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WHY DO PEOPLE BUY VIRTUAL ITEMS IN VIRTUAL WORLDS? AN EMPIRICAL TEST OF A CONCEPTUAL MODEL

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Abstract

In the past few years, virtual worlds – such as Second Life, World of Warcraft and RuneScape – have demonstrated the potential to be a promising online business model. Millions of paying users around the world now participate in virtual worlds and trade virtual items with each other. However, little empirical research has been conducted into players' purchase behaviour in virtual worlds. To address this research gap, the current study develops and tests a conceptual model of purchase behaviour in the context of virtual worlds. An online survey was conducted within Second Life (n=250) and SEM-PLS (Structural Equation Models by Partial Least Squares) was used to confirm the conceptual model. Among the statistically significant paths found in the conceptual model, effort expectancy, performance expectancy, perceived value, customisation, habit, advancement and enjoyment all have strong impact on virtual world residents' purchase intention. The study rounds off with a discussion and conclusions, highlighting implications for practice, research limitations and promising areas for future research

Keywords: Structural Equation Model; PLS; Virtual World; Purchase Behaviour; Second Life.

1 INTRODUCTION

In the past few years, virtual worlds have demonstrated the potential to be a novel online transaction environment compared to the Web-based context; thousands of participants may not only interact with one another, but also buy and sell virtual items in a virtual world. At present, popular 3-D virtual worlds are mainly divided into two categories: game-oriented virtual worlds (e.g. World of Warcraft, RuneScape and EverQuest) and socially-oriented virtual worlds (e.g. Second Life, There and HiPiHi) (Bainbridge 2007, Guo & Barnes 2007). The major difference between the two types is that a game-oriented virtual world provides a story-lined scene and fixed contents while a socially-oriented virtual world attempts to provide near unlimited freedom in a simulated world in which participants use their imagination to create desired world contents. Regardless of virtual world type, typically virtual items can be traded for real world currencies within virtual worlds or via other third-party exchange platforms. DFC Intelligence (2007) estimated that virtual worlds will produce US$13 billion and over 40% of revenues will be attributed to trading virtual assets by 2012. In the face of such a large quantity of virtual item transactions, understanding the latent psychological processes that typically induce players' purchase behaviour in virtual worlds becomes of obvious importance.

The majority of previous studies in this area have focused on legal issues with regard to virtual item transactions (e.g. Lastowka & Hunter 2004, Lederman 2007) or have explored the impact of virtual worlds on the real world from a purely economic point of view (e.g. Castronova 2001, 2002). Although several prominent explanatory models of behaviour-expectation, such as the Technology Acceptance Model (TAM) (Davis 1989), have been developed and applied to explaining online shopping behaviour or the adoption of information systems (IS), virtual item purchase behaviour in virtual worlds is likely to be quite different and requires new conceptualisations. Moreover, we also need to examine whether factors related to online purchase behaviour still exert considerable influence in the context of virtual worlds. A few recent studies have begun to notice virtual item transactions and offered new insights into players' purchase behaviour in virtual worlds (e.g. Yee 2005, Lehdonvirta 2005, Oh & Ryu 2007, Nojima 2007). Nevertheless, these studies are limited in the sense that they are only based on a descriptive or theoretical analysis of virtual item transactions and they lack the rigour of empirical analysis. Their research findings need to be tested by further quantitative research using large-scale samples before making generalisations.

In order to detect factors determining purchase behaviour in virtual worlds for theory building, this research empirically develops and tests a theoretical model of virtual item purchase behaviour in virtual worlds based on established behaviour-expectation theories and previous exploratory research into virtual item transactions. The research employs a survey in the virtual world of Second Life (SL) and analyses the research model by way of a structural equation modelling approach. The outcome from this research is an extension to existing behavioural theories via new constructs validated in the virtual world domain.

The paper is organised as follows. In the next section we examine the salient literature on virtual item purchase behaviour. This is followed by an explication of the research model. Section four describes the study design and method adopted in the research, and the results are presented in section 5. Finally the paper rounds off with a discussion and conclusions, including limitations and implications for future research and practice in this very new area of investigation.

