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The Role of Personality Factors Influencing Consumer Video Game Engagement in Young Adults: A Study on Generic Games

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ABSTRACT This study aims to investigate the impact of personality dimensions on consumer videogame engagement. We distributed the study questionnaire to gamers aged 16-19 years and managed to get three-hundred-and-eighty valid respondents who provided data in the form of a self-report using HEXACO-100 items and consumer videogame engagement constructs. WarpPLS 7.0 version was employed and the impact of personality dimensions on consumer videogame engagement was assessed using Partial Least Squares Structural Equation Modeling (PLS-SEM). Our findings indicate that personality traits such as consciousness and extraversion impact consumer videogame engagement, whereas agreeableness, emotionality, openness-to-experience, and honesty-humility do not. Our study explores the utility of the HEXACO-100 item to assess the personality factors that can predict consumer videogame engagement. The article discusses the results and offers the practical and theoretical implications of our findings.

INDEX TERMS Personality factors, HEXACO personality model, consumer videogame engagement, PLS-SEM approach.

I. INTRODUCTION

The prominence of video games is increasing, and players are more actively involved with video games of different genres, including e.g. first-person shooters, real-time strategy, multi-player online battle arenas, role-playing, and massively multi-player online games [1]. With the increased intensity in video games playing, the market cap for worldwide consumer disbursement of video games has risen to nearly $140B in 2018. It is expected to exceed the $180B mark by the year 2021 [2]. The increase in the disbursement of video games is also due to the many relevant works of literature that point toward the benefits linked with playing videogames, including gains in visuospatial cognition, improvement in learning, fitness, and happiness [3]. Keeping these benefits in view, researchers have started paying attention to the consumer video game industry owing to its rapid advancements [4]. Gaming is increasingly common in adolescence years [5]. Previous studies have investigated a link between adolescents' game play and computer literacy [5]. It has been reported that an increase in time spent playing video games correlated with better scores on computer knowledge [5]

A significant part of the existing research shows the degree to which computer games apply constructive or destructive impacts in various conditions [6]. Videogame playing is considered as an activity that encourages collaboration, social activities, and cyber-communication [7]. The indulgence in video games has become a fundamental part of gamers' daily routine [8]. In particular, one of the key attributes of videogame playing is that it fosters individual engagement [9], [10]. An active area of research is uncovering the factors that lead to consumer engagement in video games [11]. Different approaches have been exercised to investigate consumer engagement (CE) in video games. Earlier, little attention was given to understanding personality traits on how consumers engage with video games [12].

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The term game engagement has been used to evaluate the emotional experience of video gameplay. Many studies have been conducted to understand the emotional experience. For example, in Brockmyer *et al.* [13] and Procci [14], the authors studied the engagement constructs absorption, flow, presence, and immersion. The engagement constructs in prior literature have also been attributed to concepts such as arousal [15], presence [15], enjoyment [16], user engagement, and game engagement [16]. In any case, these examinations have not considered the significance of behavioral aspects to gauge a player's engagement in videogame play [17]. Henceforth, in our investigation, we acknowledge this gap and conceptualize a framework where the consumer's engagement in videogames is an outcome of their personality traits.

According to Ul Islam, *et al.* [18], intra-player information sharing is one of the reasons for consumer video game engagement [19]. Information sharing illustrates an individual's yearning for social interaction. Likewise, many other aspects of an individual's personality can be investigated to better understand the factors triggering engagement with digital media applications. Exploring personality traits that influence consumer engagement can also allow creators to develop applications that appeal to unique individual beliefs and desires [18].

Studies have revealed that the personality type greatly influences video gaming behavior. For instance, extraversion, openness, agreeableness, and conscientiousness are negatively associated with pathological gaming, while neuroticism showing a positive correlation [19]. Given the fact that personality is an important aspect in influencing human-computer interaction in games [20], it makes sense to establish the users' personality traits in efforts to extend personalized games compelling engagement in consumer-game related connections. In previous studies, the "Big Five" personality traits have been extensively investigated to uncover the impact it has on online consumer engagement [18], [21]. This is subsequently followed up with more up to date studies being performed in online game settings [4], [19].

Prior studies also examined CE in video games that have been restricted to videogame addiction and scholastic achievements [22], playful consumption experience [4], the effect of consumer motivation to play video games [23], symptoms of stress, anxiety, and depression [24], violent game engagement and aggressive behavior [25], playing political games and engagement in politics [26], and playing educational games and dialogic engagement with peers on science subjects [27]. Recently, we have encountered a study in which the authors examined the role of personality traits on CE in esports. [28]. Our critical evaluation revealed that the authors applied the HEXACO-60 item's version to predict CE. Their research sample was based on esports users (who play competitive games such as CSGO, Dota 2 etc.) and conducted in Pakistani culture.

However, prior studies are still at their infancy to examine the predicting role of personality traits on CE, especially using the detailed version of the personality inventory model, i.e., HEXACO-100 items to measure the personality traits of general videogame consumers (who play any videogame genre) in the Malaysian context. Furthermore, our study is unique in that it applies the hierarchical component model technique to validate the multifaceted nature of the HEXACO personality model, particularly the HEXACO-100 items.

Therefore, it is of interest to investigate the personality factors influencing gamers to engage in videogame playing. Our research addresses this central gap by studying the predicting role of the personality trait model on Malaysian videogame players, i.e., the HEXACO personality model with a 100-items, comprising the dimensions honesty-humility, emotionality, extraversion, agreeableness, conscientiousness, and openness to experience, on consumer videogame engagement.

This study extends the knowledge of the HEXACO personality model, i.e., the HEXACO-100 items version in the Malaysian context to investigate the personality-based factors of videogame players as possible predictors of consumer videogame engagement. This study also contributes to gaming and personality studies by applying the hierarchical component model to assess the multifaceted nature of HEXACO-100 items scale and consumer videogame engagement. We then discuss various practical and theoretical implications, along-with future research directions. It is argued that understanding the relationships between human traits and multiple stakeholders, helps explaining the interplay of personality factors and consumer videogame engagement models. Our approach includes ideas from stakeholder theory [1], since we argue that game development companies benefit more by understanding the underlying behavioral traits of the main stakeholder group, namely, customers (also known as users/game players). This approach allows them to achieve both, financial and non-financial sustainability. According to the stakeholder theoretic framework, stakeholders, such as game developers, customers, governments, and communities must cooperate and harmonize their interests by eliminating or reducing trade-offs to maximize value creation for each other. The remainder of the article discusses the relevant literature and builds study hypotheses. Next, research methodology and analyses are explained. Finally, we elaborate on the theoretical and practical implications of the study.

II. LITERATURE REVIEW

Personality is an important factor for predicting human-computer related associations in games [20]. Overall, personality traits frequently predict individuals' value systems, desires, and motivations [29]. The personality trait theory proposes that every person acts in a certain way because of the personality attributes they possess [30]. Such personality traits can potentially derive consumer game engagement in the context of video games, and this is an important field to explore given the massive rise of video game popularity [21]. To date, numerous studies have investigated the impacts of the big five personality traits or five-factor model related to online consumer engagement [18], [19], [21]; however, little

research has been conducted on the impacts of HEXACO personality traits with video game engagement [31], [32].

The term, 'game engagement' has been used by previous studies as immersion, flow, presence, and absorption [13, 33]. In another study, Abbasi *et al.* [17] defines consumer video game engagement as: "*a psychological state that triggers due to two-way interactions between the consumer and videogame product, which generates a different level of consumer engagement states (cognitive, affective and behavioral)*". Game engagement can also be defined as a function of human motivation and psychological processes that influence the emotional, psychological, and physical well-being of gamers [6]. It broadly covers various aspects of human personality and how that interplays with entertainment technologies.

