

Why do people buy virtual goods? A literature review

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Abstract

This paper reviews quantitative literature that addresses the questions of what explains why people buy virtual goods. The study reviews independent and dependent variables, path coefficients, used methodologies, theoretical backgrounds as well as types of services covered in the relevant literature. The goal of the paper is both to provide an overview to the literature and to investigate reasons for virtual good purchase. The results in the body of literature reveal that, for example, purchase behavior is most strongly driven by how satisfied people are with the use of virtual goods and whether they have a positive attitude towards using real money in virtual environments. Moreover, people seem to purchase virtual goods in order to give a favorable image of themselves. Furthermore, interestingly the enjoyment of using the platform where the virtual goods are sold in does not predict virtual good purchases.

1. Introduction

During the last decade virtual goods have arguably become one of the major categories of consumption in online environments among the purchases of normal physical goods (sold on e.g. Amazon) and digital goods such as music (e.g. iTunes). Selling virtual goods has become a major revenue model for games, social networking services and virtual worlds.

Virtual goods refer to digital objects such as items avatar clothing, weapons, virtual furniture, currencies, characters and tokens that commonly exist solely within the digital environment (such as a game or a virtual world) where they are usable in. What sets virtual goods apart from digital goods such as music and photos is that they are rivalrous; virtual goods can't be duplicated in the same sense as digital goods [1, 2, 3, 4] but are bound by the rules of the environment where they are used.

Understanding why people purchase virtual goods is a pertinent practical issue for game businesses and virtual world operators. Virtual goods are primarily

being operationalized as the source of revenue for otherwise free games (free-to-play) [3, 5, 6, 7] and virtual environments. In fact, today most online games are "free-to-play" [3, 8] and those which still rely on older business models are increasingly converting their business models towards this approach. However, only a minute percentage of registered users seem to purchase virtual goods (2% according to Forbes [9]).

Therefore, to meet this looming research problem, we performed a literature review that provides an overview to the studies investigating the questions of what predicts virtual good purchases. We review the service types, sample sizes, used theoretical frameworks and distribution of articles in the analyzed literature. Moreover we report the coefficients between the direct predictors and dependent variables in the covered literature.

2. Procedure

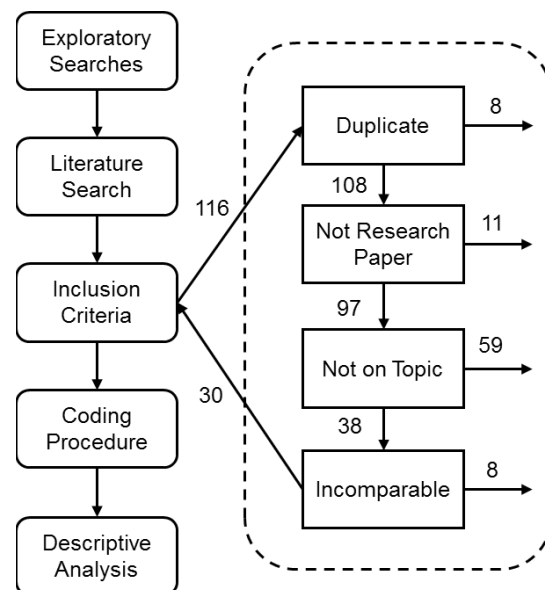


Figure 1: Procedure.

This section reports the individual phases in the analysis (see Figure 1). We began the analysis by conducting literature searches, first for defining comprehensive but accurate set of keywords with exploratory searches and then performing formal search of studies using the set of keywords. We formed an unambiguous rejection criteria for omitting search hits that did not meet the objectives of this study (Figure 1). Next, we coded the relevant statistics, findings and measures from the remaining set of studies. Finally, we conducted descriptive analysis by inspecting sample sizes, contexts of study, theoretical foundations and causal paths in the included studies.

2.1. Search

Following the guidelines of Webster & Watson [10] and Ellis [11], the analysis procedure was initiated with a literature search. We decided to use Scopus database as our main source of data, which is the largest abstract and citation database of scholarly literature [12]. Scopus is also the most relevant repository for studies within the disciplines where literature on purchasing behavior of virtual goods is being published. Moreover Scopus also includes, for example, the AIS, ACM, IEEE and Science Direct libraries among many others. The search procedure was undertaken in February 2015.

