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Research Article
The Impacts of Mobile Wallet App Characteristics on Online Impulse Buying: A Moderated Mediation Model

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The adoption of cashless payment methods compels impulse buying. This research studies impulse purchase behavior by focusing on E-wallet app characteristics, a field where empirical research is still scarce. This paper is aimed at developing and testing a theoretical model to examine a moderated mediation model of mobile wallet app characteristics and impulse buying through perceived enjoyment moderated by mobile wallet user experience. An online survey acquired 208 valid responses from active E-wallet users. The framework was empirically analyzed by using Smart PLS-SEM. Findings indicate that perceived interactivity and visual appeal have positive relationships with perceived enjoyment and impulse buying, respectively. Perceived enjoyment is positively associated with impulse buying, and perceived enjoyment mediates the relationship between visual appeal and impulse buying. The impacts of perceived interactivity on perceived enjoyment and impulse buying are moderated by user experience. Moreover, user experience moderates the relationship between visual appeal and perceived enjoyment. This study identifies differences in consumer behavior between more experienced and less experienced E-wallet users. More experienced E-wallet users emphasize the app's interactivity, while less experienced users pay more attention to the app's appealing design. Practical implications are offered for E-wallet system developers and designers to attract new users and, at the same time, retain existing users.

1. Introduction

Malaysia is a prime market for mobile payment utilization due to its high Internet and smartphone penetration rate [1]. E-wallets are pervasive with the accelerated growth of E-wallets adoption, aligning with the central bank's goal to transform Malaysia into a cashless society [2]. The penetration rate of the mobile payment method, i.e., electronic wallet (E-wallet), further boosts during the COVID-19 pandemic [3], and this has been evident in Malaysia in recent years [4]. The adoption of mobile payment, such as E-wallets, contributes to the digital economy growth in both developed and developing countries [1, 5], including Malaysia [6].

Perceived enjoyment enhances the overall information system performance and gives users a pleasant feeling of fun after using a particular technology [7]. Perceived enjoyment motivates users' behavioral intention to adopt a specific information system [8]. A greater enjoyment with mobile wallet services decreases worry or difficulty among users [7]. Recent empirical studies have indicated that perceived enjoyment has the strongest effect over other predictors concerning E-wallet users' behavioral intention [9, 10]. This paper is aimed at identifying the factors influencing perceived enjoyment in the E-wallet context.

Per the stimulus-organism-response (SOR) model, perceived enjoyment significantly predicts consumer impulsive purchase behavior [11–14]. Consumers are willing to spend more if they have a better experience [15]. From a business viewpoint, customer experience is a strategic differentiator affording companies exceptional competitive advantages [15, 16]. Understanding consumer needs and wants contribute to firms generating profits when consumers indulge in impulse purchase behavior [16]. Drawing from the conceptualization of SOR theory, this paper operationalizes perceived enjoyment as an "organism" [11, 12] and studies its mediation effect.

The characteristics of impulse purchase imply that it usually occurs when a consumer interacts with the online environment—and environmental psychology plays a vital role in predicting impulse purchase [12, 17, 18]. Much research has been done on the significant influence of website quality or features [12, 18, 19]. Research is devoted to the premise that mobile app characteristics indirectly affect impulse buying through the mediation of emotional states [20]. However, there is limited knowledge concerning the influence of mobile app design on impulse buying [17]. Considering the popularity of mobile-based shopping apps, thoroughly examining online shoppers' impulsive buying behavior would bring comprehensive insights for practitioners and researchers [21]. Understanding mobile app users' behavior would assist retailers and app designers in developing and delivering offers to stimulate app users' impulse buying tendencies [21]. This study contributes significantly to the existing literature by shedding light on impulse purchase urges within a mobile-based app context, particularly in mobile payment apps (e.g., E-wallet).

Extant literature has posited that user experience is a salient moderator while examining consumer behavior. For instance, prior empirical research has examined the moderating effects of demographic variables in the impulse purchase context, such as user experience (mobile commerce experience) [22]. Some researchers found that online banking's user e-purchase experience differences exist [23]. Chen et al. [24] observed that consumer behavior (expenditure) contrasts between more experienced and less experienced consumers. App users' perceptions of the technology affordances (e.g., interactivity of information system) vary across their experience levels—for instance, technology affordances are more useful to experienced users than less experienced users [25]. This paper incorporates user experience as a moderator in the conceptual framework to examine if more experienced and less experienced users react differently to the app characteristics when generating perceived enjoyment and impulse buying.

The subsequent sections discuss the theoretical background and develop the research framework and hypotheses. The following presents the research methodology, data analysis, results, and implication discussions.

2. Literature Review and Theoretical Background

2.1. Impulse Buying. Online impulse buying "is stimulated by a sudden, often powerful, and persistent urge to buy something spontaneously, unreflectively, immediately and kinetically" [26, 27]. Impulse buying happens when an individual feels an urge to purchase a product or service without thoroughly considering why they need it [17, 18]. Consumers usually make rapid decision-making without evaluating due to urges for immediate possession [17, 19, 28].