2 REVIEW OF EXTANT LITERATURE ON VIRTUAL ITEM PURCHASE

Although virtual item purchase behaviour is a relatively new transaction phenomenon and therefore research is limited, the prediction of purchase behaviour in the context of Web sites has been long studied by previous literature using prominent behaviour-expectation models, such as the Theory of

Reasoned Action (TRA) (Fishbein & Ajzen 1975), the Theory of Planned Behaviour (TPB) (Ajzen 1991) and TAM. These established theoretical models have shown high reliability and the predictive power of social behaviour across a variety of contexts. We thoroughly reviewed previous studies published since 1992 on the adoption of IS especially related to Web-based shopping behaviour. According to the literature, the most common construct variables for Web-based online purchase behaviour are performance expectancy, effort expectancy, social influence, perceived enjoyment, IS quality, facilitating conditions, trust and risk. Guo and Barnes (2007) first developed a theoretical model for explaining purchase behaviour in virtual worlds based on five prominent theoretical models such as, TAM, TPB and UTAUT (Venkatesh et al. 2003). Guo and Barnes (2009) further revised the preliminary theoretical model using focus groups and offered a deep insight into the whole psychological processes of virtual item purchase behaviour in virtual worlds from three perspectives: motivators for pursuing advanced virtual items, the reasons for using virtual world trading platforms to obtain desired virtual items, and factors with regard to making a specific purchase decision. All of the above factors were introduced into the revised theoretical model based on focus group findings– except for risk. On the one hand, many kinds of risk are not as relevant to virtual items, such as performance risk (Guo & Barnes 2009); on the other hand, the influence of risk on purchase behaviour in the context of virtual worlds is mediated by trust.

Yee (2005) focused on investigating players' motivations for participating in massively multiplayer online role-playing games (MMORPGs). Yee's research findings showed that customisation and achievement were players' two major motivations for pursuing advanced virtual items in virtual worlds. Oh and Ryu (2007) analysed the item-selling based payment model used by two virtual worlds, "Kart Rider" and "Special Force". Their research explored some factors stimulating players to pursue valuable virtual items in virtual worlds including improving game capability and quickly upgrading levels. Lin and Sum (2007) pointed out that virtual world operators may not only charge subscription fees, but also obtain significant profits by selling functional or decorative virtual items. A functional virtual item may increase a character's overall ability to compete (e.g. advancing character levels or moving one's avatar more quickly) while a decorative virtual item helps players to customise the appearances of their characters.

Based on Guo and Barnes' (2009) research findings, we realise that it is necessary to distinguish between general purchase behavioural intention and special purchase behavioural intention in this research. With regard to real product/service purchase behaviour, general purchase behavioural intention refers to the subjective probability of one's engagement in purchasing desired products/services through the Web-based purchase manner while special purchase behavioural intention can be viewed as an immediate indication of an individual's readiness to perform a given purchase from the specific Web site for a specific product or service. General purchase behavioural intention demonstrates an individual's intention to purchase desired goods/services through the Web-based manner rather than other manners, such as offline stores, telephone and catalogue, even if the individual still has no idea where he/she will make a purchase (i.e. identifying a specific Web site). Users possibly form their special purchase behavioural intentions and immediately result in an actual purchase when they browse an online shopping Web site. Most previous studies on Web-based shopping behaviour did not explicitly distinguish between general purchase behavioural intention and special purchase behavioural intention because an individual's belief about shopping in a specific Web site and about the Web-based shopping manner are the same in most cases. In other worlds, factors related to users' a choice between the Web-based purchase manner and other purchase manners are the equivalent of factors identifying a specific shopping Web site, such as, convenience, price, service quality, risk and so on. For example, if a user perceives that using a specific Web site is convenient, he/she usually believes that the Web-based shopping manner is more convenient than other purchase manners. Similarly, if users consider that the Web-based shopping manner is more convenient than other purchase manners, they usually have enjoyed the convenience of shopping in a specific Web site.

However, the situation in virtual worlds is quite different and more complex because players have other virtual item obtaining manners in addition to the in-world purchase manner. For example, players may get desired virtual items in virtual worlds through in-world non-purchase manners, e.g. fighting with non-player characters (NPCs), which may randomly drop virtual items, or by finishing quests in game-oriented virtual worlds, and via self-design in socially-oriented virtual worlds, in addition to buying from other players. Furthermore, buying from other players can be achieved through Web-based platforms or face-to-face approaches (i.e. out-of-world purchasing manners). Compared to virtual items, perhaps purchasing in the real world (i.e. using real money) is the only method to get desired real products/goods and very limited in-world trading platforms have been used for purchasing real products/goods so far (i.e. using virtual currencies).

