An Antecedent Study of Mobile Social Game Addiction vs. Virtual Goods Purchase: A Gen Y Gamer’s Perspective

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ABSTRACT

This study aims to investigate how cognitive antecedents impact social game addiction and virtual properties purchase among Generation Y players in Malaysia. Using a quantitative method with 341 Generation Y gamers analysed via structural equation modeling through a two-step analysis approach, the results demonstrate that social game addiction is influenced by enjoyment, play intensity, and self-control. The purchase intention of virtual goods is affected by flexibility and play intensity. However, social game addiction has no impact on a gamer’s intentional purchase of virtual items. A player’s income level interacts with the relationship between flexibility and likelihood of virtual property purchase, which could be insightful for gaming publishers and vendors.

KEYWORDS

Flexibility, Income, Purchase Intention of Virtual Goods, Self-Control, Social Game Addiction

INTRODUCTION

Online Social Network Services (SNSs) embedded with networking technologies are designed to satisfy a player’s needs for virtual entertainment, diversion, as well as relaxation, and have increased in popularity in recent years (Gupta, 2018). This shift has led to fierce competition and new challenges to the existing business models of gaming publishers (Wei & Lu, 2014). Nowadays, most network social games are free to play for gamers, thus sales of virtual game goods or properties, such as extra lives, avatar outfits, powerful arms and tools have become one of the main revenue streams for game publishers (Hamari, 2015; Bortko et al; 2019). The logical argument is that, notwithstanding the ethical considerations, the more addicted the players are to a particular game, the more likely they are to make virtual purchases to progress and therefore generate revenue for game publishers.
However, the actual circumstance may not be as similar to the assumed situation, especially with
Malaysian Gen-Y gamers’ current financial literacy. Previous research has primarily examined online
social games played on personal computers (Domahid et al; 2018), application design (Wu et al; 2018),
game usability (Choi & Kim, 2018) or technical aspects of information technology (IT) and
information systems (IS) (Huang et al, 2019), but overlooked the cognitive perspectives of game
playing, convenient value of time-saving, varying locations and always-connected nature of mobile
devices. As a result of this research, new insights may emerge with an examination of relations among
affective antecedents in the context of mobile social games.

LITERATURE REVIEW

Online Gaming

Multiplayer Online Games (MMOGs) has attracted a large number of players by offering users the
ability to interact concurrently within for example, a science fiction world full of genre-based fantasy,
such as World of Warcraft and Lineage (Song & Lee, 2007; Huang et al; 2019). MMOG’s are usually
categorized by anonymity, media richness, real-time interaction and a lack of boundaries. Unique
features and updated new game content making the challenges seem endless (Shen & Williams,
2011; Wu et al; 2018).

Similarly, Social Network Games (SNGs) with applications integrated into social networking
platforms are also becoming popular (Domahidi et al; 2018), including games, such as MyPlace,
Clash of Clans, Farmville or games embedded in social networks (i.e. Facebook). Normally SNGs
players are friends, families or co-workers with its emphasis on social interaction and content sharing,
such as game achievements and virtual status, rather than hardcore competition (Paavilainen et al;
2017). However, interaction is not the main distinction between MMOGs and SNGs as the interaction
could occur both within the games and on social networks as well. The majority of SNG’s players are
playing with users in their existing friendship networks, while MMOGs users can play with anyone
within or outside their offline networks (Bergstrom, 2019). With an anonymous identity in the form
of avatars, nicknames or icons, players’ true identities are not revealed. This anonymity may lead the
players to feel more goal-oriented and excited in playing against strangers or any gamer from their
social networks. It perhaps contributes to higher level of addiction to the game due to the competitive
aspect of the engagement.

Compared to SNGs, Mobile Social Games (MSGs) has made mobile games a more popular
choice for leisure activities as it removes the need for larger gaming platforms and allows for shorter
entertainment time periods (Baabdullah, 2018). The distinction made between the three types of game
is summarized in Figure 1. The spread of 4G and 5G services has helped mobile gaming to reach new
levels of user experience, which maximizes the value of convenience and flexibility of play. Given
these changes, MSGs could perhaps be seen as casual rather than hardcore gaming. This particular
platform has easy learning curves, lower entry barriers, play on-the-go and always-connected mobile
features; they are much more accessible and convenient than other gaming platforms (Ha et al; 2007;
Paavilainen et al; 2017). With a mobile device, MSGs blend gaming with mobile content sharing,
which allows players to view and share game-related content (Goh et al; 2017), such as game rewards,
achievement status, photos, text or other multimedia.

Game Addiction

The fast development of high-speed mobile data services combined with an individual’s freedom of
mobility has created an environment for mobile gamers to commit themselves more to gaming, thus
increasing the possibility of becoming addicted. According to the literature, social game addiction is
found on three main disciplines, the first perspective is based on the IT and IS perspectives by
adopting the Technology Acceptance Model (TAM). Scholars use TAM to predict gamer’s acceptance,
loyalty and continuance to playing social games (CC. Wang & CH. Wang, 2008; Huang et al; 2019).