An individual's personality category is established by the likeliness of each trait dimension [34]. Similarly, the HEXACO model portrays how an individual is placed on the six personality-based typesets. Under this model, the six dimensions of personality are honesty-humility, openness to experience, conscientiousness, extraversion, agreeableness, and emotionality. An individual's readiness to accept change and the presence of explorative, imaginative, and artistic traits demonstrate that the individual houses a high openness to experience score [35]. Furthermore, an individual's propensity to focus on achievement, success, and accountability represents conscientiousness. Extraversion is one's tendency to be social and cooperative. Honesty- humility depicts qualities like sincerity, modesty, fairness, and greed avoidance. People who are anxious, sensitive, and require assistance from others are usually higher on the emotionality scale. Agreeableness depicts aspects like forgiveness, controlling of anger, and extending benefits to others—even though one is losing [36]...Brockmyer, *et al.* [13] explored different degrees of engagement in videogames and found that some video gamers experienced stream states, or deep flow states [13]. Engagement is the result of two-way interaction among personality types (subjects) and products or services (objects). It produces cognitive, affective, and behavioral engagement stages [37]. For instance, the study about personality, genre, video gameplay experience [38] suggested that people with high agreeableness, conscientiousness, and openness to experience are likely to enjoy the highest challenging aspects of gameplay. Consequently, personality types influence an individual's engagement level (more or less) with video gameplay.

III. HYPOTHESES DEVELOPMENT

A. HONESTY-HUMILITY

This dimension captures the extent to which an individual is honest, modest, greed avoidant, and sincere [36]. Individuals having high scores on this scale usually avoid directing or influencing others for their benefit and expresses respect for others. While at the lower end, such personalities manipulate others for personal benefit and are selfish [39]. More precisely, honest humility measures the degree of being fair and real with others, even at the expenditure of their pain [40].

In previous research, honesty-humility was being investigated as an exploratory purpose, but it did not show an association with gaming experiences [31]. On the other hand, Worth and Book [41] found that certain behaviors that could be seen as aggression, e.g. violence against the in-game avatars of other players, was negatively correlated with personality traits such as honesty-humility. This study provided support for previous research that explored the relationship between low honesty-humility traits with in-game actions that are categorized as aggressive. However, this was not the case in the study conducted by McCreery *et al.* [42] who failed to find a relationship between in-game behavior and real-life personality traits. Similarly, Johnson *et al.* [38] also found that aggression was not significantly related to Agreeableness. This means that in-game behavior may not necessarily relate to a set of real-life personality traits. However, the relationship between low honesty-humility is also related to the higher presentation of psychopathic traits, which may establish support for the paradigm that in-game behaviors reflect real-life personality demonstrations to a certain extent. Similarly, Peng *et al.* [43] also found that players who had an aggressive personality in real life were more prone to aggressive acts in gameplay. The other study found that individuals with lower levels of HH expect preferential treatment and may feel instigated or reactive more easily [44]. This may lead to greater instances of aggression, relating honesty-humility negatively with aggression.

Under this model, it can be inferred that players engage with games that involve behavior that resonate with real-life behaviors. Therefore, given the nature of the games under observation, honesty-humility may be negatively related to the players' inclination towards playing as they may feature behaviors that are not in line with their real-life behaviors. Thus, we hypothesize that:

H1: Honesty-humility has a negative association with consumer video game engagement.

B. EMOTIONALITY

Emotionality often depicts feelings of anxiety, sadness, worry, fearfulness, and stress [38]. It describes a person's depressive inclinations and the tendency to ask for emotional support from others [39]. Those personalities having a high score on this scale are likely to experience heightened nervousness and sentimentality [32]..Worth and Book [40] suggested that people who are more worried and dependent, typically engage more with video games. It could be because such activities allow them to avoid possible failure situations and criticisms from others. Besides, players with higher emotionality, typically prefer repeating different game levels—that minimizes their risks of receiving depressing comments from others [40]. Whereas, McGrath *et al.* [32] found that lower emotionality is positively linked with greater poker (gambling game) experience, which suggests that skillful players might be more emotionally calm at times of playing

a poker game. Some scholars recently proposed a concept, known as, ''loneliness theory'', meaning that an individual with high emotionality would frequently use the Internet to avoid being alone [45]. Since previous literature has also found that video games are used as a medium to form social connections and communities due to the formation of teams and prolonged and frequent playing behavior, it may be inferred that video games may also be used as an online medium to evade loneliness, as posited by the loneliness theory. Moreover, social engagement is an antecedent for increased engagement with video games [46]. Therefore, we hypothesize that:

H2: Emotionality has a positive association with consumer video game engagement.

C. EXTRAVERSION

Extraversion indicates the extent to which an individual is sociable, lively, talkative, enthusiastic, and deterministic [47]. Extraverted personalities are prone to engage more in online settings [48]. It also suggests that the personalities having high scores in extraversion, also tend to have more interpersonal connections, as they take pleasure in such actions. In video game settings, prior researches have also investigated the positive association of extraversion with video game engagement. Teng [47] revealed that students who are more energetic and have the capabilities to accept tough challenges could achieve more success in online games than their non-player counterparts. Similarly, a previous study about the HEXACO model of personality and video game preferences revealed a significant relationship of extraversion with survivor and daredevil game preferences [31]. Considering this relationship between preferences and extraversion as a personality trait, it can be inferred that that being extraverted in real-life may lead to increase gameplay and engagement, as the players have a medium to perform behaviors positively related to extraversion.

However, according to Wittek *et al.* [49], an insignificant association was examined between extraversion and video game addiction, mainly, with a sample of gamers playing World of Warcraft. This insignificant relationship is consistent with the literature [50]. Another study, titled, ''FFM traits as predictors of pathological gaming'' also revealed an insignificant relationship between extraversion trait and indulgence in pathological games [19]. However, Wittek *et al.* [49] studied a Norwegian sample that did not feature a high proportion of addicted gamers as compared to other studies. However, as extraversion is related to team-building and socializing behaviors, which are observed as key components of certain online multiplayer games, extraversion may prove to be an influencing factor for increasing engagement in gameplay [46]. Hence, we hypothesize that:

H3: Extraversion has a positive association with consumer video game engagement.

D. AGREEABLENESS

Agreeableness describes characteristics, such as acceptance, obedience, cooperativeness, flexibility, and forgiveness. Agreeable people are motivated to satisfy key needs connected with affiliation [48]. Agreeableness depicts a helpful emotion towards others that are related to openness and sociability [51].

In the literature, the agreeableness factor is considered as a significant forecaster of gambling severity in young adults [32]. Similarly, a study on personality, genre, and video gameplay experience reported that individuals with a high score on agreeableness are expected to account more for the intensity of competence and enjoyment, and minimum for annoyance [38]. However,..McCreery, *et al.* [42] have found no significant relationship between Agreeableness and corresponding behaviors, which may be a result of a limited number of behavior sets. Highly agreeable people showed concern for the gratification of others, and thus, would give importance for their dedications in online platforms particularly [51]. Since online game playing is a platform where teams play together, forming social bonds for long periods of gameplay, it can be inferred that high agreeability may lead to greater video game engagement. Similarly, as video games are seen as a source of enjoyment [52], being agreeable as a person may have a positive correlation with video game engagement. Therefore, we hypothesize that:

H4: Agreeableness has a positive association with consumer video game engagement.

