products.

Deliberate inertia, as discussed previously, is the intentional persistence to maintain

status quo, even if better competitive brands or strong incentives to brand change are available [72, 77]. According to Schwarz [77], there are four types of inertia: spontaneous, forced, unobtrusive, and deliberate inertia. The grouping is based on the two dimensions of motivation for change (high versus low value) and influencing condition (external versus internal). The concept of inertia examined in this study is deliberate inertia, which falls in the quadrant with a low motivation to change and the effect of internal condition.

Some studies may confuse the concepts of inertia with habit [e.g. 44, 83]. In fact, habit is an automatic behavior that responds to a given stimuli [81] or a tendency to repeat previous behavioral responses in a stable usage context [69]. By contrast, deliberate inertia is customers' conscious and rational decision-making behavior. With the assessment of value, benefits, and costs of a status quo ICT brand product against alternatives and the evaluation of the risks involved in changing brand, consumers knowingly and deliberately chooses inertia to make a decision of remaining with the status quo brand products or being loyal to the incumbent product choice [77]. Therefore, this study proposes the following hypothesis:

H5: Deliberate inertia has a positive effect on consumers' loyalty to a brand of ICT products.

Within the commitment–trust perspective [62], commitment is described as consumers' enduring desire to continue relationships with suppliers. Gundlach et al. [30] believe that commitment consists of instrumental and attitudinal temporal dimensions, while others argue that commitment can be divided into three types: affective, calculative (or continuance), and normative commitment. Calculative commitment has recently been further expanded into three components: economic, forced, and habitual commitment [51]. Normative commitment reflects an individual's belief, while the components of calculative commitment reflect one's perception of investment or costs. Here, all these are relational forces linking consumers to

the brands or vendors [4, 31]. Moreover, belief, perception, and emotion are three different constructs [1]. As we argued earlier on the dimensions of loyalty, it would be more appropriate to treat them as separate constructs and revert back to the essence of a construct for a simpler definition rather than adopting a complex definition that consists of multiple causal relationships [14, 19]. As such, we adopt the definition of commitment by Garbarino and Johnson [25] as consumers' desire based on an emotional and psychological attachment to a brand of ICT products. In other words, we use affective commitment in this study, as its definition is close to the essence of commitment as conceptualized in the commitment–trust perspective [62]. Several recent studies that also adopt this approach in defining commitment [e.g., 27, 65] suggest that commitment is an antecedent of brand loyalty [47, 55] and show that commitment has a direct effect on consumers' brand loyalty [27, 65]. Thus, this study is in line with the reasoning logic and proposes the hypothesis:

H6: Commitment has a positive effect on consumers' loyalty to a brand of ICT products.

3. Methodology

3.1. Construct measurement

All constructs in the research model are reflective latent constructs manifested with multiple observable items [45]. Four items were adopted to measure brand loyalty from studies by Han et al. [36] and Tsai [80]. Five items were adopted to measure trust from the studies by Kim et al. [53]; Mayer, Davis, and Schoorman [61]; and Tsai [80]. We developed six items to measure the construct of deliberate inertia with reference to studies by Schwarz [77] and Polites and Karahanna [72]. In addition, five items to measure commitment were derived from studies by Garbarino and Johnson [25] and Gustafsson, Johnson, and Roos [31].

Finally, the measurement items for lock-in were developed on the basis of the studies of Johnson, Bellman, and Lohse [46] and Murray and Häubl [63]. The Appendix summarizes the constructs manifested by 25 observable variables. Control variables in the research include the brands of current smartphone, the length of time using the status quo smartphone, the length of time using the brand of status quo smartphone, and other respondents' demographic information such as gender, age, education, and occupation.

The measurement items were anchored on a 7-point Likert-scale ranging from “strongly disagree (1)” to “strongly agree (7)” in the questionnaire. Two screening questions (propensities to change) were used to detect inconsistent responses. The authors first invited 18 research students of smartphone consumers to act as the members of a panel. The panel members then asked to scrutinize the statements of questionnaire and give suggestions for improvement. We revised the questionnaire and translated into Chinese, and it was reviewed by two professors in Information Systems and Marketing for question refinement. Thereafter, we further revised the questionnaire and carried out a pilot survey with 91 smartphone consumers. Finally, in light of the feedback from the survey, we fine-tuned the questionnaire to form the final survey instrument for this study.

3.2. Sample and data collection

As smartphone is widely adopted by individual consumers, we aimed to cover a wide spectrum of respondents with various occupations through surveys of smartphone consumers. One thousand five hundred paper questionnaires were distributed through personal connections to reach individuals in organizations and companies including various government sectors, listed companies, medium and small enterprises, and universities, as well as in high schools in China. In addition, we created an identical online version of the questionnaire and distributed it by email invitations. Online respondents were also

encouraged to forward the questionnaire link to their friends, colleagues, and family members. Within a month, we received 756 returned questionnaires including 571 returned hard copies and 185 online responses. Sixty-one copies were unusable owing to incomplete and missing data, and 67 copies were removed owing to inconsistent responses detected by the screening questions. Focusing on the consumers of iPhone and Samsung, the respondents who used other brand smartphones were excluded from data analysis. As a result, 508 valid observations were used for the empirical analysis of the research model. Table 1 provides the descriptive statistics of respondents.