We began the search process by conducting a set of exploratory searches of articles for discovering and identifying the common terminology in order to determine comprehensive but accurately describing set of keywords for formal search. We also searched through studies that referred to those studies found in the keyword search. Repeating this process iteratively while keeping accurate terms and discarding too wide keywords eventually resulted in acceptable search string. This basically consists of two parts: 1) action of making purchases and 2) context of virtual items and typical type of games or virtual worlds that allow such purchases. This search string is targeted for meta-data (titles, abstracts and keywords) of the articles rather than entire text and gave us 116 search hits:

TITLE-ABS-KEY(purchase OR purchasing OR repurchase OR shopping OR buying OR "behavioral outcomes" AND "virtual items" OR "virtual goods" OR "virtual products" OR "digital items" OR "game items" OR "using virtual currency" OR "facebook games" OR "in game purchase" OR "virtual world application" OR "social network games" OR "free-to-play" OR "online games stores" OR "in virtual world")

2.2. Inclusion

We determined 4 criteria for systematic and straightforward inclusion of studies for the analysis. First, 8 duplicate research articles were omitted since they were earlier versions of an extended study or slightly differing variations using the same data set.

Second, 11 search hits were omitted for not being research articles. There were 8 full conference proceedings, 2 books and one more general article on online games which was not an empirical study.

Thirdly, the largest omission category with 59 omissions was research articles that were on a different topic than the purchasing behavior of virtual goods. In this category, most frequent topic was concerning interactive virtual product experience (e.g. inspecting virtual model of real item or wearing it on an avatar) and its effects on purchasing behavior of non-virtual items. This category also contains studies focusing on behavioral outcomes of augmented reality in purchasing decisions, effect of brands in virtual worlds on real brand item purchase intentions and development reports of different virtual product systems in addition to less frequent various topics.

Finally, 8 articles were omitted for being incomparable with the main body of research. This category contains 2 studies using incomparable data analysis methods, including Bayesian network approach and mean differences between groups. Instead, we identified that clear majority of the research had correlation based approaches for measurements, such as structural equation modeling and regression analyses. Additionally, this criterion rejected 6 qualitative studies that otherwise fit the topic. Since this review focuses only on quantitative research literature, these studies were therefore omitted.

The inclusion process resulted in 30 research articles for further analysis (See Figure 1).

2.3. Coding

Before the analysis, the data was coded in accordance to Webster & Watson [10] and Ellis [11]. In addition to all of the metadata we coded used methods, theories, contexts of studies, independent variables, dependent variables, relationships between variables, coefficients and effect sizes. Not all studies name and measure variables in the same way and, therefore, we were required to identify and combine variables that measured a same factors but used different names as well as variables with equivalent names but which in reality measured different aspects.

We identified two different types of variables related to measuring purchasing behavior of virtual

items: 1) intention to purchase and 2) actual purchasing behavior. Clear majority of the studies investigated intention and a significantly smaller number of studies were measuring actual purchasing.

In addition we checked all independent variables of all studies on whether they actually measured what the variable name indicated. As an example many studies measured “enjoyment”, however, some studies measured the enjoyment of the core service while others were interested in the enjoyment of using virtual goods and even some investigated the enjoyment of shopping activity itself. We combined or separated these cases accordingly.

As the body of literature is rather uniform and studies used rather standardized analysis methods, we were required to make only few other decisions in the coding process that can have an effect on final results. First, we had the decision of how to handle 5 studies that were not reporting effect sizes for statistically non-significant effects. The easy solution would have been to omit these for being incomparable studies. However, doing so would lose valuable information about discovered effects in the body of literature. Instead, we decided to roughly estimate the unreported non-significant effects by assigning them with zeros. It is highly unlikely that effects would have been strong but non-significant and most probably treating

these effects as zero would only slightly underestimate the measured but unreported effects. Fortunately for this review, there is only few relationships that are concerned by this.