With regard to virtual item purchase behaviour, general purchase behavioural intention refers to the subjective probability of one's engagement in obtaining desired virtual items through the purchase manner in virtual worlds while special purchase behavioural intention is only an immediate indication of an individual's readiness to perform a given purchase from a specific vendor for a specific virtual item in virtual worlds. First, general purchase behavioural intention in the context of virtual worlds is determined by an individual's overall belief that in-world shopping manner has greater relative advantages and lower complexity than other in-world non-purchase manners and out-of-world purchase manners. Second, special purchase behavioural intention is mainly determined by a player's belief that a specific virtual world vendor has relative advantages than others (e.g. good reputation and reasonable price). With respect to virtual world transactions, players still have to make a series of specific decisions (e.g. identifying a specific vendor) prior to actual purchase even if they have formed a strong intention to obtain desired virtual items through buying in virtual worlds (i.e. general purchase behavioural intention). Consider the following example of a player in a game-oriented virtual world for further illustrating the differences between general purchase behavioural intention and special behavioural purchase intention. A player has planned to obtain advanced weapons for improving a character's power through buying from other players in the virtual world, which refers to a general purchase behavioural intention. However, he or she has to identify a specific purchasable virtual item based on his/her personal conditions prior to making an actual purchase from enormous range of alternatives because every virtual item has various attributes (e.g. strength, level requirements for use or durability) even though two virtual items may be of the same item type, e.g. a virtual sword. Moreover, he or she also needs to identify a suitable vendor for the desired virtual items. In case the player has formed intention to purchase a specific virtual item from a vendor, we claim that he or she has formed a special purchase behavioural intention at this point.

In this research, we only focus on capturing key determinants influencing players' general intention to purchase virtual items in virtual worlds rather than special purchase intention with a focus on specific purchase decisions. A clear distinction between general purchase behavioural intention and special purchase behavioural intention with a focus on players' specific purchase decisions can keep our conceptual model parsimonious as much as possible. A parsimonious model is easier to comprehend and should obtain a high degree of generality. Factors identified by previous literature are not included this research if they relate predominantly to players' special purchase intention, e.g. trust (Guo & Barnes 2009, McKnight 2002). It is worth noting that the term "purchase behavioural intention" used in later sections pertains primarily to general purchase behavioural intention unless otherwise noted.

3   FORMULATION OF A CONCEPTUAL MODEL OF PURCHASE BEHAVIOUR IN VIRTUAL WORLDS

Based on a thorough review of previous studies on virtual worlds and a focus on players' general purchase intention, a conceptual research model was formulated (see Figure 1). Eight constructs appear to be significant determinants that influence players' virtual item purchase behavioural intention and actual purchase behaviour in virtual worlds including: effort expectancy, performance expectancy, perceived value, advancement, customisation, perceived enjoyment, social influence and

habit. Moreover, performance expectancy, effort expectancy and perceived valued are identified as extrinsic motivators, while perceived enjoyment, advancement and customisation are three intrinsic motivators based on Verhagen et al.'s (2008) typology of motivations for adopting virtual worlds. Extrinsic motives refer to the technical performance of an activity, which are relevant to the achievement of goals/benefits external to the system-user interaction while intrinsic motives refer to users undertaking an activity for creating pleasurable experiences, which are derived from the system-user interaction per se (Van der Heijden 2004; Koo 2009). The importance of effort expectancy, performance expectancy, perceived enjoyment and social influence has been broadly discussed in previous literature on behaviour-expectation in different contexts include general IS adoption, Web-based shopping and virtual world purchase behaviour (e.g. Venkatesh et al. 2003, Guo & Barnes 2007, 2009, Davis et al. 1992). For example, Guo & Barnes (2007, 2009) proposed that the two constructs, effort expectancy and performance expectancy are utilitarian factors contributing to explaining the relative advantages of using in-world trading platforms, which in turn influence players' purchase channel choice when considering buying desired virtual item from others. Similarly, Venkatesh et al. (2003) suggested that effort and performance expectancies are two major beliefs with regard to system characteristics in the context of IS adoption (i.e. in-world trading platforms in this case). TPB, DTPB (Taylor &Todd 1995) and UTAUT proposed that social influence has an important impact on behavioural intention. In addition, some prior studies (e.g. Van der Heijden 2004, Dahlberg et al. 2003, Lee et al. 2006, Moon & Kim 2001, Guo & Barnes 2007, 2009) proposed the importance of hedonic factors (i.e. perceived enjoyment) for explaining users' IS adoption behaviour. In the remainder of this section, we place emphasis on providing the theoretical justification for four new empirical constructs (i.e. advancement, customisation, perceived value, and habit).