[Insert Table 1 about here]

3.3. Data analysis

Deploying the software packages of IBM SPSS (version 22), the partial least square for structural equation modeling (PLS-SEM) procedure in SmartPLS (version 3.0), and the covariance-based structural equation modeling (CB-SEM) methods in AMOS (version 20), we performed rigorous data analyses to estimate the model parameters. Hair et al. [35] and Gefen et al. [26] confirm that these SEM methods are complimentary to each other and suggest that deploying a combination of them can provide stronger statistical power to interpret causal relationships; thus, this study adopted the combined analytical approach in line with their recommendations. First, we used exploratory factor analysis (EFA) for the pilot survey dataset to purify the observable variables for the constructs in the research model. Second, we assessed the internal consistency reliability for each construct by using Cronbach's alpha, composite reliability, and average variance extracted (AVE) [26, 33, 34]. Thereafter, we evaluated the measurement model in light of construct correlation, variance inflation factors (VIFs), convergent validity, and discriminant validity. Finally, we conducted analyses of PLS-SEM and CB-SEM for parameter estimations, competing modeling,

hypothesis testing, and structural model confirmation [3, 34, 35].

3.4. Robustness checks

To ascertain the robustness of the research, we used the principal component method in EFA to examine the factor validity and purify the observable variables for constructs in the research model. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.940 and significant ($p < 0.01$). Further, we adopted the criteria of cut-off values of loadings (< 0.50), cross-loadings (> 0.40), and the eigenvalue (≥ 1.0) to assess each construct and its observable variables. Two of the 25 variables (TRT5 and COM1) were dropped in both datasets owing to their cross-loadings. Finally, the structure of five constructs in the model was well confirmed by the two samples with 72.43% and 71.89% of explained variances, respectively [34]. We adopted Cronbach's alpha (α), composite reliability, and AVE to assess the internal consistency reliability of each construct with their respective observable variables [34]. The results, as presented in Table 2, show that Cronbach's alpha (α) values and composite reliability are greater than the cut-off value (≥ 0.70). In addition, the AVE values of all constructs are greater than 0.50. Together, these assessment outcomes indicated that all constructs had sufficient consistency, reliability, and validity to warrant modeling analysis [21, 34].

[Insert Table 2 about here]

Further, as this study collected data of the observable variables for exogenous and endogenous constructs from the same respondents, a common method variance bias may exist. In line with Podsakoff, et al. [71], we assessed the common variance bias in the data by using CB-SEM with AMOS. A construct termed as common method factor (CMF) was added in the structure model and connected to all of the observable variables. The construct was

used to control the common variance among all endogenous and exogenous constructs. We conducted SEM analyses of “with” and “without” the CMF involved in the structural models and compared the statistical outcomes. The results indicated that no significant differences between the estimated parameters and fit indices were identified in the two models. Therefore, the outcomes justified that the common method bias was not an issue to interfere further structural model analysis.

Moreover, the partial least square method in SmartPLS was used to examine the loadings of observable variables onto their corresponding constructs in the model. As Table 2 presents, all of the observable variables are substantially and significantly loaded onto their measured constructs. The loadings are greater than 0.50, which satisfy the recommended loading requirement level [21]. In addition, the high t-values indicate low standard errors in the loadings. Thus, the convergent validity of all constructs was well justified. The discriminant validity was examined by comparing the value of square root of AVE of a construct with its correlation coefficients associated with other constructs. The higher value of square root of AVE than that of the correlation coefficients verifies that the construct meets discriminant validity [21]. Table 3 presents the diagnostic figures that are greater than the correlation coefficients between the construct and all other constructs in each column. Further, as suggested by Chin [8], this study assessed the discriminant validity of the constructs by examining the cross-loadings of the observable variables for measuring the constructs. Scrutinizing down and across the rotated factor loadings of PLS outcomes from the samples, we found that the loadings for the measured constructs were much higher than the loadings of the items to measure other constructs. Therefore, these evaluations of the observable variables together satisfied the measurement criteria for discriminant validity [8, 21, 34].

[Insert Table 3 about here]

4. Results

Table 3 provides the correlation matrix for the five constructs from the samples. It is noted that some correlation coefficients are high (e.g., the coefficient between DINT and ABLT). Therefore, we conducted the multicollinearity assessment with multiple regressions for all exogenous constructs. The construct of brand loyalty is not necessarily included, as it is the final endogenous construct in the research model [34]. The outcomes of VIFs for the constructs are shown in Table 2. All VIF values are less than the suggested cut-off value of 5.00; thus, the multicollinearity among the exogenous constructs is not an issue to impact further SEM analysis [34].

The PLS algorithm, bootstrapping, and blindfolding procedures in SmartPLS are used to estimate the structural parameters of the research model, as they provide rich information on path coefficients, significance, t-values, standard errors, coefficient of determination (R^2), effect size (f^2), and the predictive relevance q^2 for hypothesis testing, model evaluation, and comparison [9, 26, 35].