E. CONSCIENTIOUSNESS

This trait measures the degree to which an individual is being careful, self-disciplined, accountable, and cautious [31]. Conscientiousness features are focused on accomplishments, successes, constituency, reliability, and tasks [48]. Such personalities perform well with several specialized teams, and with many occupation practice criteria [53]. Individuals having a higher score on this trait have well-built inspiration to seek out novel content [54], which facilitates expertise and improves upon capabilities. Conscientiousness is positively associated with gameplay experience, especially in the context of challenging games [38]. However, it is negatively correlated to ambitious, achievement-seeking behavior by [55] which is in contradiction to the exploration of this trait in real life behaviors by.Soto and John [56]. This may be a result of a limited set of measuring items of behavior in the study as such personalities are believed to be experts in conducting daily responsibilities and seek novel information with courage. These individuals are more likely to get accomplishments in video games, which in turn builds up their self-adequacy, and that as a result makes them continue playing video games [47]. This prolonged usage of games may lead to higher engagement as the game offers a medium to seek challenging tasks, team play, and accomplishments. Therefore, we hypothesize that:

H5: Conscientiousness has a positive association with consumer video game engagement

F. OPENNESS TO EXPERIENCE

Openness to experience is related to an individual's achievement. People with high openness to experience are described as being inventive, inquisitive, progressive, and smart. They are emphatic and can learn quickly, which encourages their dominance and enriching capabilities [47]. According to.Teng [47], personalities that score high on this scale tend to achieve more success in online games, and this improves their self-efficacy. As a result, it tends to keep these individuals engaged in video games. Furthermore, openness to experience is positively associated with immersion in the context of video games. For example, individuals who are more open to experience are expected to have their thoughts inspired by the game and are also engaged with the narrative and characters of the video games [38]. Such personalities tend to actively get engaged in game genres, such as shooting, action, and role-playing [12], [47].

However, some players engage in games despite being low in openness to experiences as they tend to stick with more conventional tasks, e.g., raiding. However, if they are high in this trait, they are more likely to engage in certain gameplay behaviors such as exploration [57]. Thus, it is reasonable to infer that people with high openness to experience tend to play more online video games. Therefore, we hypothesize that:

H6: Openness to experience has a positive association with consumer video game engagement.

A path diagram of the video game engagement model is shown in Figure 1, the observed variables in the figure are represented in rectangles, whereas latent variables are illustrated in ellipses. The straight lines with arrowheads on one end indicate a path that links predicting variables (HEXACO personality traits) towards the predicted variable (consumer videogame engagement.

IV. RESEARCH METHODOLOGY

Employing a cross-sectional survey, this study collected data from teenage students aged between 16-19 years, who were enrolled in various Malaysian universities having foundation courses. We selected these students as our survey respondents because digital game-playing is a prevalent activity among teenagers [58]. Moreover, Malaysia's gaming market keeps evolving and is currently one of the largest game markets within Southeast Asia. Malaysia has close to 13.6 million players and is projected to reach US$402 million by the year 2021 [59]. A significant portion of these players (25.1%) are below the age of 24 [59].

To assess the appropriate number of participants of the study, we performed a power analyzing employing the G∗Power 3.1.9.2 [60]. We used the F-test as the test family; the statistical test we selected was linear multiple regression: fixed model; the type of power analysis was a priori with the goal to compute required sample size, given $\alpha = 0.05$, power $= 0.95$, and effect size $= 0.15$; and number of predictors $= 6$. With the given input parameters, the suggested samples size was 139 [minimum required sample to perform partial least squares–structural equation modeling (PLS-SEM) analyses] with an actual power of 0.95.

We applied the multistage sampling technique that includes two basic steps such as listing and sampling [61]. We first shortlisted educational institutes within the two states of Malaysia, namely Perak and Selangor. At times of selection, we had nine institutions (e.g., University Putra Malaysia, International Islamic University Malaysia, etc.). We then utilized systemic sampling in each institute, administering our questionnaire to every 2nd on-going class. With permission from the class lecturer, we handed over the questionnaire in the final 10 minutes of an on-going class. For filtering, we first enquired whether the respondents play digital games. Only those who did were handed over the full questionnaire that comprised questions regarding personality dimensions and video game engagement. Following the multistage sampling technique, this study managed to collect 380 valid responses that were retained for further analysis, see Table 1 for demographic details. In this study, the average age of the participants is 18.684, followed by a standard deviation of 0.649. Hence, we conclude that the majority of respondents fall under the generation Z/late adolescence who are more prone to playing videogames [62].

Additionally, for videogame genre, gaming device, and location of videogame playing, we used multi-response coding whereby a participant can choose multiple response options depending upon his videogame consumption patterns. For instance, gamers mostly play an action game with an average of 65/100.

The study questionnaire is based on two main sections. Section one carries the demographic details of respondents concerning their consumption patterns. Whereas section two involves the main constructs such as consumer videogame engagement and the HEXACO personality model. The construct measuring consumer videogame engagement, included Cognitive Engagement (Conscious Attention, Absorption); Affective Engagement (Dedication, Enthusiasm); and Behavioral Engagement (Social Connection, Interaction). The items for these constructs were adopted from the following articles [17], [63]. The items assessing the HEXACO-100 items personality factors included Honesty-Humility (Sincerity, Fairness, Greed avoidance, Modesty); Emotionality (Fear, Anxiety, Dependence, Sentiment); Extraversion (Social Esteem, Social Boldness, Sociability, Live); Agreeableness (Forgiveness, Gentleness, Flexibility, Patience); Consciousness (Organization, Diligence, Perfect, Prudence); and Openness to Experience (Aesthetic Appreciation, Inquisitiveness, Creativeness, Unconventionality). These items were adopted from the following articles [36], [64], see Table 7 for detailed information on the scales.

In structural equation modeling (SEM), there are two main approaches comprising co-variance based (CB) SEM and variance-based (VB) or partial least squares (PLS) SEM [65]. CB-SEM is usually applied for common factor models and theory testing and whereas, PLS-SEM is utilized for exploratory and explanatory (where the focus