First, we viewed "customisation" and "advancement" as two subcomponents of general achievement because they represent players' two major desires to achieve in a virtual world. Lehdonvirta (2005) applied Yee's (2005) motivations to analysing four different virtual worlds. According to their research findings, all motivations contributing to virtual item purchase behavioural intention can be covered by the two constructs. On the one hand, players can derive a great sense of achievement from becoming powerful, rapidly increasing game level through purchasing functional virtual items or accumulating rare virtual items or money. On the other hand, players may get self-esteem and a sense of satisfaction through personalising their character appearances or showing a unique style using decorative virtual items (Yee 2005). For example, in the famous socially-oriented virtual world, "Three.com", "much attention is given to personal appearance, and one of the main activities in There is designing virtual clothes and selling them" (Brown & Bell 2004, p. 1). Therefore, we propose that "advancement and "customisation" should be two important intrinsic motivators for purchasing virtual items in virtual worlds in addition to perceived enjoyment.

Second, perceived value has been defined as "the consumer's overall assessment of the utility of a product based on perceptions of what is received and what is given" (Zeithaml 1988, p. 14). Within this definition, Zeithaml (1988) proposed four kinds of meanings of value: (1) low price, (2) whatever one wants in a product, (3) the quality that the consumer receives for the price paid, and (4) what the consumer gets for what they give (p. 14). A product of perceived value is usually measured according to the difference between the perceived benefits that a product delivers and its perceived costs, or the ratio of the perceived benefits to the perceived costs. Here, costs include monetary costs (i.e. currency) and non-monetary costs (i.e. time and energy). Previous studies have proposed that there are different channels to get desired virtual items in virtual worlds. Thus, players first need to make a selection from these channels when pursuing desired virtual items through a comprehensive virtual item benefit and associated cost valuation (Castronova 2001, 2003, Guo & Barnes 2009). Consequently, it seems that the construct "perceived value" is appropriate to cover these dimensions.

Third, many previous studies proposed that habit and purchase behavioural intention may be used as two independent antecedents of actual behaviour (e.g. Mittal 1988, Tuorila & Pangborn 1988). Moreover, the moderating effect of habit on the relationship between purchase behavioural intention and actual purchase behaviour is added to the conceptual model. Limayem et al.'s (2007) research

findings proposed that the relationship between behavioural intention and actual IS continuance behaviour may be weakened when an individual has established a strong habit to use it. Here, we place research emphasis on one-off purchase behaviour rather than continuance behaviour because the latter is quite difficult to measure in the context of virtual worlds. Unlike other IS adoption behaviour, it is impossible that a player never uses virtual world trading platforms in virtual worlds especially so in a new virtual world. Inexperienced players are relatively unaware of outside trading channels (e.g. Web-based platforms or face-to-face). During the early stage of virtual world participation, Second Life users may purchase basic virtual items for daily life in virtual worlds. Moreover, an individual may obtain many free virtual items through Second Life trading platforms. Therefore, we believe that Second Life players may have established the habit of using virtual trading platforms to some extent even if they first spend considerable money on purchasing valuable virtual items for meeting their intrinsic motivators. These basic or free virtual items have low market values as they can only satisfy players' basic survival requirements, which are not our research target. In this research, we only consider players' commercial purchase behaviour for achieving their goals (i.e. buying valuable virtual items for advancement and customisation) in a virtual world. Thus, there is no conflict when adding habit into the conceptual model even if we focus on initial purchase behaviour towards valuable virtual items.