Online shopping enables consumers to make purchases around the clock and is more likely to nudge impulsive buying [17, 27, 29]. Online transactions or payments can trigger overspending, as this virtual process may give consumers an illusion of not spending their own money [27]. There is a

considerable effort by marketing and academic researchers to examine the factors influencing consumers' impulsive buying behavior. External stimuli, such as shopping app characteristics and cashless payment methods (i.e., credit card use), influence consumer impulse purchase urges [30, 31]. However, the impact of cashless payment methods on impulsive buying behavior remains underexplored. This research examines whether the E-wallet payment app's characteristics would directly impact its user to make impulse buying while using an E-wallet for payment transactions.

2.2. Stimulus-Organism-Response Theory. Mehrabian and Russell [32] propose the stimulus-organism-response (SOR) theory, consisting of three main components: stimuli, organism, and response. This model posits that the stimuli (i.e., environmental cues) influence the organism (i.e., a person's cognitive and emotional states), resulting in the final response (i.e., avoidance or approach behavior) [33]. This model has been adopted in a multidisciplinary research context as a parsimonious and robust theoretical framework to clarify various Internet users' behavior [33]. Researchers have adopted this framework to explore website experiences [34, 35] and consumer impulsive buying behavior [12, 19, 36].

The stimulus can be categorized into external and internal stimuli [37]. External stimulus refers to marketing stimuli [30, 38] and website stimuli [19, 36]. Per the SOR theory, the "organism" consists of the entire process intervening between the stimuli (triggers) and the responses (final decision) [19, 33]. The emotional organism is the affective state arising when a person indulges in interacting with a certain situation [37]. These emotional organisms can be operationalized as positive affect, negative affect [35, 39, 40], and perceived enjoyment [11, 12, 38, 41]. Finally, the third component is the response, which refers to the reaction to the perceptions depending on different situational factors [36].

The SOR model is an appropriate theoretic foundation where researchers substitute different context-specific factors to examine the factors' holistic impact on individuals' organismic states and ensuing responses [33, 42, 43]. The SOR theory lays the foundations for the current study to examine how the mobile payment app characteristics (stimuli) influence users' enjoyment (organism) and impact impulsive buying behavior. This paper investigates the effects of perceived interactivity and visual appeal on E-wallet users' perceived enjoyment and impulse buying, respectively.

2.3. Perceived Interactivity. Interactivity is "the extent to which the communicator and the audience respond to each other's communication needs and proposed playfulness, choice, connectedness, information collection, and reciprocal communication as five characteristics of interactivity" (p. 3) [44]. Perceived interactivity has been operationalized and studied in different research contexts and comprises personalization, connectedness, and responsiveness [44]. The literature indicates that perceived interactivity is highly relevant for technology [45–47] and for adopting electronic payment services [48]. Additionally, perceived interactivity

(i.e., responsiveness) greatly influences users' positive feelings about electronic payment services [49].

A significant positive relationship between perceived interactivity and impulse buying has been observed [50, 51]. The interactivity of a website is a vital factor for a buyer to have a pleasant feeling when browsing shopping websites [44]. Prior research has highlighted that impulses can happen when the buyer encounters a satisfying feeling in the interactive functions [51]. Similarly, this paper postulates that the interactivity of mobile payment systems (E-wallets) facilitates impulse payment transactions.

Perceived interactivity positively correlates with perceived enjoyment in the different research contexts, such as motion-based video game enjoyment [52] and virtual environments employing wide-field displays [53]. The perceived interactivity of mobile augmented reality apps significantly influences the users' perceived enjoyment [11]. Bae et al. [54] indicated that interactivity is one of the most robust features to improve users' experiences and increase enjoyment in the online environment. This study examines the relationship between perceived interactivity and perceived enjoyment through the following hypotheses:

Hypothesis 1. Perceived interactivity of an E-wallet positively influences impulse buying.

Hypothesis 2. Perceived interactivity of an E-wallet positively influences perceived enjoyment.

2.4. Visual Appeal. Visual appeal is one of the salient factors consumers will be concerned about while browsing social commerce websites [36, 55, 56]. An element-rich application interface can enhance one's emotional experience during browsing, thereby eliciting the user's enjoyable or pleasant experiences [17]. Extant studies have found that visual appeal positively influences perceived enjoyment [11, 12]. This study postulates that visual appeal significantly affects the perceived enjoyment of using an E-wallet; therefore, we hypothesize the following:

Hypothesis 3. Visual appeal positively influences impulse buying.

Hypothesis 4. Visual appeal positively influences perceived enjoyment.

2.5. Perceived Enjoyment. Zhou and Feng [57] define perceived enjoyment as "the extent to which the activity of using the information system is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated" (p. 3). Perceived enjoyment was found to have a significant relationship with impulse buying intention [11, 12, 41, 58]. Extant studies have indicated that the main influence on impulsive buying intention stems from positive affective states [58]. In the online shopping context, consumers' subjective emotions from the purchase process improve their initial engagement and recognition of the mobile shops and subsequently strengthen buying impulses [58]. Consumers will experience an intense affec-

tive reaction upon being triggered by various stimuli (either internal or external). Individuals in a positive emotional state will react positively to a product or service [58]. Therefore, this paper posits that perceived enjoyment will affect E-wallet users' impulsive buying behavior. In other words, when E-wallet users perceive that using E-wallet payment services is enjoyable, they may tend to use E-wallet for making impulse transactions. More formally, the following is hypothesized:

Hypothesis 5. Perceived enjoyment of using an E-wallet positively influences impulse buying.