Table 4 provides the analytic outcomes of the research model and competing models. All demographic variables are included as control variables in the analyses to examine the effects on the consumers' brand loyalty. As depicted in Figure 2, the results of the research model are statistically significant and the percentage of variance for brand loyalty explained by all other constructs is: $R^2 = 0.608$ or 60.8%. Five hypotheses are strongly supported with statistical significance, although the relationship between trust and brand loyalty is not significant. In particular, the statistical outcomes indicate that deliberate inertia is the most impactful determinant of consumers' brand loyalty with high path coefficients.

[Insert Figure 2 about here]

Given the strong relationship between deliberate inertia and brand loyalty in the prior analytical outcomes, we designed a competing model A by omitting the construct of deliberate inertia, as this is in line with the commitment–trust theory to explicate the effects of trust and commitment on consumer loyalty. In particular, we specifically examine the impact of deliberate inertia and compare the outcomes of the original model with model A. As shown in Table 4, model A is significantly supported by the statistical results but with the lower percentages of variance explained ($R^2 = 0.451$ or 45.1%). As the literature of relationship marketing addressed, the constructs of trust and commitment are significant predictors for consumers' brand loyalty. However, it is notable that, without consideration of the effect of consumers' deliberate inertia on consumer loyalty, the prediction power or the percentage variance explained for consumer brand loyalty is decreased to 15.7%. Therefore, these results justify that deliberate inertia is a strong determinant for consumer brand loyalty in addition to consumers' commitment.

[Insert Table 4 about here]

Next, in line with the recommendations by Anderson and Gerbing [3], we searched for the most appropriate interpretation with a mediation model B. We incorporated deliberate inertia into the model and added a direct path from the exogenous construct of lock-in to the endogenous construct of brand loyalty. It is assumed that the constructs of trust, deliberate inertia, and commitment are mediators to convey the impact of lock-in onto the endogenous construct. As presented in Table 4, the outcomes of model B are significant ($R^2 = 0.654$). Except the insignificant path from trust to brand loyalty, the other six paths are significant. Particularly, the path from lock-in to brand loyalty is significant at the level of $p < 0.01$. Thus,

an additional finding in model B is that lock-in has both direct and indirect effects on consumers' brand loyalty to the brands, and it increases the explanation power to consumers' brand loyalty compared to model A and the original model. Model B in particular is confirmed as a partial mediation model because the three constructs act as co-mediators partially conveying the effect of lock-in on brand loyalty.

Thereafter, we carried out an analysis of moderation effect. As trust is insignificant in the prior analytical outcomes, we examine whether the inertia interacts with trust and commitment as Lee and Neale [57] as well as Han, Kim, and Kim [36] attempt. We created a competing model C by adding two interactions – trust \times inertia and commitment \times inertia into the model, with other relationships remaining the same as those in the original model. Using the moderation analysis procedures in SmartPLS, we found that the interactions are not significant at all and trust remains insignificant as indicated in Table 4. Thus, the inertia does not interact with trust and commitment. Instead, the outcomes remind us to reconsider the model structure, as literature assumes that trust should play an important role in consumers' branding loyalty in line with the commitment–trust theory.

Finally, synthesizing the previous modeling and analytical outcomes, we designed the competing model D, which includes the mediation effect identified in model B and considers consumers' trust as the precursor for inertia and commitment. As such, trust is assumed to enhance consumers' inertia and commitment and, in turn, influence on brand loyalty. Indeed, the analytical results confirm this remodeling, as model D outperforms the original model and other competing models with significant fitness: the coefficients of determination R^2 are increased from 0.608 (original model) and 0.654 (model B) to 0.655, and eight paths are consistently significant. Comparing the statistics of model D with that of other models, we believe that model D supports much of the theoretical reasoning and analytical and predictive

power for interpretation, which can be considered as the most appropriate model derived from the competing model analysis. As a result, Figure 3 presents this model and statistical outcomes.

[Insert Figure 3 about here]

To further confirm our findings, we compare the original model and model D again by running the blindfolding procedures in SmartPLS and structural equation modeling in AMOS. Table 5 presents the detailed outcomes. The goodness of fitness indices indicates that the consistent findings from PLS-SEM and CB-SEM procedures: (1) the best model outperforms the original model in terms of R^2 , χ^2/df , CFI, TLI, IFI, NFI, and RMSEA. All indices are better than the assessment criteria [26, 32]; (2) being congruent with the original model and the best model, the authors find that five of the six hypotheses are accepted with statistical significance; (3) deliberate inertia is the consistently dominant predictor for determining consumers' brand loyalty, as indicated by the high ΔR^2 , f^2 , and q^2 values in the models [9]; (4) trust plays a significant role in fostering consumers' deliberate inertia and commitment, rather than directly strengthening consumers' brand loyalty; (5) commitment has direct but adequate predictive power similar to the moderate f^2 and q^2 values as shown in Table 5; and (6) finally, consumers' lock-in has strong predictive relevance as indicated by the moderate to strong f^2 and q^2 values in the best model.

[Insert Table 5 about here]

5. Discussion

This study examines consumer brand loyalty toward ICT brands by integrating commitment and trust from relationship marketing paradigm with consumers' deliberate inertia and cognitive lock in from the status quo bias perspective. There are several key

findings from our empirical results. First, the findings show that deliberate inertia is the most powerful determinant of all antecedents toward consumers' brand loyalty across different brands. Consumers may deliberately seek reasons to resist the marketing efforts of other brands with an action of "doing nothing" to alternatives and maintaining their status quo brand choice of ICT products [75, 77].