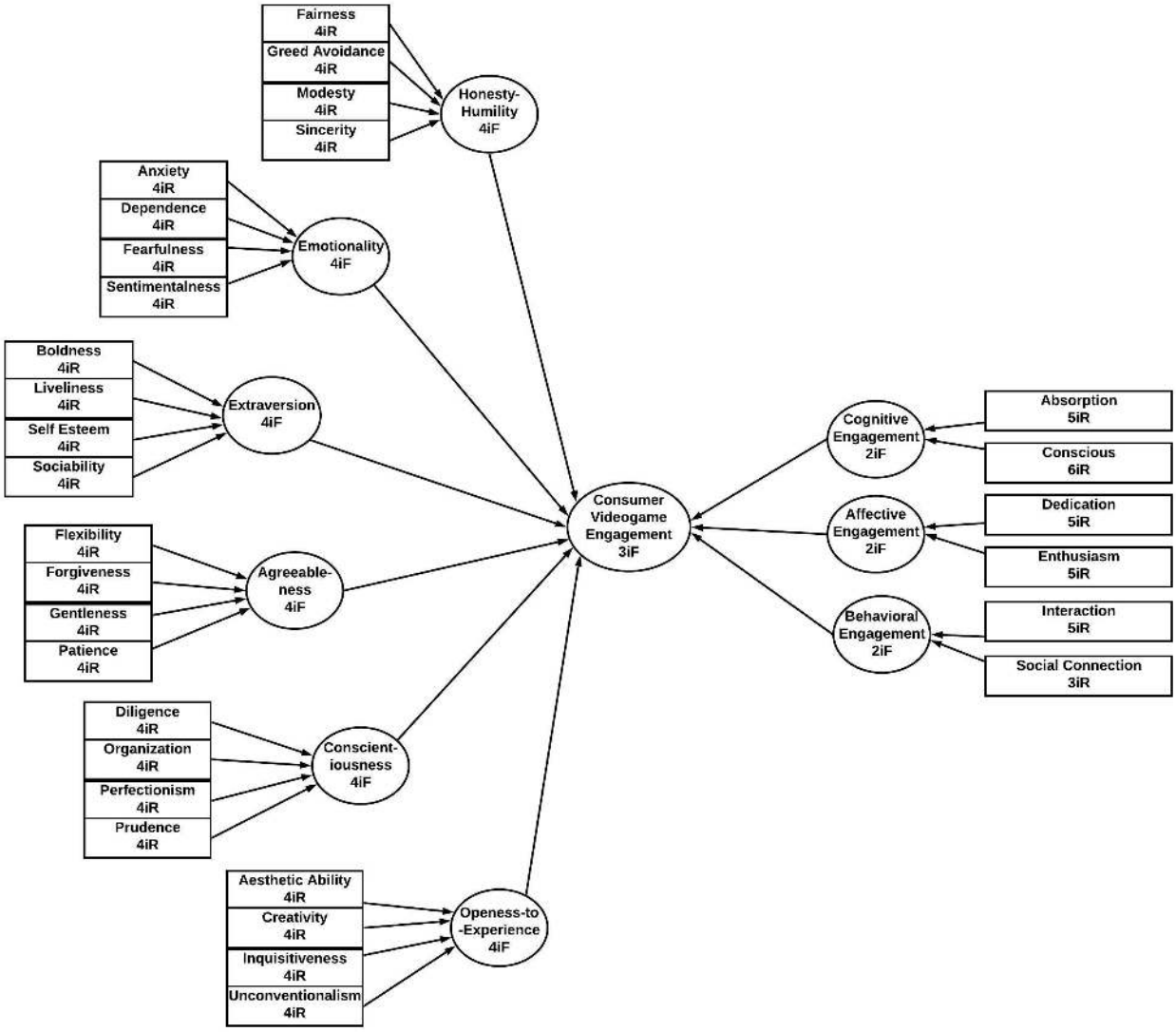

FIGURE 1. Summary of our research model. Note: In Figure 1, (R) refers to reflective/first-order constructs, (F) refers to formative measurement models (used at the second-order and third-order level for consumer videogame engagement construct) and i denote to indicators/items. Figure 1 illustrates that the hypotheses on domain level constructs (Honesty-Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness and Openness-to-experience) impact on Consumer Videogame Engagement.

is on prediction rather than covariance) studies, composite models, and complex models [63], [65]. More importantly, the PLS-SEM approach is favorable to accommodate reflective and composite-based models [66]. Considering the uses of both approaches, we consider the PLS-SEM as the most appropriate technique over CB-SEM for the study analyses because our study framework comprised 31 first-order reflective constructs and 129 items. Besides, the study model involved both reflective and composite/formative measurement models. Hence, PLS-SEM was employed to assess both the measurement and structural models as the framework is relatively complex, comprised of both reflective and composite constructs [65]. We applied the PLS-SEM approach using WarpPLS 7.0 [67]. We followed a two-step process, including the measurement and structural model assessment. For the measurement model evaluation, the reliability and validity measures were assessed. For the structural model, we examined the structural model that explains the relationships between the study constructs. Often concerns regarding Common Method Bias (CMB) can emerge when it comes to self-reported surveys. We adopted the following procedures to ensure we overcome CMB: (a) participants confidentiality and anonymity was maintained; (b) we pretested the questionnaire to address issues pertaining to unclear measurement items; (c) and finally we conducted pilot testing. Alongside these measures, we also adopted statistical procedures to avoid any additional limitations. We investigated the CMB through Harman's single factor [68] and Full Collinearity Variance Inflation Factors (FVIFs) [69]. We assessed the Harman's single factor applying the principal component factor analysis; the general factor accounted for 15% variance which is fairly below the critical value i.e. 50%. In addition,

TABLE 1. Demographic Information of the Respondents

Respondents Profile	Percentage %
Gender	
Male	60
Female	40
Age (Years)	
16	1
17-18	19
19	80
Ethnicity	
Malay	56
Chinese	36
Indian	8
Education	
Secondary School	8
Diploma	44
Undergraduate	48
Videogame Playing Frequency	
Everyday	36
Once a week	21
A few times a week	43
Average daily hours	
1-4 hrs/Daily	71
Above 4-8 hrs/Daily	25
Above 8-12 hrs/Daily	2
More than 12 hrs/Daily	2
Videogame genre (average calculated from 100)	
Action	65
Adventure	61
Arcade	33
Shooter	54
Role-Playing	43
Fighting	49
Strategy	58
Sports Game	39
Racing	50
Casual	22
Children' Entertainment	12
Family Entertainment	17
Flight	14
Other video games/Genre	7
Gaming device/Platform (average calculated from 100)	
Personal computer	79
Dedicated gaming console	30
Smartphone	69
Wireless device	21
Dedicated handheld device	9
Others	1
Location of videogame playing (average calculated from 100)	
Home	97
Friend's place	17
Cyber café	17
Others	5

we calculated the FVIFs for CMB, and the FVIFs of all the latent variables were below 3 (see Table 2).

V. RESULTS

Using the WarpPLS 7.0, we performed the PLS-SEM analyses in two stages comprising measurement and structural model assessment. To assess the measurement model, it is suggested that we should first specify the measurement models [70]. In this study, we specified consumer videogame engagement and the HEAXCO personality model as higher-order reflective-formative constructs, see Figure 1. HEXACO personality model comprised six domain-level/second-order formative constructs comprising honesty-humility, extraversion, agreeableness, conscientiousness, emotionality, and openness-to-experience. Each domain-level construct (e.g., honesty-humility) consists of four main facet-level/first-order reflective constructs such as sincerity, fairness, greed avoidance, and modesty. Extraversion is measured through four first-order reflective constructs, e.g., boldness, sociability, liveliness, and self-esteem. Emotionality at the domain-level is evaluated via four first-order reflective constructs involving anxiety, dependence, sentimental, and fearfulness. Conscientiousness at the domain-level is captured through four sub-dimensions (diligence, perfectionism, organization, and prudence) referred to as first-order reflective constructs. Agreeableness and openness-to-experience at domain-level constructs are also assessed through four first-order reflective constructs. Forgiveness, flexibility, patience, and gentleness are sub-dimensions of agreeableness. Whereas, aesthetic ability, creativity, unconventionality, and inquisitiveness are sub-variables of openness-to-experience, see Figure 1.

To ensure the reliability and validity of first-order reflective constructs, we tested the following criteria: 1) internal consistency using composite reliability (CR) due to the inherent limitations of the Cronbach's alpha, it is preferred to apply a different internal consistency reliability method, such as the composite reliability (>0.70) [71]; 2) outer loadings (should be at least 0.40 or greater); 3) convergent validity (AVE >0.50) and discriminant validity [72]. The results indicate that all constructs have achieved the threshold values as suggested (see Table 2). However, we deleted the items (HHfair3, Efear3, Eanxi1, Edep4, Esenti4, Xlive2, Corg2, and Cprudence3) from HEXACO 100-items due to poor outer loading, i.e., <0.40.

Table 3 illustrates the discriminant validity of reflective constructs. The diagonal values reported in the table represent the square root of the AVE of each construct. To reach discriminant validity [73], this value should be greater than its parallel correlation coefficients. In the table, all the diagonal values are greater than the off-diagonal values. These outcomes imply no concerns related to discriminant validity in the study (see Table 3).