Construct	Conceptual Definition	Hypothesis
Effort expectancy	The degree to which an individual believes that purchasing virtual items in virtual worlds would be free of physical and mental effort.	+→Intention
Performance expectancy	The degree to which an individual believes that using virtual world trading platforms would help him or her to attain desired virtual items in virtual worlds.	+→Intention
Perceived enjoyment	The degree to which fun can be derived from participating in virtual worlds.	+→Intention
Perceived value	An individual's perception of net benefit gained in exchange for sacrifices while purchasing virtual items in virtual worlds.	+→Intention
Advancement	The degree to which an individual tends to derive satisfaction from becoming powerful and well-known or accumulating virtual world resources and personal fortune.	+→Intention
Customisation	The degree to which an individual tends to derive satisfaction from customising the appearance of their characters.	+→Intention
Habit	The degree to which an individual tends to perform behaviour (i.e. using a virtual world trading platform to purchase virtual items) automatically.	+→Intention
Social influence	The degree to which an individual perceives that important others believe he or she should obtain desired virtual items through purchasing from other players in the virtual world.	+→Intention
Purchase intention	An individual' own estimated probability that he or she would like to obtain desired virtual items through buying from others in virtual worlds.	+→Actual
	+ denotes that the independent variable positively affect the dependent variable.	

Table 1.   Constructs and definitions used in this research.

Note that, in this research, perceived enjoyment is defined as the extent to which fun can be derived from participating in virtual worlds instead of using virtual item trading platforms (systems). Guo & Barnes (2007, 2009) suggested that when a player perceives that participation in a virtual world is an enjoyable experience, he or she will have an incentive to obtain advanced virtual items for achieving personal goals thereby possibly purchasing virtual items in virtual worlds. Therefore, we suggest that perceived enjoyment should significantly influence a player's behavioural intention to purchase virtual items in virtual worlds.

4 STUDY DESIGN AND METHOD

In this research, Second Life was selected as the target virtual world. Second Life is the most popular socially-oriented virtual world at present (KZero 2008). Since opening to the public in 2003, it has grown explosively and today is inhabited by nearly 16 million residents from around the globe (Second Life 2008). An online survey was carried out in SL. The URL to the survey Web site was disseminated by means of virtual world internal communication facilities, official Web sites and professional game forums. A total of 262 completed responses were received and 12 invalid responses were deleted. Therefore, a total of 250 qualified responses were obtained for quantitative analysis. Prior to data collection, the required sample size was computed based on the power analysis technique using G*Power 3.0 (Faul et al. 2007). For our conceptual model and a medium effect size ($1-\beta=0.8$, $\alpha=0.05$) the sample size should therefore be 160. Thus, we can confirm that 250 responses are enough for detecting a medium effect size and using the SEM-PLS technique.

4.1 Measurement

A major issue associated with using questionnaire surveys in social science research is how to develop valid and reliable measures of the latent constructs (i.e. the unobservable constructs) (Churchill 1979). In this research, multi-item scale measurement was employed. For each construct, items were drawn from previous empirical studies related to the adoption of IS and behaviour-expectation. Theoretical guidance and judgment was used to select the items that best reflect the dimensions of constructs developed in this research. Although, where possible, we encapsulated items examined in previous studies to maintain consistency, some items were reworded to relate specifically to this research. The final version of questionnaire contained 43 questions (13 general questions and 30 scale items). Perceived enjoyment and perceived social status were measured using 7-point semantic differentials. All other items on the questionnaire were scored on a 7-point Likert scale with a score of 7 indicating 'strongly agree' and a score of 1 indicating 'strongly disagree'. A 7-point scale excels at capturing smaller differences, which is an important condition leading to a higher reliability (Nunnally 1978). In addition, the research used self-reported previous purchase frequency and money spent as a proxy for actual purchase. Prior to the formal online survey, questionnaire pre-testing was carried out among 20 players who have high levels of participation experience in different virtual worlds; the aim was to further enhance content validity by assessing the differences between the understanding of participants on measurement items and the definitions of the variables that they are intended to measure.

4.2 Data Analysis

The hypothesised relationships developed in this study reflect general propositions to theoretically explain virtual item purchase behaviour. The proposed model and hypothesised relationships among constructs were evaluated using SEM-PLS modelling in SmartPLS 2.0M. Partial Least Squares (PLS) is a component-based structural modelling technique that has become popular in modern business research, particularly since it has specific advantages including minimal demands on measurement scales and sample size (Chin 1998a). What is more important is that the PLS technique excels at causal-predictive analysis in which hypothesised relationships are complex and few theoretical bases have been established (Gefen et al. 2000). This research is an initial attempt to empirically test a conceptual model of virtual item purchase behaviour in virtual worlds grounded in few theoretical foundations on behaviour-expectation in the context of virtual worlds.