According to the SOR theory, positive affective states/emotions (organism) are a potential mediator construct [32]. Furthermore, research has highlighted the significant mediation effect of perceived enjoyment in social commerce [11, 12] and mobile commerce [58]. Based on the premise underpinning Hypothesis 2 and Hypothesis 5, as well as Hypothesis 4 and Hypothesis 5, the following research hypotheses are developed:

Hypothesis 6. Perceived enjoyment mediates the relationship between perceived interactivity and impulse buying.

Hypothesis 7. Perceived enjoyment mediates the relationship between visual appeal and impulse buying.

2.6. Moderating Effect of User Experience. The function of experience in online shopping settings has been examined across diverse research fields, including social media commerce/Facebook commerce [22], artificial intelligence TV subscription services [59], and attitudes toward e-commerce websites [60]. With the launching of new online shopping, there will be constant entries of first-time users. First purchase and following purchase behaviors are different as consumers with low e-purchase experience may tend to explore more features than more experienced ones [61]. In addition, the moderating effect of user experience has been researched and confirmed as a significant moderator in e-commerce [61], mobile payment technology acceptance [62], and social commerce impulse purchase context [22].

The moderating role of users' experience greatly influences their behavior [60]. Users' prior experience allows marketers to understand better potential customers' preferences, needs, and habits [60], as consumer behaviors may change due to prior experiences [63]. Nevertheless, it was found that consumer impulse purchase behavior is not influenced by the gap in user experience (f-commerce experience) [22]. Given the inconsistent findings, this paper is aimed at filling the research gap by examining the role of the moderator of the user's experience. We postulate that user experience (E-wallet usage experience) will moderate the E-wallet app characteristics (visual appeal, perceived interactivity), perceived enjoyment, and impulse buying. Moreno et al. [38] recommended future studies to examine if the gap in user experience affects consumers' perceived enjoyment. This research contributes to the literature by analyzing whether user experience (E-wallet usage experience)
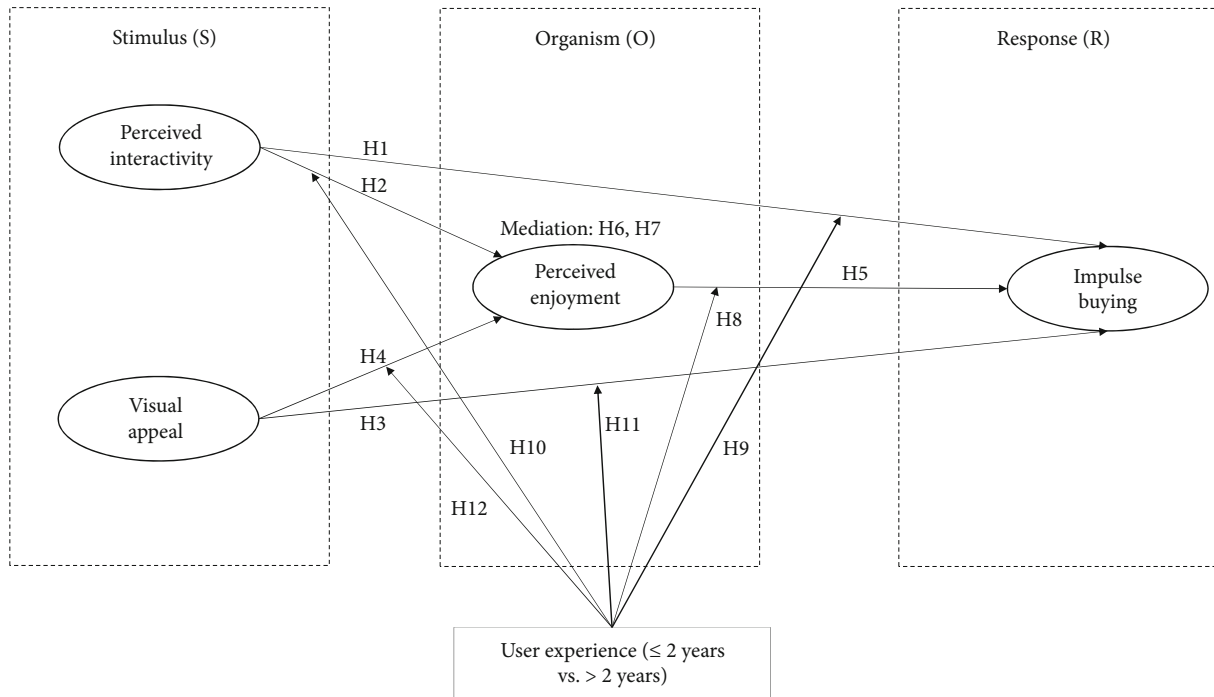
FIGURE 1: Proposed research framework.

moderates the relationship between E-wallet app characteristics (visual appeal and perceived interactivity) and perceived enjoyment. Hence, the following research hypotheses are formulated:

Hypothesis 8. User experience moderates the relationship between perceived enjoyment and impulse buying.

Hypothesis 9. User experience moderates the relationship between perceived interactivity and impulse buying.

Hypothesis 10. User experience moderates the relationship between perceived interactivity and perceived enjoyment.

Hypothesis 11. User experience moderates the relationship between visual appeal and impulse buying.