To assess the second-order formative constructs and higher-order formative constructs i.e. consumer videogame engagement, a two-stage method was adopted [74]. To find the validity of the second-order formative construct,..Hair, *et al.* [75] recommends that VIF of all the items must be assessed, with a resulting value less than five, (or equal to 3.3 as suggested by..Kock [67]). Hair *et al.* [75] also emphasized that the construct's weight and significance level must be assessed. The value of the significance level must also be less than 0.05. Table 4 and Table 5 show that the p-value (level of significance) of indicator weights is

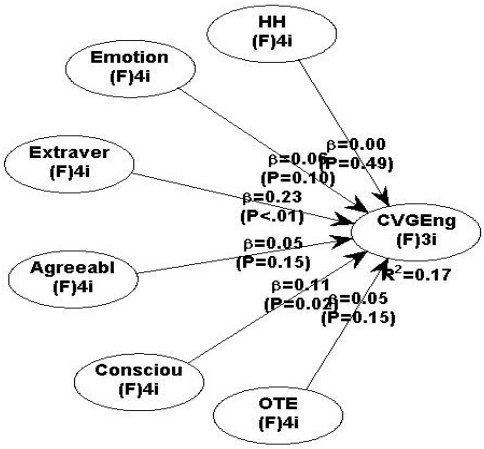

FIGURE 2. Model testing. Note: F represents a formative evaluation of higher-order formative constructs and i refers to indicators used to establish higher-order formative constructs.

associated with the designated constructs. VIF values also support the threshold criteria. Therefore, our second-order formative constructs and higher-order formative construct (consumer videogame engagement) are valid, and reliable for conducting further analyses (see Table 4 and 5).

We tested the study hypotheses using WarpPLS 7.0. Hypotheses were verified using the following checks such as P-value, T-value, Path co-efficient, and effect size..Cohen [76] recommended the references values of effect size, where 0.35 refers to large association, 0.15 to medium association, and 0.02 to a smaller one. Our results in Table 6 and Figure 2 show that personality traits such as extraversion and conscientiousness have successfully predicted consumer videogame engagement. Other personality traits such as honesty-humility, openness-to-experience, agreeableness, and emotionality failed to predict consumer videogame engagement.

VI. DISCUSSION

This study aimed to provide an insight into the HEXACO personality traits model and its impact on consumer video game engagement. The study results reported that personality traits such as honesty-humility, emotionality, agreeableness, and openness to experience of gamers have no significant effect on consumer videogame engagement. On the other hand, extraversion and conscientiousness exhibit significant associations with consumer video game engagement. From the first hypothesis, honesty-humility has insignificant impacts on consumer video game engagement. This finding is consistent with previous studies. For instance, a study revealed that individuals having low scores on the honesty- humility scale are associated with Player-vs-Player (PVP) style games [40]. Another study by.Andrus [39], also suggested, that low honesty-humility scores are associated with rule-breaking, manipulation, and self-gains. In this study, we collected data responses from Malaysia. In Malaysia, there is a culture of obedience towards parents, and a push for youth to seek education as part of their primary responsibility. These parents typically dissuade their children to engage with video games. As a result, children avoid playing video games. Our second hypothesis also shows an insignificant relationship between emotionality and consumer video game engagement. Previous studies also indicate an insignificant relationship between emotionality and daredevil preferences in video games [31]. Another study investigated the correlation between emotional stability and competence and suggested that less anxious and worried individuals are more likely to practice a sense of competence while playing video games [38]. Therefore, in general, individuals with high emotionality avoid playing video games due to the fear of receiving criticisms and hesitancy for crowds.

The third hypothesis showed a significant relation of extraversion with consumer video game engagement. Johnson, *et al.* [38] suggested that extraverts are more likely to enjoy challenging aspects of their preferred games. Individuals with high scorers on this scale preferred to play role-playing-style-games [39]. Lively and talkative people (also the characteristics of extraversion) are more likely to engage with video games for entertainment, pleasure, and social interaction purposes [77]. Our fourth hypothesis showed an insignificant relationship between agreeableness and consumer video game engagement. People having high scores on agreeableness are negatively correlated with a preference for playing evil characters [78]. Therefore, we suggest that people having such personalities use games to experience positive moral values due to their nature towards social cohesion and cooperation. In the fifth hypothesis, conscientiousness has a significant impact on consumer video game engagement. Prior studies also indicated a positive impact. For instance, a study about game preferences investigated that conscientious people tend to choose mastermind preferences and performances [31]. Furthermore, Zeigler-Hill and Monica [31] suggested that individuals with this trait prefer games that involve challenging tasks. From these results, we conclude that well organized, disciplined, and caring individuals prefer investing their time to pursue a professional career in playing video games.

Our last hypothesis shows an insignificant relation of openness to experience with consumer video game engagement. This finding is surprising and counter-intuitive because prior studies have shown openness to be positively associated with the frequency of social media use and video gameplay through mobile phone technology [79]. Since different forms of digital media such as social media platforms, different mobile applications, or games have become prevalent in society, we believe gaming companies do not offer novel products or services for young adults [80]. This particular trait has been difficult to replicate across cultures, and therefore, there is uncertainty about the validity of this specific dimension [81].

Previously, authors were limited to studying the personality traits in different settings such as personality differences between gamers vs. non-gamers [47], [82], [83], personality traits associated with motivations to play World of Warcraft game [55], subjective wellbeing [84], smartphone usage pat-

TABLE 2. Measurement Model: Evaluation of First-Order Reflective Constructs

Scale	Items	Loadings	CR	AVE	Full Collinearity (FVIF)
Conscious Attention	CAtt2	0.78	0.904	0.612	3.280
	CAtt3	0.79			
	CAtt4	0.87			
	CAtt5	0.81			
	CAtt6	0.77			
	CAtt7	0.66			
Absorption	Ab1	0.75	0.873	0.578	2.969
	Ab2	0.71			
	Ab3	0.80			
	Ab5	0.79			
	Ab6	0.75			
Dedication	Dedi2	0.82	0.866	0.569	3.544
	Dedi3	0.55			
	Dedi4	0.77			
	Dedi5	0.84			
	Dedi7	0.76			
Enthusiasm	En1	0.64	0.86	0.553	2.785
	En2	0.78			
	En3	0.79			
	En5	0.74			
	En6	0.76			
Social Connection	SC1	0.85	0.888	0.726	1.770
	SC2	0.87			
	SC3	0.84			
Interaction	Int1	0.81	0.892	0.623	2.778
	Int2	0.73			
	Int3	0.84			
	Int4	0.78			
	Int5	0.78			
HH-Sincerity	HHSin1R	0.79	0.818	0.531	1.529
	H.Hsin2	0.76			
	HHSin3R	0.65			
	H.Hsin4	0.71			
HH-Fair	HHfair1	0.81	0.849	0.652	1.427
	HHfair2	0.80			
	HHfair4	0.82			
HH-Greed Avoidance	HHGA1	0.41	0.818	0.544	1.206
	HHGA2R	0.83			
	HHGA3R	0.84			
	HHGA4R	0.79			

TABLE 2. *(Continued)* **Measurement Model: Evaluation of First-Order Reflective Constructs**

HH-Modesty	HHm1	0.66	0.805	0.509	1.703
	HHm2	0.73			
	HHm3R	0.70			
	HHm4R	0.76			
X-Social Esteem	XSe1	0.69	0.821	0.535	2.096
	XSe2	0.71			
	XSe3R	0.74			
	XSe4R	0.79			
X-Social Boldness	XSb1R	0.79	0.831	0.553	2.401
	XSb2	0.77			
	XSb3	0.76			
	XSb4R	0.65			
X-Sociability	Xsoc1R	0.64	0.82	0.534	1.841
	Xsoc2	0.79			
	Xsoc3	0.73			
	Xsoc4	0.75			
X-Live	Xlive1	0.55	0.795	0.573	2.714
	XLive3R	0.85			
	XLive4R	0.83			
E-Fear	EFear1	0.60	0.757	0.512	1.31
	EFear2R	0.76			
	EFear4R	0.77			
E-Anxiety	EAnxi2R	0.77	0.771	0.534	1.673
	EAnxi3R	0.81			
	EAnxi4	0.59			
E-Dependence	Edep1	0.80	0.761	0.524	1.333
	Edep2R	0.52			
	Edep3	0.82			
E-Sentiment	ESenti1	0.69	0.809	0.586	1.301
	ESenti2	0.81			
	ESenti3	0.79			
A-forgive	AF1	0.74	0.842	0.572	2.361
	AF2	0.73			
	AF3R	0.74			
	AF4R	0.81			
A-Gentle	AG1R	0.57	0.809	0.519	1.789
	AG2	0.71			
	AG3	0.76			
	AG4	0.82			
A-Flex	AFlex1R	0.69	0.833	0.56	2.582
	AFlex2	0.61			
	AFlex3R	0.81			
	AFlex4R	0.86			
A-Patience	AP1R	0.76	0.829	0.548	1.841