4.2.1 Convergent validity and reliability

To test the convergent validity and reliability, two metrics were used: average variance extracted (AVE) and composite reliability (CR). AVE measures the amount of variance that a latent construct

captures from its indicators relative to the amount of variance from measurement error (Chin 1998a, p. 321); an AVE of 0.5 or higher is usually acceptable, meaning that 50 percent or more variance of the indicators is accounted for (Chin 1998a, Fornell & Larcker 1981). The second criterion used was the composite reliability, which indicates the internal consistency of measurement items of one latent construct; typically CR should be greater than the benchmark of 0.7 to be considered adequate (Fornell & Larcker 1981). As illustrated in Table 2, all the values of AVE and composite reliability for all constructs are considered satisfactory, with composite reliability at 0.746 or above and average variance extracted at 0.584 or above. It thus can be deduced that the measurement items used in this research are converging on the same latent construct.

Construct	AVE	Composite Reliability
Actual Purchase	0.725	0.839
Purchase Intention	0.884	0.958
Social Influence	0.682	0.810
Advancement	0.696	0.902
Customisation	0.584	0.847
Performance Expectancy	0.638	0.839
Effort Expectancy	0.662	0.886
Perceived Enjoyment	0.755	0.925
Perceived Value	0.613	0.746
Habit	0.709	0.878

Table 2.   Item convergent validity measurement.

4.2.2   Discriminant Validity

One way to test discriminate validity is to examine whether the square root of the AVE for each factor is much larger than the correlations between it and all other constructs (Fornell & Larcker 1981, Chin 1998b). To assess discriminant validity, we developed a matrix of correlations between constructs with reflective measures in which we replaced the diagonal with the square root of the AVE (see Table 3). We found that the squared root of AVE for each construct is higher than the elements off the diagonal (i.e. the correlations between it and all other constructs). According to Churchill (1979), we can further assess discriminant validity of constructs through making a comparison between the loadings of an item with its associated construct and its cross-loading on other constructs. For our model, we found that all items loaded on their corresponding constructs much more strongly than their cross-loadings on other constructs (details not shown here due to space constraints). Therefore, the above evidence provides strong empirical support for the reliability and validity of the constructs used in the research model.

Constructs	AP	PI	SI	Ad	Cu	EE	PE	Ha	PEx	PV
Actual Purchase (AP)	**0.852**									
Purchase Intention (PI)	0.446	**0.940**								
Social Influence (SI)	0.189	0.187	**0.826**							
Advancement (Ad)	0.250	0.144	0.248	**0.835**						
Customisation (Cu)	0.412	0.420	0.197	0.494	**0.764**					
Effort Expectancy (EE)	0.248	0.528	0.280	0.117	0.256	**0.814**				
Perceived Enjoyment (PE)	0.150	0.307	0.103	0.020	0.171	0.278	**0.869**			
Habit (Ha)	0.484	0.690	0.338	0.259	0.367	0.476	0.199	**0.842**		
Performance Expectancy (PEx)	0.192	0.500	0.185	0.090	0.228	0.600	0.228	0.440	**0.799**	
Perceived Value PV	0.256	0.334	0.249	0.266	0.244	0.226	0.129	0.355	0.143	**0.783**

Table 3.   Correlations between constructs with reflective measures.