Hypothesis 12. User experience moderates the relationship between visual appeal and perceived enjoyment.

Figure 1 illustrates the proposed research framework of this present research which summarizes the hypothesized relationship.

3. Methodology

3.1. Data Collection and Sample. This study adopted an online survey and applied a nonprobability purposive sampling technique for data collection. Purposive sampling requires respondents to meet some criteria that the researcher aims to research to ensure that the data collection from respondents has the related experience and knowledge

[3]. Respondents who met the two criteria (have at least one registered E-wallet account and have used an E-wallet to perform a payment transaction) were invited to complete the survey [64]. Before the data collection, a pretest (expert review) was done to ensure content reliability and validity of the survey items.

The data collection obtained responses about consumer behavior during the COVID-19 pandemic. Due to social distancing and local lockdown conditions, the online survey was set up using Google Forms [65]. The survey link was disseminated to the respondents through social media (Facebook and WhatsApp). G∗ power was used to determine the minimum sample size [66]. Seventy-seven responses were computed based on the settings of three predictors, an effect size of 0.15, a significance level of 0.05, and a power of 0.80.

3.2. Instrument. An online survey was developed using various subscales of perceived interactivity, visual appeal, perceived enjoyment, and impulse buying. Each research variable is referenced from the existing research work, with minor modifications for contextual consistency. This study adopted a five-point Likert scale with participants rate their disagreement and agreement for each survey item: "1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree". Perceived interactivity was measured using four items adapted from Yoon [44], such as "Access and response speed of E-wallet is fast." Visual appeal was modified from the measurement developed by Zheng et al. [36], such as "The E-wallet is visually pleasing." Perceived enjoyment was measured using three items adapted from Natarajan et al. [67], such as "I have fun while using E-wallet." Impulse buying was measured by using five survey

items adapted from Chen and Yao [35], such as "When I use E-wallet for payment transactions, I buy things that I had not intended to purchase."

3.3. Data Analysis. This paper applied Partial Least Squares Structural Equation Modeling (PLS-SEM) to test the research model. The data analysis was conducted using Smart PLS. PLS-SEM is deemed appropriate for this study because the research constructs' psychometric properties, including reliability and validity, were assessed simultaneously with the associations between exogenous and endogenous variables in the research model [68]. In addition, PLS-SEM is variance-based and is suitable for predictive applications (focuses more on explained variance, R2) [69]. In addition, while performing PLS-SEM, the data is not necessary to be normally distributed; PLS favors the nonparametric multigroup analysis for group comparison [21].

4. Results

4.1. Demographic Characteristics. A total of 214 responses were obtained. Six were removed due to the straight-lining response [69], resulting in a final sample of 208 responses. Among the 208 respondents, 59 (28.4%) were male, and 149 (71.6%) were female. The respondents were between 18 and 45 years old. The findings revealed that 51.4% of the participants had used E-wallets in the recent one to two years, while 10.1% had just begun using E-wallets within the past 12 months. There was a total of 35.1% ($N = 73$) of the respondents who have had three to four years of E-wallet using experience, followed by five to six-year experience ($N = 5$) and more than six-year experience ($N = 2$). In addition, the participants have used an E-wallet to perform transactions one to five times ($N = 58$), followed by six to ten times ($N = 72$), 11 to 15 times ($N = 27$), and more than 15 times ($N = 51$) during the past 12 months. Furthermore, 78.8% of the respondents use Touch n'Go E-wallet ($N = 164$) to perform payment transactions, followed by ShopeePay ($N = 131$), GrabPay ($N = 69$), Lazada Wallet ($N = 43$), and Samsung Pay ($N = 40$).

4.2. Common Method Bias. Common method bias (CMB) is the amount of spurious covariance shared between exogenous and endogenous constructs when all variables are measured at a single period. Harman's single factor was used to examine whether there is an occurrence of CMB. Unrotated principal component factor analysis accounted for 29.87% (less than 50%) of the variance in data. The CMB was not a concern for the current dataset [70].

4.3. Measurement Model. As tabulated in Table 1, all factor loading values were well above 0.5 [66], indicating that the outcome sufficiently demonstrated that the research variables showed good agreement [71]. The composite reliability (CR) values of each research construct and average variance extracted (AVE) were analyzed to ensure convergent validity [66]. Table 1 shows that the AVE values ranged from 0.577 to 0.869 and were above the minimum threshold value of 0.50 [66]. Composite reliability values ranged from 0.844

to 0.952, achieving the recommended threshold value of 0.70 [66].

Fornell-Lakers criterion and the heterotrait-monotrait ratio of correlations were assessed to verify the discriminant validity. The square roots of the AVE (bold diagonal values) for all the constructs tabulated in Table 2 were higher than the correlations with other research variables [72]. The heterotrait-monotrait ratio of correlations (HTMT) was further assessed. All the HTMT values were below the threshold of 0.85 [73], as shown in Table 3. Therefore, the Fornell-Lakers criterion and HTMT results provided sufficient discriminant validity evidence for all the research constructs.

The outer variance inflation factor (VIF) values for the research variables ranged between 1.358 and 3.729, which were less than 5, demonstrating that the multicollinearity issue was not a concern in the current research model [66].