However, acceptance or perceived usefulness might not be the most accurate determinates of game addiction. Users’ cognitive perception and subsequent behavior cannot simply be explained by technological innovations, such as unique game features and/or friendly website interfaces. Gamer’s subjective norms or attitudes towards virtual properties could be neglected by just employing TAM.

The second perspective links to psychological and pathological studies focusing on the negative consequences of game addiction (Lu & Wang 2008; Jin et al; 2017). In contrast to substance addictions, such as to nicotine or caffeine, gaming addiction is also called ‘technological addiction’ (Griffiths, 2018). A total of seven dimensions of MMOG technological addiction were presented in Figure 2. It is considered psychological dependence or a kind of behavioral addiction to online games (Lee et al; 2019). Although adolescents were always the main targeted demographic group of game addiction in

Figure 2. Seven Dimensions of MMOG Game Addiction

| Dimensions      | Definitions                                                                                                                                 |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Saliences       | MMOG use becomes the most important activity in the gamer’s life and dominates the gamer’s thinking (i.e., Cognitive Saliences) and behavior (i.e., Behavioral Saliences). |
| Mood Modification | Subjective experiences derived from playing MMOG, consisting of both an arousing “buzz” or “high” (i.e., Mood Enhancement) and a tranquilizing feeling of “escape” or “numbing” (i.e. Emotional Relief). |
| Tolerance       | Increasing amounts of gaming are required to achieve the former experience. Gamers gradually build up the amount of time spent playing MMOG.          |
| Withdrawal      | The unpleasant feeling states, emotions, and/or physical effects (i.e. moodiness, irritability, or shakes) that occur when MMOG use is discontinued or suddenly reduced. |
| Conflicts       | Conflicts result from excessive MMOG use, such as missing real-life social engagements (i.e. Interpersonal Problems), missing work or classes (i.e. Professional and Academic Problems), and personal problems that the gamer experiences within themselves, such as physical illness. |
| Relapse         | The tendency to revert to earlier patterns of excessive MMOG use after periods of abstinence or control.                                        |
| Loss of Control | The inability to limit the time or resources given to MMOG use, even when a decision appears to have previously been made to do so.                |

Source: Griffiths (2010); Lemmens et al. (2009); & Lee et al. (2012, p.10).
previous studies (Hur, 2006; Choi et al; 2018), today’s dominant players are not necessarily confined to this age group. Furthermore, the psychological needs and research implications in pathological field might not be easily generalized into commercial gaming industries (Lee et al; 2012; Tseng et al; 2018).

The third perspective of game addiction focuses on flow experience. Csikszentmihalyi (2018, p.178) defined flow as “…the holistic experience that people feel when they act with total involvement…” and is argued to have an influence on user’s satisfaction with social games (Liu et al, 2018). People in the state of flow are more likely to become absorbed in their activities with relatively narrow awareness or less self-consciousness and more involvement in their environment. Such concept has been applied in a wide range of studies including E-Commerce, online games (Sanjamsai & Phukao, 2018; Rho et al; 2018), IT/IS (Lee et al; 2012), social networking (Chen & Lin, 2018) and has been prompted by Huang et al (2019) to propose a framework to predict player’s loyalty towards online games. The flow concept consists of four components: control, attention, curiosity and intrinsic interest. It has been considered as a critical antecedent to understand online gamer’s behavior. However, previous investigations of flow theory are discussed in tandem with Technology Acceptance Model TAM (Matute-Vallejo & Melero, 2019), clustered on website usefulness and ease of use (Bilghihan, 2016), or Telepresence (Pelet et al; 2017), with discussion of technological innovation arguably not a medium to comprehensively explain the gamer’s cognitive perception or game-related behaviors.

Self-Control

As a gamer becomes more engaged with the online gaming environment, they could lose a degree of perspective and self-control, unable to resist or change one’s inner responses and behavioral tendencies and refrain from acting upon them (Baumeister & Vohs, 2018; De Ridder & Lensvelt-Mulders, 2018). An individual’s ability for self-control has implications for perceived behavior control (PBC) and the theory of planned behavior (TPB). PBC represents the perception of psychological control rather than actual control (Ajzen, 2015). Both PBC and TPB can be employed to explain the player’s purchase intention and game addiction. Because any significant event that occurred or is experienced while playing has the ability to influence the gamer’s emotions and cognitive self-efficacy. The literature on the relationship between self-control and game addiction indicates that players are unlikely to become addicted to a game if they feel in control of that game (Kim et al; 2008). Although some studies concluded that impaired self-control was a significant risk factor for a broad range of addictive behaviors, most of this research was conducted in the context of psychological or medical studies (Ferrari et al; 2017). For social gaming, it might be unnecessary to follow the default direction set previously in Ajzen’s TPB model (2015), such as perceived control impacts on intention, then intention further influences individual behavior. Actually, perceived control might directly impact on individual action and their intentional behavior. PBC is specific to an action and its level may vary depending on the situation or engagement. Therefore, self-control could simultaneously affect game addiction and gamer’s intentional purchase of virtual properties:

**H3**: Self-control is negatively associated with social game addiction.

**Purchase Intention of Virtual Goods**

Given games are now usually free to play, the role of in-game purchasing has risen in prominence. Virtual goods or properties refers to digital in-game objects which are only usable or have value within the game environment, including extra lives, energy refills, currencies, premium memberships, clothes for an avatar, more powerful weapons, additional gems or tools (Hamari & Lehdonvirta, 2010). Many players are interested to purchase and consume virtual goods in order to maintain their game momentum or enhance the capabilities of their in-game characters (Shukla & Drennan, 2018; Lee et al; 2018). Virtual item consumption is about building identity, experiences, and status similar to real-life consumption habits (Ravoniarison & Benito; 2019). The more the players play the
game, the higher the fees required and the more likely and frequently that they will spend more on acquiring advanced virtual properties. Lehdonvirta (2009) identified three classes of purchase drivers of virtual items, namely functional drivers (game performance & advanced characters), hedonic drivers (aesthetic appeal) and social drivers (visual appearance & rare collectibles). Regardless of which class the gamers are categorized as, the probability of virtual item purchase increases as they become more addictive to the game and/or losing a degree of self-control.

**H6:** Social game addiction positively influences the purchase intention of virtual goods.

**H8:** Self-control is negatively associated with the purchase intention of virtual goods.

**Flexibility**

The terms flexibility and mobility have been used interchangeably to indicate the ability of gamers to play anywhere, anytime and while on-the-go (Ha et al; 2007) as a means to occupy their spare time or for the purpose of relaxation (Goh et al, 2012; Hsiao & Chen, 2006). Any communication exchange or content sharing could derive perceived entertainment value from its ability to fulfill the audience’s (i.e. gamer’s) needs for escapism, diversion or emotional release (McQuail & Windahl, 2015). Players may psychologically perceive that they are flexible and describe mobile social gaming as an enjoyable and casual way to fulfill time. However, having less time and limited flexibility does not mean less perceived enjoyment and gratification nor does it necessarily mean less intention to play mobile social games (Wei and Lu, 2014), rather less flexibility could just mean the games are not necessarily played anywhere or anytime. This research will investigate the role of flexibility and the role it plays in a gamer’s relationship with social gaming and the intention to purchase virtual goods:

**H5:** Flexibility is positively associated with intentional virtual goods purchase.

**Use and Gratification Approach and Perceived Enjoyment**

The relationship between use and addiction is arguably premised on gratification, if an individual’s gratification is fulfilled to meet specific needs, they are more likely to repeat the enjoyable experience (Bryant & Miron, 2004), with enjoyment being a player’s intrinsic motivation to participate in playing games (Kim et al; 2018). Previous studies have found that perceived enjoyment significantly influence the gamer’s participation and loyalty towards online games (Huang et al, 2019). However, enjoyment of games may not always be sufficient to motivate users continually playing games, because the enjoyment of most games is only temporary (Song & Lee, 2007; Aleem et al; 2018). Furthermore, with the freemium business model (most social games are free to play) or low switching costs, players often try new online games even though they enjoy the games being played (Teng, 2018). Gamers might be addicted to social games, but not necessarily loyal to certain specific games. Thus this study emphasizes on game addiction rather than game loyalty:

**H1:** Perceived enjoyment positively impact on social game addiction.

It is logical to believe that users play games for fun, which could positively influence their purchase intention of virtual items. However, the relationship between perceived enjoyment and purchase intention of virtual goods is arguably more complex. In the freemium business model context, there is the argument around purchasable content that negatively skews a player’s immersive experience and encourages unfair competition among gamers (Hsieh & Tseng, 2018; Ravoniarison & Benito, 2019) where players “are buying [their] way to the top of the leaderboard with no gaming skill required…” (Rigney, 2012 as cited in Hamari, 2015, p.14). Using this argument, the purchase intention of virtual goods could be negatively influenced by perceived enjoyment where social game
publishers may create artificial obstacles or gaps, which can only be filled with the purchase of virtual items, a discussion which will be investigated in this research:

**H7:** Perceived enjoyment has a significant effect on the purchase intention of virtual goods.

**Play Intensity**

As an individual becomes more addicted, the level of engagement and intensity with the game will increase (Puerta-Cortés et al.; 2017). Most studies measure the play intensity by looking at the number of hours spent per week/day on game playing. The average American adult (aged 18 and above) spends nearly 70 hours per month on social games or network apps (Hwong, 2016), a figure over and above the amount of time spent on any other activities. Games with low play intensity are normally considered as a form of relaxation for players, rather than hardcore competitive interaction; whereas games with high play intensity are normally goal motivating and task performance-oriented. Huang et al. (2017) found that MSGs gamers play intensively and spend an average of 22 hours per week engaged in gaming, which could result in them detaching themselves from the real world and becoming more fully integrated into the game, purchasing virtual goods and relating more to virtual than real relationships.