Second, we find that cognitive lock-in has a significant, positive, and strong effect on consumers' brand loyalty. Consumers develop the lock-in after devoting time and effort to learn and nurture their brand-specific knowledge and skills [46, 63]. The results further show that cognitive lock-in enhances consumers' psychological tendency for rational deliberate inertia and emotional commitment to their brand of ICT products. Third, the findings of this study reveal that differing conventional understanding, trust, and commitment are no longer co-mediators as in the commitment–trust model when consumers' cognitive lock-in and deliberate inertia are established in the use of ICT products [62]. This study suggests that consumers' commitment is a trust-based commitment [42], as trust antecedes and engenders commitment and deliberate inertia. In addition, trust has no direct effect on brand loyalty. It works as a fundamental and conditional factor, as consumers have already developed trust in the trustworthy brands. By contrast, commitment has consistent and direct effects on brand loyalty in all brands and models as affective feelings and belongings [80]. It functions as the mediator to positively convey the impact of antecedent constructs upon brand loyalty.

5.1. Theoretical Implications

This study has several implications for research on consumer brand loyalty with ICT brands. First, we extend the commitment–trust theory with the integration of consumers' status quo bias perspective including cognitive lock-in and deliberate inertia [77]. To the best

of our knowledge, this is the first empirical study that has justified the critical roles of consumers' deliberate inertia and cognitive lock-in for consumers' brand choice and loyalty. As a result, our findings advance the present understanding of consumers' brand loyalty with ICT products and pave the way to modeling and considering social and psychological factors in determining consumers' brand loyalty.

Second, this empirical results provide fresh findings that trust is not a direct precursor to brand loyalty, while prior studies have indicated that trust is one of the major antecedents of brand loyalty [e.g. 58]. The key difference is that these studies have not considered consumers' deliberate inertia and cognitive lock-in in model development, and as a result, trust becomes a direct determinant of brand loyalty. Therefore, research can explore other potential factors that provide better explanatory power for consumer brand loyalty in the future. Finally, this study effectively examined the causal structure of consumer brand loyalty within the context of ICT brand products and validated the constructs and competing models with the advanced analysis methods of both PLS-SEM and CB-SEM. Thus, the findings are underpinned with sound theoretical rationale and justified with robust statistical evidence; as a result, the findings are with reliable and empirical support and can be referred to further theoretical articulation of consumers' behavior and purchase intention.

5.2. Managerial Implications

The findings also provide managerial insights for the suppliers of ICT brand products in general, and for smartphones in particular. First, it is clear that the consumers' brand loyalty to ICT products is mainly determined by their deliberate inertia and cognitive lock-in. Tracked back into the most appropriate model, consumers are mature, as their demographic factors have no significant influence on their brand loyalty, and their inertia is determined by consumers' lock-in. These results indicate that smartphone suppliers have deployed a simple

and successful strategy for in past years to cultivate consumers' knowledge- and skill-based lock-in and tailor consumers' personal preferences irrespective of the consumers' demographics such as age or gender. Therefore, the suppliers may need to scrutinize their consumer loyalty programs and potentially adapt and adopt the successful approaches to lock-in consumers for cultivating consumers' deliberate inertia and lock-in effects.

Moreover, the research clarifies that consumers' inertia may differ from their expected loyalty to a brand of ICT products, and consumers' resistance to change does not mean they will not change to an alternative brand at all. Some consumers may become dissatisfied with the performance of their present brand of ICT products but remain with their behavioral status quo because they perceive that either competitive brands do not have substantial advantages to motivate a switching action or the costs and risks of switching are higher than that of "doing nothing". Thus, the branded ICT product suppliers should not be misled by their consumers' strong brand loyalty driven by deliberate inertia. Instead, they should consider inertia as a signal of unstable consumer loyalty as consumers may change brands in the future, if these brands cannot continue to enhance the consumers' commitment and lock-in. Therefore, suppliers should manage customer loyalty programs to cognitively lock consumers into their brands and maintain their present brand choices.

Finally, summarizing the findings in a consumer management perspective, we suggest that these ICT brand product suppliers should (1) enhance existing continuous improvement of product functionality, maintaining perception of value and usage; (2) develop consumers' personal knowledge, skills, and applications in using ICT brand products to create consumers' enjoyable lock-in effects, so as to heighten brand-specific experience and skills, and (3) foster consumers' brand preferences to strengthen psychological tendency to resist brand switching.