4.4. Structural Model. The data analysis results supported all the hypotheses, as shown in Table 4. Hypothesis 1 and Hypothesis 2 were also supported, indicating that perceived interactivity has significant relationship with impulse buying ($\beta = -0.154$; $p < 0.05$) and perceived enjoyment ($\beta = 0.212$; $p < 0.01$). Visual appeal has a significant relationship with impulse buying ($\beta = 0.218$; $p < 0.01$) and perceived enjoyment ($\beta = 0.340$; $p < 0.001$), thus supporting Hypothesis 3 and Hypothesis 4, respectively. Hypothesis 5 was supported, indicating that perceived enjoyment has a significant relationship with impulse buying ($\beta = 0.217$; $p < 0.01$).

The R^2 (coefficient of determination) was assessed to determine the predictive accuracy of the perceived enjoyment and impulse buying, respectively. Overall, the model interprets 20.2% of the variance in perceived enjoyment, and the model explains 11.6% of the variance in impulse buying. The R^2 value of 0.202 was above the threshold of 0.13, as recommended by Cohen [74], which denotes a moderate predictive power. The R^2 value of 0.116 represents weak predictive power [74].

4.5. Mediation Test. Table 5 shows the mediation result. The empirical t value of the indirect effect (0.046) for the perceived interactivity ➔ impulse buying relationship was 0.079, yielding a p value of more than 0.05. The result concluded that the mediation effect was not statistically significant, thus rejecting Hypothesis 6. The indirect effects' empirical t value (0.074) of the visual appeal ➔ impulse buying relationship was 2.103, and a p value of less than 0.05. The result indicated that perceived enjoyment is statistically significant and mediates the relationship between visual appeal and impulse buying. Thus, Hypothesis 7 was supported. Following the mediation analysis procedure [75], the result indicated that the mediation did take place. The indirect effects 95% Boot CI bias corrected (lower level and upper level) for visual appeal ➔ impulse buying did not straddle a 0 in between, indicating mediation [76, 77]. The direct effect (0.292) for the visual appeal à impulse buying relationship was further assessed, yielding a p value of less than 0.05. Table 5 shows that the direct effect was still significant, suggesting a complementary partial mediation [75].

TABLE 1: Construct reliability and validity.

Construct	Items	Loading	CR	AVE	R-square	VIF
	IB1	0.729	0.903	0.652	0.116	2.268
	IB2	0.851				2.876
Impulse buying	IB3	0.845				1.787
	IB4	0.726				1.826
	IB5	0.873				2.650
	VA1	0.928	0.952	0.869		1.813
Visual appeal	VA2	0.941				2.193
	VA3	0.928				1.612
	PE1	0.829	0.887	0.723	0.202	3.512
Perceived enjoyment	PE2	0.886				3.729
	PE3	0.834				3.367
	PI1	0.631	0.844	0.577		1.358
	PI2	0.819				1.595
Perceived interactivity	PI3	0.836				1.777
	PI4	0.736				1.531

Notes: CR = composite reliability; AVE = average variance extracted; R-square = coefficient of determination; VIF = variance inflation factor.

TABLE 2: Fornell-Lakers criterion.

	Impulse buying	Perceived enjoyment	Perceived interactivity	Visual appeal
Impulse buying	0.807			
Perceived enjoyment	0.257	0.850		
Perceived interactivity	-0.024	0.310	0.760	
Visual appeal	0.260	0.401	0.289	0.932

Note: the italics in diagonal are the square roots of the AVEs of the individual constructs; off-diagonal values are the correlations between constructs).

TABLE 3: HTMT.

	Impulse buying	Perceived enjoyment	Perceived interactivity	Visual appeal
Impulse buying				
Perceived enjoyment	0.259			
Perceived interactivity	0.094	0.379		
Visual appeal	0.267	0.461	0.324	

TABLE 4: Hypothesis results.

	Hypotheses	β value	t value	p value	Result
H1	Perceived interactivity ➡ impulse buying	-0.154*	2.135	0.016	Supported
H2	Perceived interactivity ➡ perceived enjoyment	0.212**	2.509	0.006	Supported
H3	Visual appeal ➡ impulse buying	0.218**	2.732	0.003	Supported
H4	Visual appeal ➡ perceived enjoyment	0.340***	4.154	0.000	Supported
H5	Perceived enjoyment ➡ impulse buying	0.217**	2.617	0.004	Supported

Note: $^*p < 0.05$, $^{**}p < 0.01$, and $^{***}p < 0.001$.

4.6. Moderation Test

4.6.1. Measurement Invariance Analysis across Groups.
Before testing the moderating effect, this paper first determined and confirmed the measurement invariance using the Measurement Invariance of Composite Models (MICOM)

procedure [66, 78]. To run a multigroup analysis, the configural invariance must be established [78]. The configural invariance is automatically established [78]. The next step is to assess the permutation algorithm [78]. Configural invariance was established and confirmed by examining whether the correlation values of the calculated scores are larger than

TABLE 5: Mediation results.

| Hypotheses | | β value | t value | Indirect effect | | | | | Direct effect | | | Mediation type |
| | | | | Confidence interval bias corrected | | | | | β value | t value | p value | |
				2.5%	97.5%	p value	Result					
H6	PI → PE → IB	0.046^{ns}	1.756	0.005	0.106	0.079	Not supported		-0.108	1.486	0.137	No mediation
H7	VA → PE → IB	0.074^{*}	2.103	0.013	0.148	0.035	Supported		0.292	3.921	0.000	Complementary partial mediation

Note: $^{*}p < 0.05$, $^{**}p < 0.01$, and $^{***}p < 0.001$; ns: not significant.

the 5% quantile of the empirical distribution [66]. As summarized in Table 6, the correlation values of the calculated scores (original correlation) are larger than the 5% quantile of the empirical distribution. This result was corroborated by the permutation's p values larger than 0.05, demonstrating sufficient support for compositional invariance [66].