**H2:** Play intensity is positively related to social game addiction.

**H4:** Play intensity is positively associated with the purchase intention of virtual properties.

**Generation Y and Income**

Generation Y (Gen Y) consumers can be defined as eco boomers and millionaires born between 1978 and 1994 (Muda et al.; 2016). In Malaysia, Gen Y accounted for 13.44 million people in 2018 which is 42% of Malaysia’s population (Department of Statistics Malaysia, 2018). The most significant characteristics of Gen Y is that they are technology-savvy (Wiedmer, 2015), able to easily adapt to mobile activities and virtual interaction (Kumar & Lim 2008) and have a ‘buy-now-pay-later’ (Zainudin et al.; 2019) impulsive purchasing mindset, which has consequences for the accumulation of debt. Currently, many of Gen Y consumers live beyond their means and are trapped in emotional spending, despite the majority having received a formal financial education (Vigaindren, 2017). In a recent study the majority of Gen Y consumers rated themselves as only having average financial knowledge and more likely to seek financial advice from their personal network, such as family, friends or co-workers (Asian Institute of Finance, 2018). The ability to manage one’s income and the role of income in the context of online purchase behaviour (Tiruwa et al.; 2018) and technology acceptance (Huang et al.; 2019) has been the subjects of recent academic research. Previous studies suggest that higher income results in lower implicit risks associated to online purchases with the reverse scenario argued for lower income groups (Kim et al.; 2017). While, in a virtual game environment, the perceived risk of financial losses may be more obvious in the gamer’s purchase decision of virtual items, this research will examine the impact of income on a Gen Y gamer’s purchase mechanism.

**H9:** Income moderates the relationship between flexibility and purchase intention of virtual goods.

**METHODODOLOGY**

**Data Collection and Measurement**

This study distributed a total of 1165 online questionnaires and draw social gamers from a web-based survey to collect data through Malaysia’s game-related bulletin board and four popular social gaming websites, namely Hay Day, Clash of Clans, Foursquare and Bright Kite over a four-month
period. All social gamers were experienced using mobile devices (i.e. smartphones, tablets, personal
digital assistants or mobile internet devices) to engage themselves in different kinds of social gaming
activities. Since this study targeted Gen-Ys social gamers in Malaysia, aged between 20-38 years old,
respondents from other age groups or who had no or less mobile gaming experience were eliminated.
All respondents were self-selected and participated voluntarily. Although an incentive (10 possible
tokens to win department store gift vouchers) was applied to increase the response rate, a total of 341
completing and valid questionnaires were returned.

The survey questionnaire was developed from relevant previous literature and modified to ensure
the measurement instrument was reliable and appropriate (see Appendix A). A pilot test was conducted
with 47 respondents collected in English to ensure respondents understood all the item questions
and to validate the reliability of measurement instruments. Based on respondents’ feedback, certain
item measurements were revised or removed due to relatively lower factor loading (less than 0.7)
and/or primarily crossed-loaded with items of other constructs, the finalized questionnaire was also
translated into two more languages (Bahasa and Mandarin) to be better understood by non-english
speakers. In order to reduce error variance correlated among items and avoid common methods
variance bias, all survey items were randomly arranged without a particular order. All items were
measured on a 7-point Likert-type scale from ‘strongly disagree (1)’ to ‘strongly agree (7)’. Data
analysis was conducted through structural equation modeling (AMOS 22) with a two-step analysis
approach (Anderson & Grebin, 1988).

**Maximum Likelihood Analysis**

Although maximum likelihood (ML) is set as a default estimation procedures in SEM, it is necessary
to assess the data distribution as a failure to meet the assumption of normality may lead to an
overestimation of the chi-square statistics, consequently enhance an inflated Type I error (Powell &
Schafer, 2001) and downward biased standard errors (Jackson et al, 2009). The univariate normality
is achieved in this study as kurtosis of each item is between -1.212 and 0.312 within the acceptable
range [-7 and 7] (Muthen & Kaplan, 1992); skewness of each item is between -0.908 and 0.577
within the acceptable range [-1 and 1] (Pallant, 2011). The multivariate critical ratio is 24.89, which
indicates a slight violation of multivariate normality (MVN). However ML estimation is still robust with mild departures from multivariate normality (Hu et al; 1992), thus the findings of this study should be reliable with maximum likelihood.