TABLE 2. *(Continued)* **Measurement Model: Evaluation of First-Order Reflective Constructs**

	AP2	0.76			
	AP3	0.69			
	AP4R	0.75			
C-Organization	COrg1	0.69	0.796	0.567	1.478
	COrg3R	0.83			
	COrg4R	0.73			
C-Diligence	CDelig1	0.72	0.801	0.501	2.154
	CDelig2	0.67			
	CDelig3	0.71			
	CDelig4	0.74			
C-Perfect	CPerf1	0.74	0.806	0.510	1.897
	CPerf2R	0.63			
	CPerf3	0.72			
	CPerf4	0.76			
C-Prudence	CPrud1R	0.84	0.819	0.602	1.436
	CPrud2R	0.76			
	CPrud4R	0.73			
OTE-Aesthetic Appreciation	OTEAA1R	0.80	0.828	0.547	1.842
	OTEAA2R	0.78			
	OTEAA3	0.67			
	OTEAA4	0.70			
OTE-Inquisitiveness	OTEIn1	0.73	0.849	0.584	2.182
	OTEIn2	0.77			
	OTEIn3R	0.77			
	OTEIn4R	0.79			
OTE-Creative	OTEcr1R	0.79	0.859	0.605	2.316
	OTEcr2	0.77			
	OTEcr3	0.76			
	OTEcr4R	0.79			
OTE-Unconventionality	OTEUC1R	0.71	0.851	0.590	1.995
	OTEUC2	0.81			
	OTEUC3	0.77			
	OTEUC4R	0.77			

Note: R refers to reverse coded items.

terns [85], videogame preferences [31], and personality and behavior in multiplayer games [41, 42]. Previous research has evidenced that there have been limited studies on personality factors as possible predictors of consumer videogame engagement. While reviewing the literature, we have only found a single study in 2020 that has recently considered personality dimensions as contributing factors towards consumer engagement in esports games [28]. In response to the recent study, we critically assessed the research and found that authors used the HEAXCO 60-items version to measure personality factors that cause players' engagement in esports settings and the research sample was based on Pakistani community. However, we extend the existing literature on personality traits in videogame studies through studying the impact of personality traits (using the HEXACO-100 items version) to predict consumer engagement in generic games.

TABLE 3. Discriminant Validity

	ConAtt	Absorp	Dedicat	Enthusi	SocialC	Interac	HHSin	HHFair	HHGAoi	HHm
ConAtt	0.780									
Absorp	0.670	0.760								
Dedicat	0.710	0.640	0.750							
Enthusi	0.640	0.640	0.670	0.740						
SocialC	0.480	0.440	0.430	0.400	0.850					
Interac	0.620	0.620	0.570	0.660	0.480	0.790				
HHSin	0.180	0.030	0.090	0.060	0.160	-0.040	0.730			
HHFair	0.060	0.020	0.140	0.090	0.090	-0.030	0.290	0.810		
HHGAoi	0.030	0.030	0.090	0.060	0.060	-0.060	0.160	0.230	0.740	
HHm	0.130	0.020	0.090	0.090	0.170	-0.020	0.430	0.340	0.230	0.710
	Efear	**Eanxi**	**Edep**	**Esenti**	**XsocE**	**XsocB**	**Xsoc**	**Xlive**	**AForg**	**AGent**
Efear	0.720									
Eanxi	0.190	0.730								
Edep	0.170	0.020	0.720							
Esenti	0.120	0.120	0.300	0.770						
XsocE	-0.020	0.350	0.060	0.020	0.730					
XsocB	-0.060	0.380	-0.030	-0.010	0.580	0.740				
Xsoc	0.000	0.270	0.130	0.150	0.370	0.410	0.730			
Xlive	0.080	0.440	-0.060	0.040	0.600	0.590	0.450	0.760		
AForg	-0.020	0.340	-0.060	0.030	0.480	0.490	0.430	0.560	0.760	
AGent	-0.070	0.280	-0.020	0.080	0.350	0.390	0.420	0.390	0.520	0.720
	Aflex	**Apatien**	**Corg**	**Cdelig**	**Cperf**	**Cprud**	**OTEAA**	**OTEIn**	**OTEcr**	**OTEuc**
Aflex	0.750									
Apatien	0.490	0.740								
Corg	0.290	0.250	0.750							
Cdelig	0.440	0.390	0.390	0.710						
Cperf	0.430	0.360	0.250	0.540	0.710					
Cprud	0.240	0.250	0.340	0.290	0.210	0.780				
OTEAA	0.430	0.310	0.200	0.330	0.360	0.200	0.740			
OTEIn	0.480	0.410	0.210	0.390	0.420	0.170	0.510	0.760		
OTEcr	0.380	0.420	0.210	0.410	0.410	0.230	0.450	0.500	0.780	
OTEuc	0.290	0.290	0.100	0.330	0.270	0.160	0.370	0.420	0.600	0.770

Note: Square roots of average variances extracted (AVEs) shown on diagonal.

Unlike previous study, we conduct the research in Malaysian culture to uncover the personality factors of young adults that influence their engagement in games. Besides, this study is the first to utilize the hierarchical component model approach in PLS-SEM as suggested bySarstedt, *et al.* [86] to construct higher-order constructs in both personality (i.e. HEXACO 100-items version) and videogame studies.

Other than theoretical contributions, we also believe that this research has significant practical implications. The synthesis of human behavioral traits and video game engagement provides useful directions for stakeholders in the industry. To list a few, these stakeholders include game development firms, individual players (varying in age and geographies), parents, governments, and communities. This concept is borrowed from the stakeholder theory, which is an organizational theory that promotes balancing or harmonizing the interests of various stakeholders, typically referred to as, suppliers, financiers, communities, employees, and customers for achieving commercial, as well as other non-commercial objectives [1]. According to Freeman, a stakeholder is: "any group or individual who can affect or is affected by the achievement of the organization's objectives." In particular,

TABLE 4. Evaluation of Formative Measurement Model on the Second-Order Constructs

Constructs	Items	Scale type	Weights	Significance	Full Collinearity	VIF
Cognitive Engagement		Formative			3.761	
	Conscious Attention		0.547	<0.001		1.820
	Absorption		0.547	<0.001		1.820
Affective Engagement		Formative			3.455	
	Dedication		0.548	<0.001		1.803
	Enthusiasm		0.548	<0.001		1.803
Behavioral Engagement		Formative			2.306	
	Social Connection		0.582	<0.001		1.295
	Interaction		0.582	<0.001		1.295
Honesty and Humility		Formative			1.292	
	Sincerity		0.386	<0.001		1.267
	Fairness		0.369	<0.001		1.189
	Greed avoidance		0.282	<0.001		1.088
	Modesty		0.417	<0.001		1.339
Emotionality		Formative			1.099	
	Fear		0.399	<0.001		1.068
	Anxiety		0.306	<0.001		1.049
	Dependence		0.456	<0.001		1.124
	Sentiment		0.468	<0.001		1.119
Extraversion		Formative			2.740	
	Social Esteem		0.324	<0.001		1.778
	Social Boldness		0.328	<0.001		1.793
	Sociability		0.269	<0.001		1.317
	Live		0.336	<0.001		1.902
Agreeableness		Formative			2.507	
	Forgiveness		0.331	<0.001		1.969
	Gentleness		0.296	<0.001		1.512
	Flexibility		0.316	<0.001		1.745
	Patience		0.305	<0.001		1.598
Consciousness		Formative			1.807	
	Organization		0.340	<0.001		1.266
	Diligence		0.401	<0.001		1.583
	Perfect		0.357	<0.001		1.414
	Prudence		0.300	<0.001		1.172
Openness to Experience		Formative			2.024	
	Aesthetic Appreciation		0.252	<0.001		1.530
	Inquisitiveness		0.272	<0.001		1.800
	Creativeness		0.280	<0.001		2.049
	Unconventionality		0.239	<0.001		1.642