4.6.2. Multiple Group Analysis. From the generated multiple group analysis (MGA) result, the report revealed that the relationship between perceived interactivity and impulse buying has a significant p value ($p < 0.05$). This result was corroborated by the p values of the parametric test and Welch-Satterthwaite test, which were less than 0.05 [78]. This implies a significant difference across E-wallet user experience (≤ 2 years vs. > 2 years) in the relationship between perceived interactivity and impulse buying, supporting Hypothesis 9. Based on the bootstrapping result, users who used E-wallets for more than two years ($\beta = -0.354$) had a stronger path coefficient than users who used E-wallets for a shorter period ($\beta = -0.053$).

In addition, the relationship between perceived interactivity and perceived enjoyment has a significant p value ($p < 0.01$). This result was corroborated by the p values of the parametric test and Welch-Satterthwaite test, which were less than 0.01 [78]. This implies a significant difference across E-wallet user experience (≤ 2 years vs. > 2 years) in the relationship between perceived interactivity and perceived enjoyment, affirming Hypothesis 10. Based on the bootstrapping result, users who used E-wallets for more than two years ($\beta = 0.502$) had a stronger path coefficient than users who used E-wallets for a shorter period ($\beta = 0.095$).

Moreover, the report revealed that the relationship between visual appeal and perceived enjoyment has a significant p value ($p < 0.001$). This result was affirmed by the p values of the parametric test and Welch-Satterthwaite test, which were less than 0.01 [78]. This implies a significant difference across E-wallet user experience (≤ 2 years vs. > 2 years) in the relationship between visual appeal and perceived enjoyment, endorsing Hypothesis 12. Based on the bootstrapping result, users who used E-wallets for more than two years ($\beta = 0.071$) had a weaker path coefficient than users who used E-wallets for a shorter period ($\beta = 0.477$).

Furthermore, the result revealed that there is no significant difference across E-wallet user experience (≤ 2 years vs. > 2 years) in the relationship between the effect of perceived enjoyment ($p = 0.617$) and visual appeal ($p = 0.817$) on impulse buying. Thus, Hypothesis 8 and Hypothesis 11 were rejected. Concerning path coefficients across E-wallet user experience subgroups, the analysis results for the two

subsamples (≤ 2 years vs. > 2 years) are presented in Table 7. Figure 2 shows the research framework's structural analysis results.

5. Discussions

This study investigates the E-wallet app's impact on impulse buying through the SOR theory lens. The findings demonstrate that perceived interactivity significantly predicts impulse buying. The finding concords with the previous research indicating that perceived interactivity has an indirect effect [79] and a direct effect [80] on impulse buying. However, the relationship between these two variables is negatively related. Therefore, inferences can be made that the higher the interactivity of the E-wallet app, the less powerful the buying impulses. Suppose an information system is very easy to use (responsive) and has lower complexity. Users could then complete their tasks quickly and leave the system without exploring other functions, thereby avoiding temptations for potential impulse buying [51]. Besides that, perceived interactivity is found to positively influence perceived enjoyment, which conforms with some research findings [54, 81]. This finding demonstrates that interactivity in terms of responsiveness, accessibility, and convenience factors is vital in improving E-wallet users' perceived enjoyment.

The findings of the SEM method indicate that visual appeal is a notable direct predictor of perceived enjoyment and impulse buying and has the strongest direct effect in predicting both perceived enjoyment and impulse buying over other predictors. This observation sustains previous empirical findings indicating that visual appeal is positively associated with perceived enjoyment [56, 82] and impulse buying behavior [21, 83]. The significant results reveal that the pleasing design interface of the E-wallet app enhances the overall interface presentation and improves users' perceived enjoyment, subsequently prompting impulse buying.

This study finds that perceived enjoyment positively influences impulse buying, which coheres with prior findings [38, 84–86]. The significant result indicates that perceived enjoyment can be obtained by adopting mobile payment services (E-wallet). The experience enables users to carry out certain actions such as making impulse buying by using E-wallets for payment transactions. This study confirms that perceived enjoyment is a crucial mediating variable in the relationship between visual appeal and impulse buying. On the other hand, perceived enjoyment does not significantly mediate the relationship between perceived interactivity and impulse buying.

TABLE 6: Measurement invariance analysis.