**Convergent and Discriminant Validities**

Conducting a confirmatory factor analysis is able to provide an assessment of the unidimensionality and provide quantifiable evidence regarding the external and internal consistency among a set of construct indicators (Segars, 1997). The aforementioned internal consistency is assessed by convergent validity, with external consistency assessed with discriminant validity. For this research, the adequacy of each multi-item scale in capturing construct validity is presented in Figure 4.

The standardized loading estimates of all items are significant \( (p<0.001) \) and higher than 0.6 (Hair et al; 2010). The average variance extracted (AVE) estimates are between 0.519 and 0.780 (above 0.5, Ping, 2004) and construct reliability (C.R) of each construct is between 0.738 and 0.892 (above 0.7, Fornell & Larcker, 1981). With Anderson and Gerbing’s first step approach (1988), the correlations among latent constructs are between absolute 0.232 and 0.577. The AVE square root of each variable is larger than any correlation between that particular variable and any other variables (Figure 5), which reveals that the discriminant validity is achieved and the Type II error rate is low. There is no issue of multicollinearity among constructs in this study.

**Structural Equation Model**

The construct model includes four exogenous latent variables (enjoyment, play intensity, self-control & flexibility) and two endogenous variables (game addiction & purchase intention of virtual goods). The goodness-of-fit indices of this model are within an acceptable range (chi-square =144.452, df=90, \( p<0.001 \), chi-square/df = 1.605, GFI=0.952, AGFI=0.927,

**Figure 4. CFA and Convergent Validity (n=341)**

|                | UNSTD | S.E. | T-Value | P     | STD  | SMC  | I-SMC | C.R  | AVE  |
|----------------|-------|------|---------|-------|------|------|-------|------|------|
| Enjoy1         | Enjoy | 1    |         |       | 0.772| 0.596| 0.404 | 0.892| 0.675|
| Enjoy4         | Enjoy | 0.956| 0.066   | 14.587| ***  | 0.754| 0.569 | 0.404|      |
| Enjoy3         | Enjoy | 1.149| 0.063   | 18.293| ***  | 0.925| 0.856 | 0.144|      |
| Enjoy2         | Enjoy | 1.001| 0.062   | 16.213| ***  | 0.824| 0.679 | 0.321|      |
| PIVG2          | IPI   | 1    |         |       | 0.876| 0.767| 0.233 | 0.876| 0.780|
| PIVG3          | IPI   | 1.05 | 0.078   | 13.452| ***  | 0.890| 0.792 | 0.208|      |
| Intensity1     | Intensity | 1    |         |       | 0.783| 0.613| 0.387 | 0.806| 0.581|
| Intensity3     | Intensity | 1.018| 0.082   | 12.429| ***  | 0.742| 0.551 | 0.449|      |
| Intensity2     | Intensity | 1.145| 0.091   | 12.632| ***  | 0.760| 0.578 | 0.422|      |
| Flex1          | Flexibility | 1    |         |       | 0.800| 0.640| 0.360 | 0.763| 0.519|
| Flex2          | Flexibility | 0.781| 0.072   | 10.861| ***  | 0.659| 0.434 | 0.566|      |
| Flex4          | Flexibility | 0.686| 0.069   | 9.889 | ***  | 0.695| 0.483 | 0.517|      |
| Self_C3        | Self_C | 1    |         |       | 0.873| 0.762| 0.238 | 0.739| 0.592|
| Self_C4        | Self_C | 0.704| 0.103   | 6.856 | ***  | 0.649| 0.421 | 0.579|      |
| Add1           | Add   | 1    |         |       | 0.836| 0.699| 0.301 | 0.738| 0.587|
| Add2           | Add   | 0.842| 0.087   | 9.723 | ***  | 0.690| 0.476 | 0.524|      |
RMSEA=0.042, TLI=0.970, IFI=0.978, CFI=0.978, NFI=0.943). There was no negative error variance of variables or ‘Heywood case’ (Kolenikov & Bollen, 2012). The standard errors of variance are relatively small between 0.062 and 0.103.

All tested hypotheses are statistically significant among latent variables in the structural model, with the exception of H6 ($p=0.561$), H7 ($p=0.051$) and H8 ($p=0.869$). This indicates that game addiction has no impact on the purchase intention of virtual goods. The parameter estimates for the relationship of addiction with enjoyment (H1, $p<0.001$), play intensity (H2, $p<0.001$) and self-control (H3, $p<0.001$) are all statistically significant and consistent with the proposed hypotheses. The path coefficients for the relation of virtual goods purchase intention with play intensity (H4, $p=0.019$),
flexibility (H5, \(p<0.001\)) are also significant. Approximately 45.20% variance of social game addiction can be explained by enjoyment, play intensity, and self-control. Enjoyment (0.424, \(t=5.122, p<0.001\), H1) has larger impact on game addiction than play intensity (0.303, \(t=3.569, p<0.001\), H2) and self-control (-0.215, \(t=-3.178, p=0.001\), H3). Flexibility and play intensity address 34% variance of virtual properties purchase intention. Compared with play intensity (0.221, \(t=2.346, p=0.019\), H4), flexibility (0.456, \(t=5.873, p<0.001\), H5) has more impact on purchase intention of virtual goods.