5   RESULTS

We calculated t-statistics and path significance levels for each of the hypothesised relationships through the bootstrapping method (with 1000 resamples). Path coefficients and R^2 values were obtained by running the PLS algorithm to assess the predictive performance of the structural model. The construct for purchase intention had an R^2 value of 0.453 indicating that the research model accounts for 45.3% of the variance in SL players' general purchase intention. Moreover, the research model explained some variance in SL players' actual purchase behaviour (R^2=0.258). Overall, the empirical results strongly confirm the explanatory power of the developed research model over players' virtual item purchasing behaviour in virtual worlds. The important research findings of the empirical test are summarised below.
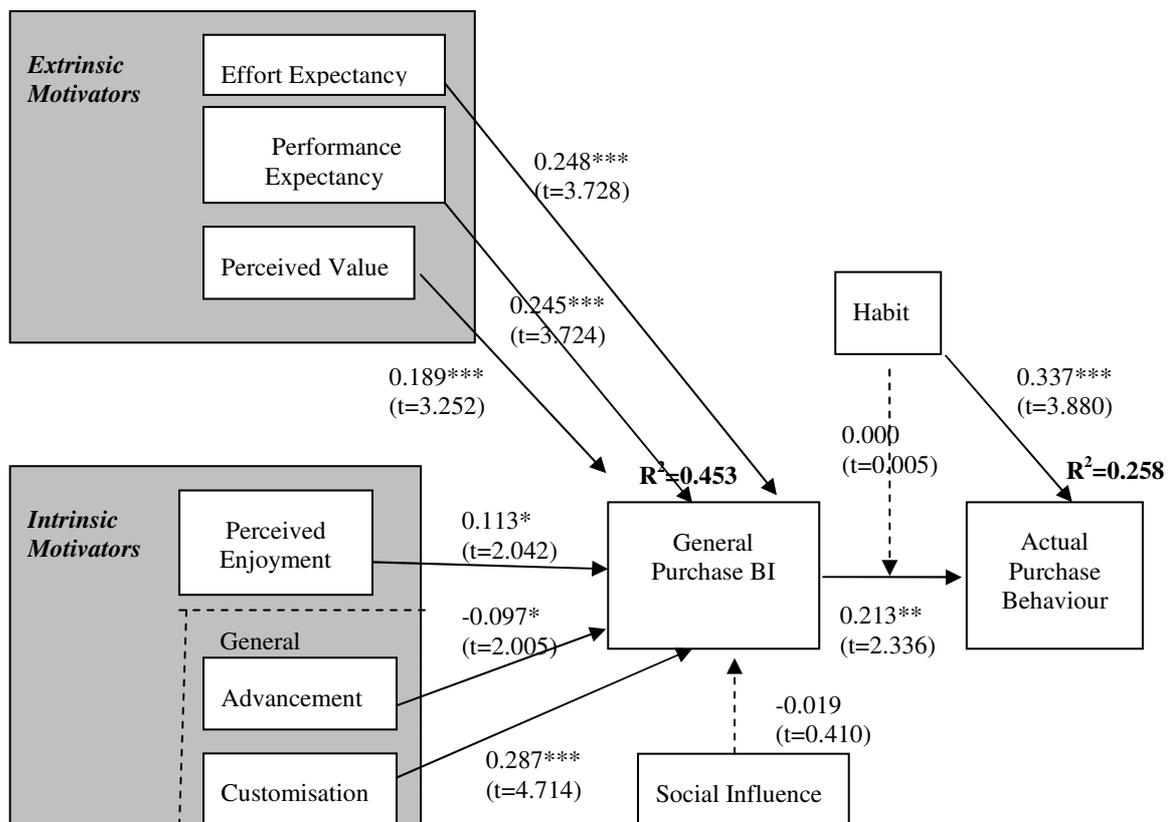
Note: + denotes p<0.1, * denotes p<0.05, ** denotes p<0.01 and *** denotes p<0.001(one-tail test).

Figure 1.   The research model with empirical results.

Overall, as we can see in Figure 1, there was strong support for most of the relationships in the research model. The extrinsic motivators in the model were all strong determinants of purchase behavioural intention at the 0.1 percent level of significance. The intrinsic motivators also showed significant relationships. The influence of customisation on purchase behavioural intention was particularly strong – the path coefficient being the largest of all direct relationships on purchase behavioural intention in our research model (p<0.001). Perceived enjoyment was also significantly related to purchase intention, albeit at a lower level of significance (p<0.05). However, our research findings showed that the path between advancement and purchase behavioural intention in SL was negative and significant at the 5 percent level. Compared to game-oriented players, SL players may freely design and create any virtual items they imagine – which is a major attraction of socially-

oriented virtual worlds. It seems that SL players intend to design rather than purchase desired virtual items for achieving advancement, which is contrary our expectation. The path between social influence and purchase intention was not supported and the path coefficient was close to zero. As mentioned above, this research focuses on explaining players' general intention to purchase virtual items rather than a specific purchase decision. Thus, our research findings suggested that social influence had little effect on forming players' general purchase intention, which does not demonstrate that social influence has no impact on making a specific decision relating to virtual item purchase (i.e. special behavioural intention), such as identifying a vendor.