	MICOM Step 2_Compositional invariance: across E-wallet user experience (≤2 years vs. >2 years)			MICOM Step1_Configural invariance: confirmed	MICOM step 3_Composite equality: across E-wallet user experience (≤2 years vs. >2 years)							
Construct	Original correlation	5.0%	Permutation p values	Compositional invariance	Original mean	2.5%	97.5%	Permutation p values	Original variance	2.5%	97.5%	Permutation p values
IB	0.986	0.943	0.335	Yes	-0.008	-0.278	0.278	0.954	-0.021	-0.375	0.392	0.911
PE	1.000	0.991	0.977	Yes	-0.128	-0.267	0.270	0.366	0.297	-0.536	0.540	0.369
PI	0.964	0.947	0.117	Yes	0.005	-0.264	0.273	0.974	0.003	-0.403	0.393	0.988
VA	1.000	0.999	0.651	Yes	-0.004	-0.270	0.290	0.981	-0.253	-0.408	0.415	0.235

Conclusion: both mean and variance original differences fall between 2.5% and 97.5 boundaries, indicating full measurement invariance.

TABLE 7: Path coefficient comparison between E-wallet user experience (≤2 years vs. >2 years).

Relationship		E-wallet user experience (≤2 years) $N = 116$ Coefficient	E-wallet user experience (>2 years) $N = 92$ Coefficient	PLS-MGA Path difference	p value	Results	Parametric test p value	Welch-Satterthwaite test p value
H8	PE → IB	0.217	0.268	0.051^{ns}	0.617	Not supported	0.392	0.394
H9	PI → IB	-0.053	-0.354	0.301^{*}	0.045	Supported	0.042	0.043
H10	PI → PE	0.095	0.502	0.407^{**}	0.003	Supported	0.003	0.002
H11	VA → IB	0.186	0.324	0.138^{ns}	0.817	Not supported	0.214	0.218
H12	VA → PE	0.477	0.071	0.406^{**}	0.003	Supported	0.002	0.002

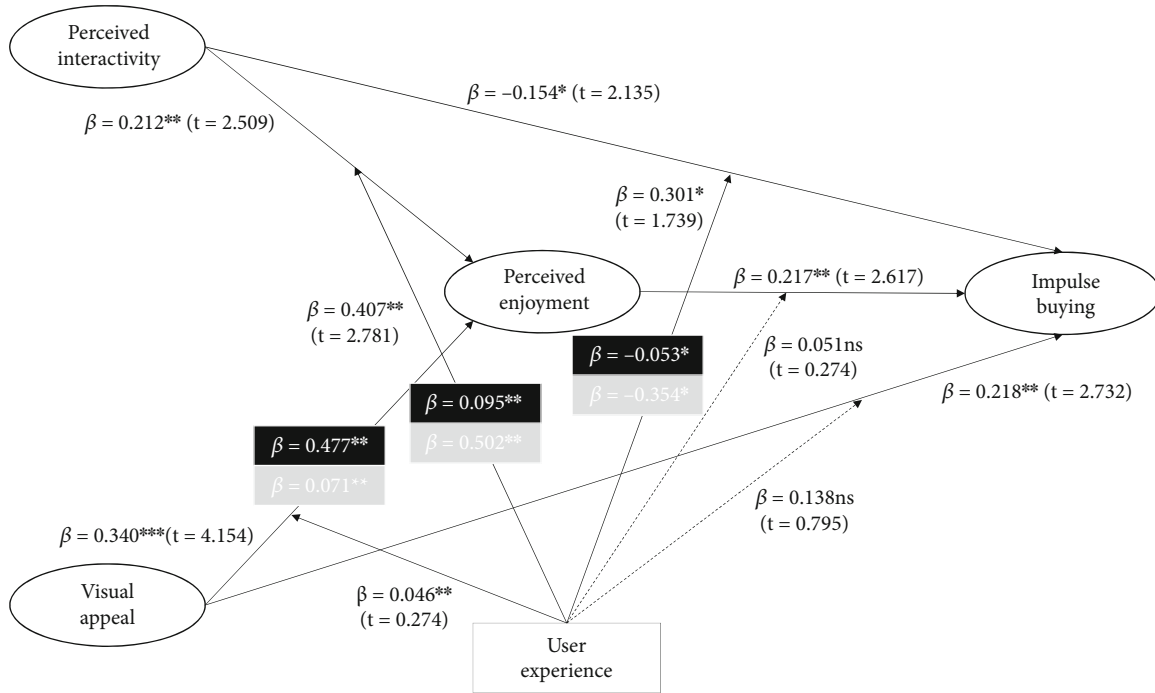Note: $^{*}p < 0.05$, $^{**}p < 0.01$, and $^{***}p < 0.001$; ns: not significant.

FIGURE 2: Research framework's structural analysis results. Note: $***p < 0.001$, $**p < 0.01$, and $*p < 0.05$. Dashed path = not significant. Black background indicates path coefficient (≤2 years of E-wallet experience). Grey background indicates path coefficient (>2 years of E-wallet experience).

The MGA results confirm the moderation effect of the E-wallet user experience. The impact of visual appeal on perceived enjoyment is highest for the less experienced E-wallet users (having one to two years of experience). Similarly, prior research has indicated a significant difference in information systems' visual appeal (appealing design) between the more experienced and less experienced users [87]. This finding is discordant with prior research, pointing out that visual appeal is significant for more experienced individuals [88]. In this context, the less experienced users utilize E-wallet design cues (visual appeal) while using E-wallet to improve their perceived enjoyment.

The effect of perceived interactivity on perceived enjoyment is highest for the more experienced E-wallet users (having more than two years of experience). This observation aligns with the previous research comparing experienced and inexperienced users on mobile services acceptance [89]. The significant finding is evident that experienced users are more confident and familiar with the navigation of mobile services [89, 90] and are more motivated to use mobile services [91]. Subsequently, the experienced users encounter a more enjoyable feeling toward the mobile payment services (i.e., E-wallet payment services).