5.3. Limitations and further research

While this study has made substantial contributions, rooms for improvement should be recognized. The ICT products in this study are smartphones, and hence, other ICT products such as tablets should also be used to test the research model to expand the generalizability of the current findings. Second, equivalent samples of the respondents from domestic smartphone brands may also be used in further studies to compare and contrast consumers' brand loyalty to international brands in the Chinese market, identify consumers' high preference to either international or domestic brands, and search for the trust and lock-in effects behind their preferences. Third, the study's focus on Chinese consumer data and thus the generalizability of the present findings should be cautiously interpreted. Specific market environment and cultural factors may impact findings in other national or cultural contexts. Further research could extend this study across different cultural settings to test the model and enhance its generalizability. Fourth, although the samples are considered as sufficient [34], higher explanation power needs larger samples and wider demographic groups from longitudinal studies. Finally, further research could explore other psychological factors in explaining the formation of consumer brand loyalty. For example, in addition to inertia, researchers could explore other types of inertia and their antecedents: spontaneous, forced, and unobtrusive inertia [77] and link different types of inertia to consumer loyalty toward ICT brands. Moreover, to explore the sources of rational decision-making of status quo bias, researchers could incorporate switching costs as an economic factor [72] into the model for empirical examination.

6. Conclusion

This work advances extant understanding of the enhancement of brand loyalty through the development of consumers' deliberate inertia and cognitive lock-in because they have stronger and more significant determination to consumers' brand loyalty than conventional

knowledge in customer relationship management, and they are of particular importance to ICT brand products, as use of the products requires much consumers' cognitive efforts and cultivates consumers' brand inertia to switch.

This research integrates the key factors from consumers' status quo bias perspective and the relationship marketing perspective; the research model and hypotheses have been examined by rigorous statistical analyses with survey data from consumers of two international smartphone brands, which are typical ICT products in this empirical investigation. The findings provide a best structural model incorporating consumers' deliberate inertia and cognitive lock-in with consumers' trust and commitment to incumbent ICT brand products. The analytical outcomes add fresh knowledge to the literature of brand loyalty, ICT products, and consumer behavior, indicating that consumers' deliberate inertia and cognitive lock-in have powerful effects on consumers' brand loyalty. We provide insightful suggestions to ICT suppliers, as they need to create consumers' deliberate inertia and cognitive lock-in to enhance consumers' brand loyalty to continue using their branded products, which will eventually sustain the firm's long-term growth and operational success.