It is worth noting that the research findings showed that although habit exerted a strong direct and positive influence on actual purchase behaviour (p<0.001), habit did not act as a moderating variable of the relationship between behavioural intention and purchase behaviour in the context of SL, which was inconsistent with previous published research (Limayem et al. 2007). Unfortunately, existing studies on exploring key factors that determine the relationships among habit, purchase behavioural intention and actual behaviour are quite limited and we believe that further research on this area is needed to solve the issue.

6   DISCUSSION AND CONCLUSIONS

This research has attempted to gain an understanding of the factors influencing virtual item purchase behaviour in virtual worlds. From a theoretical perspective, our findings indicate that the extant literature on online shopping behaviour does not adequately explore factors that either discourage or encourage players to purchase desired virtual items when participating in virtual worlds. To our knowledge, this research is the first explanatory study of virtual item purchase behaviour, which is the heart of virtual world transactions. A major gap in the existing body of knowledge regarding virtual item transactions is a lack of explanatory model with practical measures. The research has introduced a model for the measurement of virtual item purchase behaviour in virtual worlds by using previously developed constructs as well as newly developed constructs. The conceptual model was empirically tested based on a large-scale survey in SL. The statistically tests provide good support for the proposed conceptual model and a significant contribution to the body of knowledge regarding behaviour prediction in the context of virtual worlds. The rigorous testing of the conceptual model will not only extend the application of established theory models (e.g. TAM) to a new environment, but also offer a theoretical foundation for further studies on virtual item purchase behaviour.

If the research findings were to be successfully replicated in other virtual world settings, they could be of value in assisting virtual world developers in the development and design of virtual worlds. The knowledge of factors influencing players' virtual item purchase behaviour, coupled with effective items of measurement are useful for virtual world developers to prioritise their resources in terms of manpower, investment, time and allocation, in the most effective and efficient way. Effort expectancy is an important factor that influences intention to purchase virtual items in virtual worlds. Hence, virtual world developers must ensure that they provide detailed guidance on virtual world trading platforms, design effective information search functions and simplify purchasing procedures in virtual worlds. According to our results, transaction platforms should be integrated into gameplay in an intuitive and enjoyable manner and provide clear benefit and value to the players. Players should also be afforded the freedom to easily customise their own avatars, which provides an important driver for purchase behaviour – as individuals will seek to purchase items to fulfil this desire. Developers should use interface and game design that is easy to use that enforces habitual transaction behaviour. Although the freeform nature of SL appears to suggest more individualistic behaviour it is possible that other game-oriented virtual worlds encourage more collectivistic and socially-oriented purchases.

It is necessary to recognise the limitations and possible future directions of the research. First, we cannot claim that the results obtained here hold equally well in other virtual worlds especially in

game-oriented virtual worlds because characteristics unique to specific virtual worlds can potentially alter the relative importance of factors influencing players' purchase intention and actual purchase behaviour. The conceptual model and constructs should be further examined and revised in game-oriented virtual worlds, such as World of Warcraft (WoW), RuneScape or EverQuest. Second, another potential limitation of this research is that it adopts self-reported measures of previous purchase frequency and money spent as a proxy for actual purchase. To date, researchers still cannot find valid and reliable measures of actual purchase behaviour in the context of virtual worlds. To tackle this deficiency, we hope that, in the future, a longitudinal study could be designed to measure players' purchasing behaviour over time. As shown in Figure 1, in this research, all seven independent variables have been modelled as a direct determinant of behavioural intention expect for habit. Thus, it do not minimise the explanatory ability of the conceptual model even if we lack appropriate items for measuring actual purchase behaviour in view of placing emphasis on general purchase intention. However, care should be given in interpreting or generalising from these findings when applying them to the overall population (i.e. all virtual worlds). Third, although the research developed most measurement items based on previous studies, this is the first time that these items have been examined in the context of virtual worlds. Moreover, most research on virtual world transactions were carried out in the context of game-oriented virtual worlds. The ability of these items to reflect the complexities of players' perceptions and intentions in virtual worlds has not been fully explored. Therefore, the measures for the conceptual model should be viewed as preliminary and future research should be targeted at more fully developing and validating appropriate measurement items with an emphasis on new constructs lacking previous empirical testing, such as advancement, customisation and perceived value.

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