**Effect Size and Predictive Power**

This study evaluated the effect size of the predictor constructs using Cohen’s \(f^2\) (Cohen, 1988). The effect size is computed as the increase in \(R^2\) relative to the proportion of variance that remains unexplained in the endogenous latent variable. Cohen (1988) and Chin (1998b) suggest that \(R^2\) values of 0.67, 0.33, and 0.19 are substantial, moderate, and weak respectively. In this study, exogenous variables explain 45.20% variation of social game addiction and 34% variation of PIVG (See Figure 7). The smallest \(R^2\) (0.461) is used to calculate the effect size (\(f^2\)) conservatively. According to Cohen (1988), the \(f^2\) value of 0.35, 0.15, and 0.02 are considered large, medium, and small respectively. The calculated \(f^2\) (0.1259) in this study is considered medium (close to 0.15). G-Power, Post Hoc is adopted to compute achieved predictive power of constructed model (effect size \(f^2=0.1259\), \(\sigma=0.05\), \(n=341\)), indicating power \((1-\alpha\) error prob) = 0.981 (above 0.8, MacCallum et al; 1996; Markus, 2012), implying that the construct model is reliable with stable predictive power.

**Moderation Effect**

A moderator specified the conditions under which a given effect occurs, as well as the condition under which the direction, nature or strength of an effect varies (Baron & Kenny, 1986, p.1174). This study assumes that the moderation effect of income could be presented as an interaction between flexibility and purchase intention of virtual goods (H9). Players were separated into a high-income group (RM5000/month and above) and low-income group (below RM5000/month) based on their monthly income. This research emphasizes the moderation effect on the aforementioned relation and expects that income interacts with flexibility in such a way as to have an impact on the relation towards purchase intention of virtual properties: the association could be stronger with the high-income group; while a weaker correlation emerging with the low-income group. Income significantly moderates the relationship between flexibility and purchase intention of virtual goods (\(p=0.008\), H9). Pearson’s R (0.360, \(p=0.001\)) in the low-income group is much lower than the Pearson’s R (0.805, \(p=0.001\)) in the high-income group (Figure 8). The interaction effect is also presented by the moderation plot in Figure 9.

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**Figure 7. Structural Regression Weight (n=341)**

|                | UNSTD  | S.E.  | C.R.  | P    | STD  | SMC  | Hypothesis  |
|----------------|--------|-------|-------|------|------|------|-------------|
| Addiction <---- Enjoyment | 0.424  | 0.083 | 5.122 | ***  | 0.355| 0.452| H1: Supported |
| Addiction <---- Intensity  | 0.303  | 0.085 | 3.569 | ***  | 0.262|      | H2: Supported |
| Addiction <---- Self_C | -0.215 | 0.068 | -3.178| 0.001| -0.235|      | H3: Supported |
| PIVG <---- Intensity | 0.221  | 0.094 | 2.346 | 0.019| 0.180| 0.340| H4: Supported |
| PIVG <---- Flexibility | 0.456  | 0.078 | 5.873 | ***  | 0.455|      | H5: Supported |
| PIVG <---- Addiction | 0.047  | 0.080 | 0.581 | 0.561| 0.044|      | H6: Rejected |
| PIVG <---- Enjoyment | -0.237 | 0.121 | -0.196| 0.051| -0.185|      | H7: Rejected |
| PIVG <---- Self_C | -0.011 | 0.068 | -0.165| 0.869| -0.012|      | H8: Rejected |
Considertion of mobile social games, purchasing can be viewed as another level of commitment to game experience. In fact, addicted players may not really be involved in virtual purchase behavior (H6 rejected), although game publishers or platforms do offer certain functionality and quality experience to retain or increase confidence in gamers. This finding conflicts with the existing literature (Shen & Williams, 2011; Ravoniarison & Benito, 2019), which argues that addicted individuals have high intention to purchase virtual items. While opening one’s wallet and using real currency within a gameplay experience has been regarded highly incompatible (Paavilainen et al., 2013). Pinchefsky (2013) states that “...only 2 percent of registered players convert into buying consumers of virtual goods...” (cited in Hamari 2015, p.3). Two potential explanations can be given to explain this: firstly, free-to-play games are usually poorer in quality and innovation when compared to those games which use traditional retails revenue models (Hamari & Lehdonvirta, 2010), and are therefore less attractive for gamers to make purchases. The second reason could be that gamers may have a strong negative reaction or attitude towards virtual items (Pinchefsky, 2013; Ravoniarison & Benito, 2019). They may perceive that using purchased items to gain a top position on the leaderboard is unfair to other gamers as no gaming skill is required (Hsieh & Tseng, 2018). Compared to physical items, virtual items may not be considered a compulsory necessity as it is only valuable within the virtual game environment. This finding is partially consistent with the result of Asian Institute of Finance’s survey (Asian Institute of Finance, 2018) on Gen Ys in Malaysia, who revealed that 75 percent of Gen Ys