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Figures

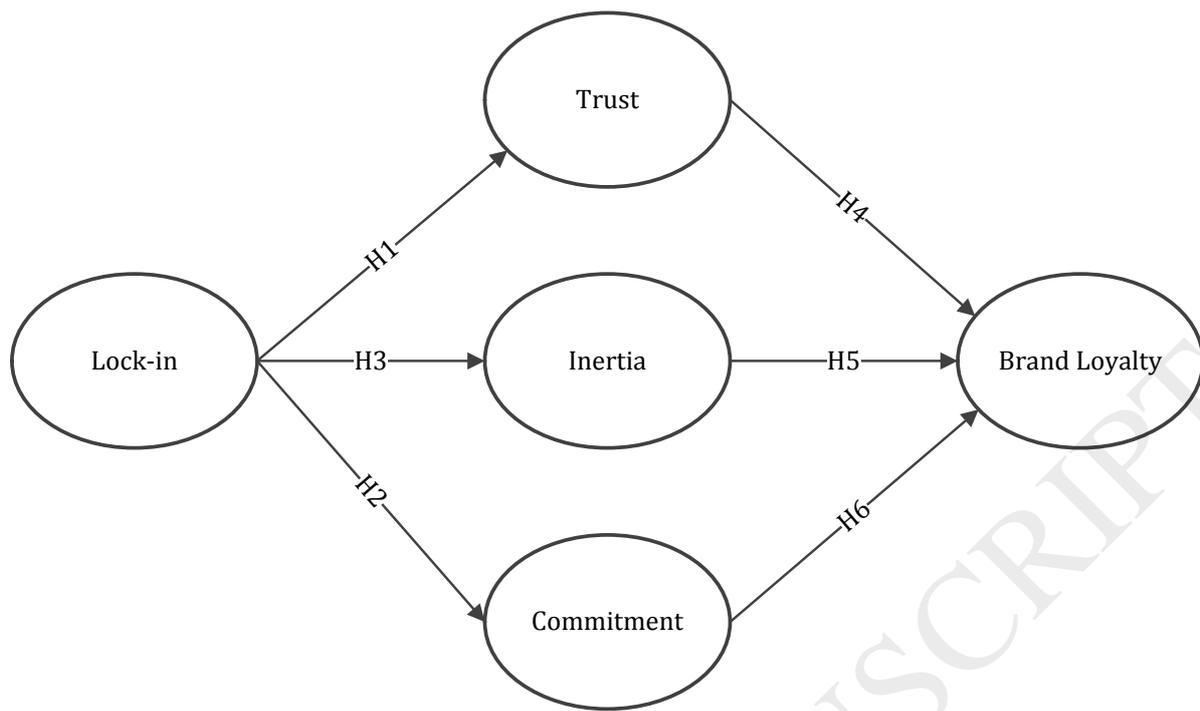
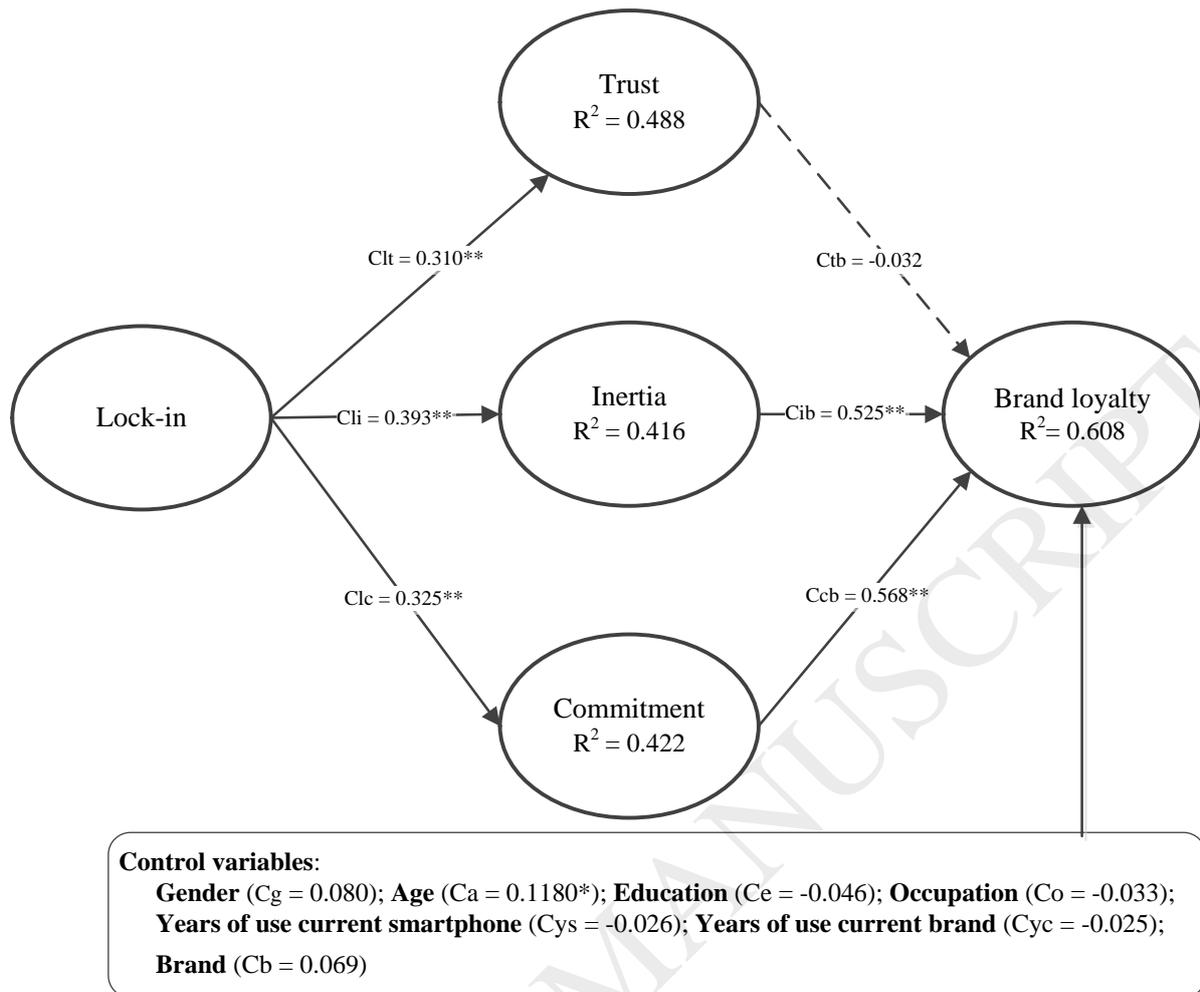
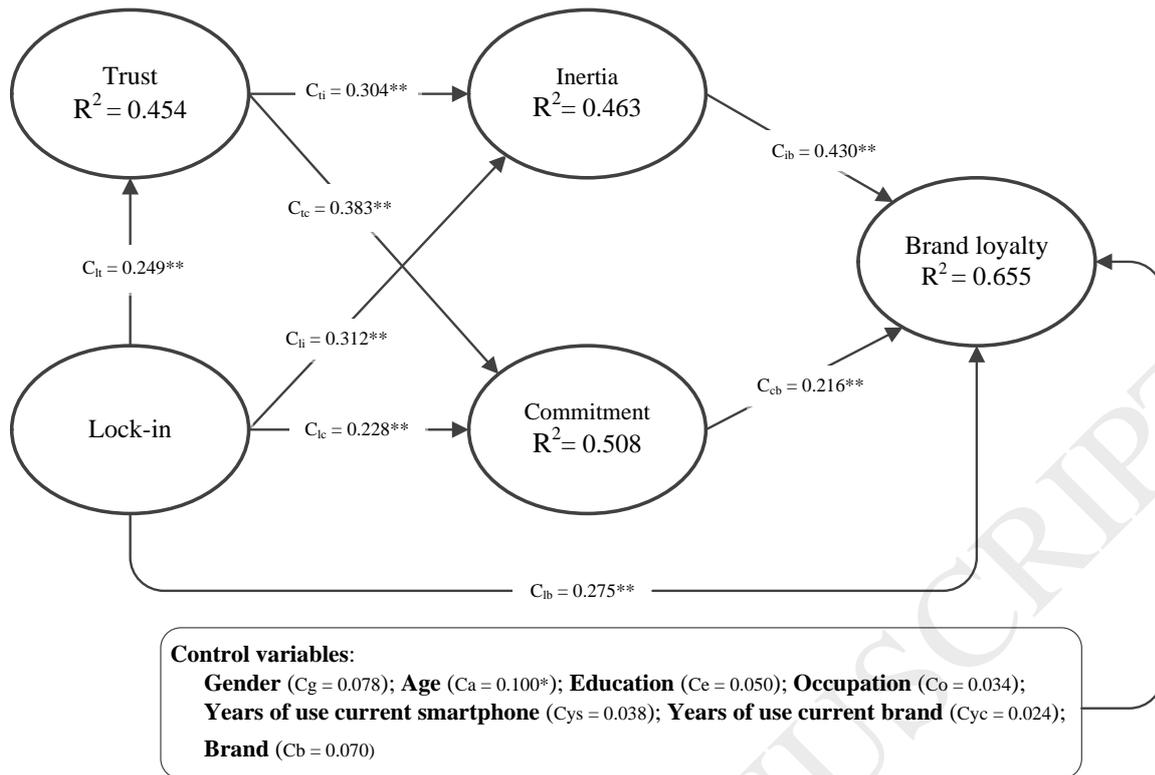