A noteworthy finding concerns the influence of the E-wallet user experience as it only moderates the relationship between perceived interactivity and impulse buying. E-wallet users' experience does not moderate the effects of visual appeal and perceived enjoyment on impulse buying. This finding is comparable to previous research revealing that users who are more experienced with a particular technology or information system understand how to use it better and derive stronger perceptions of its usefulness [92, 93].

More experienced users are frequent users likely to be skilled and knowledgeable when interacting with a certain technology [94], such as E-wallet. Subsequently, they are more likely to engage in impulse purchases by using an E-wallet for payment transactions.

6. Practical Implications

This research offers implications for E-wallet system designers. The result demonstrates that perceived interactivity positively correlates with perceived enjoyment and negatively correlates with impulse buying. Thus, E-wallet designers may consider improving the interactive functions of the E-wallet apps, such as incorporating more promotion advertisements or cashback coupons to encourage users to immerse and explore more features and functions on the E-wallet app. This is because browsing facilitates buying impulses [51]. The higher level of interactivity enriches user experiences and evokes enjoyment during E-wallet use. Ultimately, users will frequently adopt the E-wallet for future payment transactions.

Visual appeal positively influences impulse buying and perceived enjoyment. Therefore, E-wallet system designers can consider embedding the standard graphics or icons with visual attraction for search engines for the E-wallet users to use easily. This is because the visual elements are essential to grab one's attention [83]. In addition, a visually pleasing and appealing interface plays a significant role in driving user engagement with mobile payment [21, 95]. Visual elements such as eye-catching images, organized screen layout, and colors should be infused into E-wallet design, facilitating users to obtain information easily and conduct transactions more efficiently.

This study finds that perceived enjoyment positively influences impulse buying behavior. Therefore, it is recommended that when designing websites or apps, system designers focus on features that would elicit a positive feeling and subsequently influence impulse buying [12]. Perceived interactivity and visual appeal should be prioritized when developing an E-wallet app.

The present work explains consumers' affective reactions (perceived enjoyment) and impulse buying when using E-wallets for payment transactions. Accessibility and responsiveness factors (perceived interactivity) are more concerned by more experienced E-wallet users (having more than two years of experience). In comparison, a pleasing design interface (visual appeal) is emphasized by less experienced E-wallet users (having one to two years of experience). This observation informs E-wallet system developers and designers to attract new users and, at the same time, retain existing users. Besides the significance of initial adopters, experienced/continued users play a vital role in companies generating consistent revenue [3]. Thus, businesses should offer mobile payment services, given that E-wallet users can experience enjoyment using the app, which compels impulse purchases.

7. Limitations and Recommendations

The findings of the present work are subject to limitations. Although all the proposed relationships are significant, the antecedents were only able to explain 11.6% and 20.2% of the variance of perceived enjoyment and impulse buying. Therefore, the research model can be extended by including more app characteristics factors in predicting impulsive buying behavior. Besides that, caution should be taken since affective state (i.e., perceived enjoyment) is a transient feeling [96], and thus, the practical implications may be limited. Therefore, other variables such as perceived usefulness or perceived ease of use may also be included in future studies.

Furthermore, as the collected samples were only up to 45 years old, thus, the results may not be feasible for generalization. Therefore, it would be useful to include the respondents with different age ranges to capture the overall perceptions of respondents above 45 years old. The scope of this work is limited to the Malaysian context because the survey was answered exclusively by Malaysian citizens. Specifically, samples from a greater diversity of nationalities can provide more comprehensive ideas about the individual's impulsive buying behavior while using digital E-wallets. With the widespread adaption of cashless payment methods, mobile payment has become extremely prevalent in either Western or Asian countries [10, 97–100]. Therefore, in future research, researchers may repeat the current research work and examine the impulsive behavior of mobile payment users from different countries to facilitate comparison between countries.

8. Conclusion and Future Outlook

As a final takeaway, the findings of this study show that both perceived interactivity and visual appeal remain the critical predictors (external stimuli) in stimulating the user's perceived enjoyment while using an E-wallet. Both predictors are expected to influence the users to make impulsive buying while using an E-wallet for a payment transaction, especially in the Malaysian context. Studies indicated that the design of the mobile payment system might be compatible with personal trait factors (i.e., personal innovativeness) [101]. In paving future directions within the E-wallet context, this study recommends that future researchers expand the research model by including the moderating effect of personal innovativeness in mobile payment. In addition, this study recommends examining the internal stimuli, for example, the perceived value of E-wallet users, while predicting impulsive buying behavior. The consumers' perceived value (i.e., hedonic and utilitarian value) is associated with their intention to use mobile payment services [64] and will ultimately influence their purchasing behavior [102]. Future research could include the perceived value to examine the consumer's personal experience and interaction [102] with mobile payment services. Also, contemporary research finds that Malaysian adults up to 45 years old will make impulse buying while using E-wallets for payment transactions. Therefore, researchers in developing countries might consider this age group as the research sample.

Data Availability

Data is available on request.

Conflicts of Interest

The authors report no conflict of interest.

Acknowledgments

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