| Model          | DF | CMIN | P     | NFI Delta-1 | IFI Delta-2 | RFI rho-1 | TLI rho2 |
|----------------|----|------|-------|-------------|-------------|-----------|----------|
| Moderator Model| 1  | 6.938| 0.008 | UNSTD       | 0.003       | 0.003     | 0.003    |
| Addiction      | ---| Flexibility | 0.360 | 0.088 | 4.080 | 0.001 | Income Low |
| Addiction      | ---| Flexibility | 0.805 | 0.151 | 5.328 | 0.001 | Income High |

DISCUSSION AND CONCLUSION

In the context of mobile social games, purchasing can be viewed as another level of commitment to game experience. In fact, addicted players may not really be involved in virtual purchase behavior (H6 rejected), although game publishers or platforms do offer certain functionality and quality experience to retain or increase confidence in gamers. This finding conflicts with the existing literature (Shen & Williams, 2011; Ravoniarison & Benito, 2019), which argues that addicted individuals have high intention to purchase virtual items. While opening one’s wallet and using real currency within a gameplay experience has been regarded highly incompatible (Paavilainen et al., 2013). Pinchefsky (2013) states that “...only 2 percent of registered players convert into buying consumers of virtual goods...” (cited in Hamari 2015, p.3). Two potential explanations can be given to explain this: firstly, free-to-play games are usually poorer in quality and innovation when compared to those games which use traditional retails revenue models (Hamari & Lehdonvirta, 2010), and are therefore less attractive for gamers to make purchases. The second reason could be that gamers may have a strong negative reaction or attitude towards virtual items (Pinchefsky, 2013; Ravoniarison & Benito, 2019). They may perceive that using purchased items to gain a top position on the leaderboard is unfair to other gamers as no gaming skill is required (Hsieh & Tseng, 2018). Compared to physical items, virtual items may not be considered a compulsory necessity as it is only valuable within the virtual game environment. This finding is partially consistent with the result of Asian Institute of Finance’s survey (Asian Institute of Finance, 2018) on Gen Ys in Malaysia, who revealed that 75 percent of Gen Ys
have at least one source of debt which are almost exclusively physical in nature, such as car loans, education loans, and mortgages.

The research findings indicate that social game addiction mainly stems from subjective entities, rather than an objective entity. Play intensity (H2) as a perceived need for increased time spent online slightly impacts on gamer’s addictive behavior; while enjoyed experience (H1) or even temporary entertainment could keep players involved more in social interaction. However, this kind of dependence can be controlled through self-discipline (H3). Social game addiction may not be directly related to certain objective phenomena, such as technical aspects or feature innovations, but primarily subjective-oriented action. This non-chemical addiction between human and a ‘machine’ is not similar to that of drug addiction. With drug addiction, patients may fail with self-discipline, thus becoming more addicted. However, this study implies that the more disciplined the players are, the less likely they are to become addicted to games as self-control negatively influences game addiction.

The relationship between perceived enjoyment and the intention to purchase virtual goods was not significant (H7, rejected), which is in contrast to previous research. Based on hedonic studies, perceived enjoyment had been shown to be a strong predictor for continued use and purchase intention (Hamari, 2015; Ravoniarison & Benito; 2019). But in the context of mobile social games, the perceived entertainment could be temporary or a kind of non-continuance experience, especially when gratification or diversion (i.e. to pass time) is a player’s main goal. Arguably, this type of goal would be insufficient to motivate a gamer’s purchase intention of virtual items. Another reason could be found in the Theory of Reasoned Action (Ajzen, 2015) which argues that both behavioural attitude and subjective norms affect behavioural intention. Gamers might consider their immersive enjoyable experiences are reasoned and been accepted by their peers as well; while the purchase of virtual properties is reflected as a non-reasoned or unnecessary action. In fact, even addicted players may not necessarily purchase virtual items (H6 rejected) and they may not be necessarily loyal to any specific game, choosing to play different games simultaneously, especially given the low switching costs. This finding has consequences for publishers who may look to alternative revenue streams, such as advertising or sponsorship to offset any shortfall in the purchase of virtual items.