Fig. 1. A research model of consumer brand loyalty



Note: * $p < .05$; ** $p < .01$.

Fig. 2. The analytical results of the original research model



Note: * $p < .05$; ** $p < .01$. R^2 is the coefficients of determination explained By exogenous construct(s).

Fig. 3. The results of the best model from competing modeling analysis

Table 1

Descriptive statistics of brand and respondent characteristics

Variable	Category	Count	Percentage
Brand	iPhone	228	36.3%
	Samsung	280	44.6%
	Others	120	19.1%
Gender	Male	270	53.15%
	Female	238	46.85%
Age	≤ 20	58	11.42%
	≤ 30	184	36.22%
	≤ 40	190	37.40%
	≥ 41	76	14.96%
Education	High School	122	24.02%
	Associate Degree	117	23.03%
	Bachelor Degree	198	38.98%
Occupation	Master or Above	71	13.98%
	Student	72	14.17%
	Firm Clark	159	31.30%

	Managerial Staff	134	26.38%
	Professional	143	28.15%
Years of using status quo smartphone	≤ 1.0	187	36.81%
	≤ 1.5	126	24.80%
	≤ 2.0	90	17.72%
	≤ 3.0	42	8.27%
	≤ 4.0	36	7.09%
	≥ 4.1	27	5.31%
Years of using status quo brand of smartphone	≤ 1.0	85	16.73%
	≤ 2.0	142	27.95%
	≤ 3.0	149	29.33%
	≤ 4.0	72	14.17%
	≤ 5.0	29	5.71%
	≥ 5.1	31	6.10%

Table 2

Measurement loading, construct reliability, validity, and variance inflation factor

Construct	Item	Loading	t-value	Alpha (α)	CR	AVE	VIF
Lock-in	COLO1	0.875	14.55	0.896	0.925	0.708	1.383
	COLO2	0.877	14.79				
	COLO3	0.915	16.57				
	COLO4	0.733	10.89				
	COLO5	0.876	14.74				
Trust	TRT1	0.880	16.06	0.899	0.930	0.766	2.039
	TRT2	0.925	16.75				
	TRT3	0.913	16.23				
	TRT4	0.846	13.35				
Commitment	COM2	0.854	13.26	0.890	0.924	0.749	2.144
	COM3	0.869	13.75				
	COM4	0.921	17.19				
	COM5	0.883	15.45				
Inertia	INT1	0.866	16.54	0.924	0.942	0.725	1.974
	INT2	0.905	20.15				
	INT3	0.894	18.81				
	INT4	0.823	14.00				
	INT5	0.868	15.33				
	INT6	0.847	14.01				
Brand loyalty	BLT1	0.856	15.37	0.904	0.936	0.782	na
	BLT2	0.935	16.31				
	BLT3	0.897	14.43				
	BLT4	0.912	15.14				

Note: Alpha–Cronbach's alpha; CR–Composite reliability; AVE–Average variance extracted; VIF–Variance inflation factor for collinearity assessment.

Table 3

Construct correlation matrix and the square root of AVE

	Mean	SD	COLI	TRT	DINT	ACOM	ABLT
COLO	5.122	1.173	0.842				
TRT	5.478	0.950	0.506**	0.875			
DINT	5.232	1.101	0.576**	0.587**	0.852		
ACOM	5.212	1.129	0.537**	0.639**	0.615**	0.865	
ABLT	4.991	1.295	0.635**	0.488**	0.716**	0.621**	0.884

Note: * $P < .05$; ** $P < .01$. COLO – Cognitive lock-in; TRT – Trust; DINT – Inertia; ACOM – Commitment; ABLT – Brand loyalty. The diagnostic figure in bold is the square root of average variance extracted (AVE) of a construct.