Indicator weights and the significance level of the first-order constructs on the associated second-order constructs

TABLE 5. Evaluation of Formative Measurement Model on the Higher-Order Constructs

Constructs	Items	Scale type	Weights	Significance	Full Collinearity	VIF
Consumer Videogame Engagement		Formative			2.194	
	Cognitive Engagement		0.381	<0.001		3.021
	Affective Engagement		0.375	<0.001		2.800
	Behavioral Engagement		0.357	<0.001		2.023

Indicator weights and the significance level of the second-order constructs on the associated third-order/higher-order construct

TABLE 6. Structural Model Assessment

Hypothesis Testing	Path Coefficient	SE	f^2	T-value = Path Coefficient/S.E	P-value	Result
H1: Honesty-Humility → Consumer Videogame Engagement	0.001	0.051	0.000	0.019	0.495	Unsupported
H2: Emotionality → Consumer Videogame Engagement	0.065	0.051	0.015	1.274	0.101	Unsupported
H3: Extraversion → Consumer Videogame Engagement	0.227	0.050	0.087	4.54**	0.001	Supported
H4: Agreeableness → Consumer Videogame Engagement	0.053	0.051	0.019	1.039	0.053	Unsupported
H5: Conscientiousness → Consumer Videogame Engagement	0.107	0.051	0.035	2.098*	0.017	Supported
H6: Openness-to-experience → Consumer Videogame Engagement	0.053	0.051	0.016	1.039	0.147	Unsupported

**$p<0.001$

the notion of successful stakeholder-engagement has a role in creating further opportunities for game development companies. When such firms understand the underlying behaviors of their main stakeholder group, namely, customers (also referred to as game players), they achieve both, financial and non-financial sustainability. We anticipate, in the light of the results of this study, that a player provides more value to a particular game, which satisfies their interests better than others. Consequently, it enhances the ability of the firm to build strategic stakeholder relationships with the customer, which also fosters an environment of reciprocity and long-lasting engagements.

Our results (Figure 2) report that personality traits, such as extraversion and conscientiousness help considerably in predicting consumer videogame engagement. These traits can guide game developers to offer personalized products for users from different demographic backgrounds. We acknowledge that in certain cultures, there are specific personality traits that are more dominant. It is a common observation that companies, which offer products or services according to the needs of different cultures, eventually gain a larger market share. Take the example of Netflix video streaming service, which has a vast global presence. This service offers tailored content according to adhere to a country's local culture and consumer preferences. One reason for Netflix to outperform its competitors is the fact that they encourage partnerships among local content developers, which has proven to be a successful business model in countries like Canada, the USA, and India. In the gaming industry, this model of customization is not fully explored. In other related industries, such as e-commerce, there is a push for using Artificial Intelligence techniques to target relevant consumers based on their specific personality traits to further increase consumption. Prior literature on gamification, also highlights the importance of personalization of gamified systems according to end users' personalities. According to our findings, personality traits such as honesty-humility, openness-to-experience, agreeableness, and emotionality fail to predict consumer videogame engagement. This further supports our argument of the customization of videogames for cultures where populations depict specific types of personality traits. For instance, individuals with high emotionality typically avoid playing video games due to the fear of receiving criticisms. In this case, game development companies could benefit more by modifying game features and reverse users' hesitancy for crowds. This will enable companies to capture a wider user base. This will also help developers understand the characteristics that should be integrated into the development of products as well as the marketing mix. Considering this study found only a limited effect of certain personality traits, it may be more effective if the gaming industry emphasizes on extraversion and conscientiousness.

Moreover, the notion of behavioral stakeholder theory, which promotes an understanding of real behaviors of stakeholders [87], provides a promising future research direction for the videogame industry. For instance, technology firms belonging to different organizational life cycle stages, such as start-up, growth, mature, and declining, tackle their

TABLE 7. Consumer Videogame Engagement Scale (Higher-Order/Third-Order Level Formative Construct and Heaxco Personality Inventory Model (100-Items scale)

	CONSUMER VIDEOGAME ENGAGEMENT SCALE (Higher-Order/Third-Order Level Formative Construct)
	COGNITIVE ENGAGEMENT (Second-Level Formative Construct)
	Conscious Attention (First-order Level Reflective Construct)
1	I like to learn more about this video-game.
2	I notice information related to this video-game.
3	I pay a lot of attention to anything about this video-game.
4	I keep up with things related to this video-game.
5	Anything related to this video-game grabs my attention.
6	I concentrate on this video-game's story for a long time
	Absorption
1	When I am playing this video-game, I forget everything else around me.
2	Time flies when I am playing this video-game.
3	When I am playing this video-game, I get carried away.
4	When I am playing this video-game, I feel immersed.
5	I feel happy when I am playing this video-game intensely.
	AFFECTIVE ENGAGEMENT (Second-Level Formative Construct)
	Dedication (First-order Level Reflective Construct)
1	This video-game inspires me.
2	I am enthusiastic about playing this video-game.
3	I am proud of playing this video-game.
4	I find this video-game full of meaning and purpose.
5	I am excited when playing this video-game.
	Enthusiasm
1	I spend a lot of my discretionary time playing this video-game.
2	I am heavily into playing this video-game.
3	I am passionate about playing this video-game.
4	I enjoy spending time playing this video-game.
5	I try to fit playing this video-game into my schedule.
	BEHAVIORAL ENGAGEMENT (Second-Level Formative Construct)
	Social Connection (First-order Level Reflective Construct)
1	I love playing this video-game with my friends.
2	I enjoy playing this video-game more when I am with others.
3	Playing this video-game is more fun when other people around me play it too.
	Interaction
1	In general, I like to get involved in the discussions about this video-game playing.
2	I am someone who enjoys playing this video-game with other like-minded video-game players.
3	I am someone who likes actively participating in the discussions about this video-game playing.
4	In general, I thoroughly enjoy exchanging ideas on this video-game with other video-game players.
5	I often participate in activities relating to this video-game.
	HEAXCO PERSONALITY INVENTORY MODEL (100-Items SCALE)
	HONESTY AND HUMILITY (Domain-Level/Second-order Formative Construct)
	SINCERITY (Facet-Level/First-order Reflective Construct)
1	If I want something from a person I dislike, I will act very nicely toward that person to get it.
2	I wouldn't use flattery to get a raise or promotion at work, even if I thought it would succeed.
3	If I want something from someone, I will laugh at that person's worst jokes.
4	I wouldn't pretend to like someone just to get that person to do favors for me.
	FAIRNESS
1	If I knew that I could never get caught, I would be willing to steal a million dollars.
2	I would be tempted to buy stolen property if I were financially tight.
4	I would be tempted to use counterfeit money if I were sure I could get away with it.
	GREED AVOIDANCE
1	Having a lot of money is not especially important to me.
2	I would like to live in a very expensive, high-class neighborhood.
3	I would like to be seen driving around in a very expensive car.
4	I would get a lot of pleasure from owning expensive luxury goods.
	MODESTY
1	I am an ordinary person who is no better than others.
2	I wouldn't want people to treat me as though I were superior to them.
3	I think that I am entitled to more respect than the average person is.
4	I want people to know that I am an important person of high status.
	EMOTIONALITY (Domain-Level/Second-order Formative Construct)
	FEARFULNESS (Facet-Level/First-order Reflective Construct)
1	I would feel afraid if I had to travel in bad weather conditions.
2	I don't mind doing jobs that involve dangerous work.
4	Even in an emergency, I wouldn't feel like panicking.
	ANXIETY
2	I worry a lot less than most people do.
3	I rarely, if ever, have trouble sleeping due to stress or anxiety.
4	I get very anxious when waiting to hear about an important decision.
	DEPENDENCE
1	When I suffer from a painful experience, I need someone to make me feel comfortable.
2	I can handle difficult situations without needing emotional support from anyone else.
3	Whenever I feel worried about something, I want to share my concern with another person.
	SENTIMENTALITY
1	I feel like crying when I see other people crying.
2	When someone I know well is unhappy, I can almost feel that person's pain myself.
3	I feel strong emotions when someone close to me is going away for a long time.
	EXTRAVERSION (Domain-Level/Second-order Formative Construct)
	SOCIAL SELF-ESTEEM (Facet-Level/First-order Reflective Construct)
1	I feel reasonably satisfied with myself overall.
2	I think that most people like some aspects of my personality.
3	I feel that I am an unpopular person.
4	I sometimes feel that I am a worthless person.
	SOCIAL BOLDNESS
1	I rarely express my opinions in group meetings.
2	In social situations, I'm usually the one who makes the first move.
3	When I'm in a group of people, I'm often the one who speaks on behalf of the group.
4	I tend to feel quite self-conscious when speaking in front of a group of people.