Self-control was found to have a negative impact on social game addiction (-0.215, \( p=0.001 \), H3); while no impact was found in relation to purchasing intention of virtual goods (H8, \( p=0.869 \)). The different impacts shown in this study could be partially due to the nature of the content being controlled. In hypothesis (H3), self-control refers to players’ actual control behavior towards game addiction, rather than intentional control. When players feel they are losing control over the game, their playing is more likely to become compulsive, and that may develop in to game addiction. In contrast, when players are more aware of being in control over gaming, they are less likely to be addictive. In hypothesis (H8), the objective of self-control is a perceived intention (i.e. purchase intention of virtual items), which might not be considered self-disciplined as it is a kind of intention rather than actual behavior. These findings support the work of Ajzen and Madden’s (1986) which reveals that perceived behavior control (PBC) represents perception of control but not actual control, “a behavior may be said to be completely under a person’s control if the person can decide at will to perform it or not to perform it.” (cited in Lu & Wang, 2008, p.502).

The fact that gamers’ income moderates the relationship between flexibility and their intentional purchase of virtual goods (H9), demonstrates that the associated strength of relation varies between high and low-income groups. The association between flexibility and virtual goods purchase intention is stronger with the high-income group; while a weaker relationship emerges with low-income groups. Although the revenue model of the game publisher is normally not based on access fees or periodic subscriptions, a gamer’s intentional purchasing of virtual items is limited by their actual income level. Low-income players arguably spend a longer period of time and encounter more challengeable tasks for similar gaming gratification compared to the high-income group. High-income players would, in contrast, maximize their gaming success by purchasing more virtual rewards and overcoming obstacles...
through purchases which indicates that publishers could focus their offer more towards high-income adults as a means to maximize their revenue.

The research consolidated existing research on social game addiction and advanced research on Gen Y’s relationship with social gaming, it does however have its limitations. Firstly, this study was limited to Malaysia and would benefit from a wider investigation across the ASEAN region to enhance the generalizability of the findings. Secondly, this study restricted the focus to the purchase of virtual properties in the context of game publisher-to-gamer and did not include peer-to-peer interaction. Thus, a qualitative method could be employed to comprehensively understand the gamer’s individual interest in virtual items sales and their gaming engagement. Lastly, this study focuses on the gamer’s perspective only, further research on other stakeholders (game publishers, vendors and policymakers) would provide contrasting and a more holistic perspective of social games and addictive behaviour.
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## APPENDIX A

Figure 10.

| Appendix 1: Questionnaires and Factor Loading | Items | EFA Factor Loading |
|----------------------------------------------|-------|-------------------|
| **Enjoyment**                                |       |                   |
| Different categories of online games give me different satisfaction. | Enjoy4 | 0.751 |
| I feel entertained while playing the online games. | Enjoy3 | 0.849 |
| I feel excited when I unlock new levels/items/units. | Enjoy2 | 0.836 |
| I feel relaxed while playing online games. | Enjoy1 | 0.794 |
| *Source: Song & Lee (2017), Kim & Hwang (2018), Huang et al (2019) |       |                   |
| **Play Intensity**                           |       |                   |
| I feel out of touch when I don’t access online games after a while. | Inten3 | 0.821 |
| I play online games on daily basis. | Inten2 | 0.790 |
| I spent as much time as possible playing online games. | Inten1 | 0.782 |
| *Source: Hwang (2016), Huang et al (2017), Puerta-Cortes et al (2017) |       |                   |
| **Flexibility**                              |       |                   |
| My device enables me to play online games anytime and anywhere. | Flex4 | 0.760 |
| In-apps purchases reduce my waiting time in online games. | Flex3 | 0.710 |
| There are multiple ways to perform in-apps virtual purchase transaction. | Flex2 | 0.681 |
| *Source: Hsiao & Chen (2006), Ha et al (2007), Wei & Lo (2014) |       |                   |
| **Self-control**                             |       |                   |
| I easily become impatient when I am interrupted. | Self_C | 0.878 |
| I find it difficult to pause while playing. | Self_C | 0.820 |
| *Source: Kim et al (2008), Suangpaisal & Phukao (2018) |       |                   |
| **Social Game Addiction**                    |       |                   |
| I feel restless or moody or irritable when I am unable to play online games. | Add | 0.859 |
| I repeatedly made unsuccessful efforts to control or stop playing online games. | Add1 | 0.776 |
| *Source: Griffiths (2010), Huang et al (2019), Lee et al (2019) |       |                   |
| **Purchase Intention of Virtual Goods**      |       |                   |
| Virtual goods purchases enable me to gain competitive advantage in the online games. | PIVG | 0.884 |
| Virtual items purchases can make a difference to me for online games. | PIVG | 0.892 |
| *Source: Lehdonvirta (2009), Shukla & Drennan (2018), Lee et al (2018) |       |                   |
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