Table 4

The outcomes of structural and competing model analyses

Model Path (Hypothesis)	Original model	Model A	Model B	Model C	Model D
Gender	0.080	0.068	0.079	0.080	0.078
Age	0.118*	0.107*	0.094	0.093	0.100
Education	-0.046	0.040	0.044	0.045	0.050
Occupation	-0.033	0.042	0.038	0.034	0.034
Using current smartphone	-0.026	0.038	0.036	0.035	0.038
Using current brand	-0.025	0.028	-0.027	0.025	0.024
Brand	0.069	0.063	0.071	0.068	0.070
Trust \Rightarrow Brand loyalty (H4)	0.032	0.108*	0.030	0.029	
Trust \Rightarrow Inertia					0.304**
Trust \Rightarrow Commitment					0.383**
Inertia \Rightarrow Brand loyalty (H5)	0.525**		0.445**	0.534**	0.430**
Commitment \Rightarrow Brand loyalty (H6)	0.568**	0.419**	0.241**	0.352**	0.216**
Trust \times Inertia \Rightarrow Brand loyalty				ns	
Commitment \times Inertia \Rightarrow Brand loyalty				ns	
Lock-in \Rightarrow Trust (H1)	0.310**	0.251**	0.249**	0.218**	0.249**
Lock-in \Rightarrow Inertia (H3)	0.393**		0.395**	0.385**	0.312**
Lock-in \Rightarrow Commitment (H2)	0.325**	0.331**	0.328**	0.330**	0.228**
Lock-in \Rightarrow Brand loyalty			0.282**		0.275**
R ²	0.608	0.451	0.654	0.606	0.655
ΔR^2 (Percentage)	---	- 15.7	4.60	0.20	4.70

Note: * $p < .05$; ** $p < .01$, ns – not significant.

Table 5

The structural model fitness in PLS-SEM and CB-SEM analysis

Fitness index in PLS-SEM	β	R^2_{ex}	ΔR^2	f^2	q^2
Original model: Brand loyalty (R^2 model = 0.611)					
Inertia	0.531**	0.484	- 0.282	0.411	0.241
Commitment	0.308**	0.566	-0.046	0.116	0.063
Trust	-0.051	0.605	-0.002	0.004	0.000
Best model: Brand loyalty (R^2 model = 0.641)					
Inertia	0.428**	0.551	- 0.102	0.282	0.151
Commitment	0.213*	0.625	-0.022	0.058	0.038
Lock-in	0.273**	0.606	-0.025	0.122	0.057

Note: β – the path coefficient from an exogenous to the endogenous construct; R^2_{ex} – the coefficient of determination when an exogenous construct is excluded from the model; ΔR^2 – The change of coefficient determination of R^2 ; f^2 – the effective size evaluates the contribution of an exogenous construct to the R^2 value of the endogenous construct; q^2 – the relative predictive relevance of an exogenous construct for the endogenous construct.

Fitness index in CB-SEM	Original model	Best model
χ^2	703.17	653.00
df	335.67	329.66
χ^2/df	2.095	1.981
$\Delta\chi^2$	---	50.17
P-value	<.000	<.000
CFI	0.94	0.95
TLI	0.93	0.94
IFI	0.94	0.95
NFI	0.88	0.89
RMSEA	0.07	0.06

Note: * $p < .05$; ** $p < .01$.

APPENDIX

Survey construct and questionnaire items

Construct	Item	Item Description
Lock-in	CLI1:	I appreciate this brand of (smartphone) as it brings me comfort and ease
	CLI2:	I enjoy using this brand of (smartphone) as it brings me a fascinating experience
	CLI3:	I believe that switching to another brand of (smartphone) is likely to be troublesome
	CLI4:	Switching to another brand wastes my time and my effort devoted to this brand
	CLI5:	Switching to another brand wastes my knowledge and skills gained in using this brand
Trust	TRT1:	I fell this brand of (smartphone) is constantly reliable
	TRT2:	I fell this brand of (smartphone) is trustworthy
	TRT3:	I fell this brand of (smartphone) is dependable
	TRT4:	I have confidence and trust in this brand of (smartphone)
	TRT5:	This brand of (smartphone) does not abide by its commercial promises *
Commitment	COM1:	I am not happy to be a consumer of this brand of (smartphone)*
	COM2:	I pay attention to news and information about this brand of (smartphone)
	COM3:	I care about the long-term development of this brand of (smartphone)
	COM4:	I have a certain degree of commitment towards this brand of (smartphone)
	COM5:	I have a sense of intimacy and belonging to this brand of (smartphone)
Inertia	INT1:	I prefer using this brand of (smartphone) as it makes me feel comfortable
	INT2:	I prefer using this brand of (smartphone) as it makes me feel stress-free
	INT3:	I prefer using this brand of (smartphone) as it makes me feel cheerful

Construct	Item	Item Description
	INT4:	I prefer using this brand of (smartphone) as this is what I am used to
	INT5:	I prefer using this brand of (smartphone) as it is a part of my live
	INT6:	I prefer using this brand of (smartphone) as I have got used to it
Brand loyalty	BLT1:	It is impossible for me to consider any other brand of (smartphone)
	BLT2:	I would purchase this brand again if I replace my present (smartphone)
	BLT3:	I would recommend this brand of (smartphone) when my friends consult me
	BLT4:	Although other brands of (smartphone) may be better, I would not buy them

**Deleted item according to the cut-off values by EFA analysis and outcomes.*