TABLE 7. *(Continued)* **Consumer Videogame Engagement Scale (Higher-Order/Third-Order Level Formative Construct and Heaxco Personality Inventory Model (100-Items scale)**

	SOCIABILITY
1	I avoid making "small talk" with people.
2	I enjoy having lots of people around to talk with.
3	I prefer jobs that involve active social interaction with those that involve working alone.
4	The first thing that I always do in a new place is to make friends.
	LIVELINESS
1	I am energetic nearly all the time.
3	People often tell me that I should try to cheer up.
4	Most people are more upbeat and dynamic than I generally am.
	AGREEABLENESS (Domain-Level/Second-order Formative Construct)
	FORGIVENESS (Facet-Level/First-order Reflective Construct)
1	I rarely hold a grudge, even against people who have badly wronged me.
2	My attitude toward people who have treated me badly is "forgive and forget".
3	If someone has cheated me once, I will always feel suspicious of that person.
4	I find it hard to fully forgive someone who has done something means to me.
	GENTLENESS
1	People sometimes tell me that I am too critical of others.
2	I generally accept people's faults without complaining about them.
3	I tend to be lenient in judging other people.
4	Even when people make a lot of mistakes, I rarely say anything negative.
	FLEXIBILITY
1	People sometimes tell me that I'm too stubborn.
2	I am usually quite flexible in my opinions when people disagree with me.
3	When people tell me that I'm wrong, my first reaction is to argue with them.
4	I find it hard to compromise with people when I think I'm right.
	PATIENCE
1	People think of me as someone who has a quick temper.
2	I rarely feel anger, even when people treat me quite badly.
3	Most people tend to get angry more quickly than I do.
4	I find it hard to keep my temper when people insult me.
	CONSCIENTIOUSNESS (Domain-Level/Second-order Formative Construct)
	ORGANIZATION (Facet-Level/First-order Reflective Construct)
1	I clean my classroom or home quite frequently.
3	People often joke with me about the messiness of my room or desk.
4	When working, I sometimes have difficulties due to being disorganized.
	DILIGENCE
1	When working, I often set ambitious goals for myself.
2	I often push myself very hard when trying to achieve a goal.
3	Often when I set a goal, I end up quitting without having reached it.
4	I do only the minimum amount of work needed to get by.
	PERFECTIONISM
1	I often check my work over repeatedly to find any mistakes.
2	When working on something, I don't pay much attention to small details.
3	I always try to be accurate in my work, even at the expense of time.
4	People often call me a perfectionist.
	PRUDENCE
1	I make decisions based on the feeling of the moment rather than on careful thought.
2	I make a lot of mistakes because I don't think before I act.
4	I prefer to do whatever comes to mind, rather than stick to a plan.
	OPENNESS TO EXPERIENCE (Domain-Level/Second-order Formative Construct)
	AESTHETIC APPRECIATION (Facet-Level/First-order Reflective Construct)
1	I would be quite bored by a visit to an art gallery.
2	I wouldn't spend my time reading a book of poetry.
3	If I had the opportunity, I would like to attend a classical music concert.
4	Sometimes I like to just watch the wind as it blows through the trees.
	INQUISITIVENESS
1	I'm interested in learning about the history and politics of other countries.
2	I enjoy looking at maps of different places.
3	I would be very bored with a book about the history of science and technology.
4	I've never really enjoyed looking through an encyclopedia.
	CREATIVITY
1	I would like a job that requires following a routine rather than being creative.
2	I would enjoy creating a work of art, such as a novel, a song, or a painting.
3	People have often told me that I have a good imagination.
4	I don't think of myself as an artistic or creative type.
	UNCONVENTIONAL VIEW
1	I think that paying attention to radical ideas is a waste of time.
2	I like people who have unconventional views.
3	I think of myself as a somewhat eccentric person.
4	I find it boring to discuss philosophy.

Note: The missing numbering represents the deleted items due to poor loading

challenges differently [88]. It is because they deal with different stakeholders for achieving their objectives. Therefore, we suggest that knowledge about the relationships between human traits and multiple stakeholders (beyond consumers), could better predict and explain the interplay of personality factors and consumer videogame engagement. Despite having practical and theoretical implications, we also highlight the important limitations of our study for further research. First, we sampled the general videogame consumers who play any genre of games to examine gamers' personality traits and their influence on consumer videogame engagement. However, more studies are required on the users of a specific genre

of videogame that can predict personality traits based on the game, which in turn determines their level of engagement. Second, we utilized the scale of the HEXACO-100 item to assess gamers' personality traits and future study may adopt HEXACO-60 items or HEXACO-24 items as these are short scales and will take less time to complete the survey. Thirdly, we predicted the personality factors that influence consumer videogame engagement, but another study is required that can investigate the impact of consumer videogame engagement in a specific genre of the videogame to determine the gamers' personality traits. Fourthly, the study was conducted in Malaysia and more studies are needed to cross-validate in different cultures and countries. Fifth, consumers from different age groups play video game, however, the current study is limited to late adolescence years, ranging from age 16 – 19. Future studies should actively seek to investigate the effect of personality dimensions on consumer videogame engagement where consumer age groups are not limited to a certain age bracket. Future studies may also replicate the study via sampling the generation Y/Millennial () [89] to identify their personality traits/profiles influencing consumer videogame engagement and compare the results. Sixth, we applied the SEM approach, i.e., PLS-SEM to test the study hypotheses. Future research may apply other data analysis tools such as ANOVA or Kruskall-Wallis to study that to what extent personality traits correlate with the frequency and average hours spent on playing videogames. Besides, ANOVA can be applied to examine that to what extend game genre correlate with consumer videogame engagement levels comprising cognitive, affective, and behavioral engagement. Lastly, another limitation is the lack of emphasis on gamer roles and game genre influencing consumer video game engagement, and personality factors [90]. Future studies can investigate how player roles, such as killers, achievers, socializers, and explorers, influence consumer video game engagement and gamer personality.

APPENDIX A
STUDY QUESTIONNAIRE

See Table 7.

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