The second notable decision was related to which model to choose from studies that had multiple models. In case of studies with multiple path models based on the same data, we preferred the more extensive models that had most information. In case of a study with multiple analyses for different and independent sample groups, we treated the results as independent findings. However, we decided not to include moderating effects since there were only 2 studies examining them.

The third decision was the inclusion of a study that had divided its sample into 3 subgroups by their demographic features and performed three different data-analyses with same model. The issue is that as the sample was divided after collection, the results for subgroups cannot be treated as independent. Again, it would have been simple to disqualify these results and accept the risk of losing valuable data. Instead, we decided to estimate the effect for the whole sample by calculating the mean of results for subgroups and using sample sizes as weights.

Table 1: Studies.

Study	Year	Sample	Service	Service Type	Venue
Animesh et al. [13]	2011	354	Second Life	Social Virtual World	MIS Quarterly
Cha [14]	2011	350	n/a	ANY	J. of Electronic Commerce Research
Cheon [15]	2013	343	Second Life	Social Virtual World	Information Technology Management
Chou & Kimsuwan [16]	2013	335	n/a	F2P Online Game	J. of Internet Banking & Commerce
Domina et al. [17]	2012	119	Second Life	Social Virtual World	J. of Retailing and Consumer Services
Gao [18]	2012	226	Renren	Social Network Site	J. of Applied Sciences, Engineering & Tech.
Guo & Barnes [19]	2012	253	World of Warcraft	MMORPG	J. of Computer Information Systems
Guo & Barnes [20]	2011	250	Second Life	Social Virtual World	Information & Management
Hamari [21]	2015	2156	Habbo Hotel	Social Virtual World	Int. J. of Information Management
		398	Multiple	FPS Online Game	
		237	Multiple	Social Network Game	
Han & Windsor [22]	2013	225	MCP	Mobile Game	Int. J. of Mobile Communications
Huang [23]	2012	176	Multiple	Social Network Game	Internet Research
Kaburuan et al. [24]	2009	38	Multiple	ANY	9th ICE-B
Kim [25]	2012	256	Cyworld	Social Virtual World	Cyberpsy., Behavior, & Social Networking
Kim et al. [26]	2014	216	QQ China	Social Network Site	Global Economic Review
Kim et al. [27]	2012	197	Habbo Hotel	Social Virtual World	Information Systems Research
		217	Cyworld	Social Virtual World	
Kim et al. [28]	2011	225	Cyworld	Social Virtual World	Information & Management
Krasnikolakis et al. [29]	2014	104	Second Life	Social Virtual World	Information & Management
Lee et al. [30]	2012	214	n/a	Social Network Game	Cyberpsy., Behavior, & Social Networking
Lee & Wohn [31]	2012	124	Multiple	Social Network Game	Computers in Human Behavior
Liu & Shiue [32]	2014	194	Multiple	Social Network Game	Social Behavior & Personality
Luo et al. [33]	2011	576	World of Warcraft	MMORPG	The Service Industries Journal
		400	Maple Story	MMORPG	
Mäntymäki & Salo [34]	2013	1045	Habbo Hotel	Social Virtual World	Int. J. of Information Management
Mäntymäki & Salo [35]	2011	2481	Habbo Hotel	Social Virtual World	Computers in Human Behavior
Mäntymäki et al. [36]	2014	1225	Habbo Hotel	Social Virtual World	Digital Services & Information Intelligence
Park & Lee [37]	2011	327	n/a	F2P Online Game	Computers in Human Behavior
Shang et al. [38]	2012	421	iPart	Social Virtual World	Computers in Human Behavior
Shin [39]	2008	311	Multiple	Social Virtual World	Interacting with Computers
Wang & Chang [40]	2014	477	n/a	Online Game	Information Systems Frontiers
Wang & Chang [41]	2013	288	n/a	Online Game	46th HICSS
Wohn [42]	2014	264934	PuppyRed	Social Network Game	32nd ACM CHI

3. Findings

This section reports our review findings. First, we report studies and their characteristics included in the review. Then, we report frequencies of types of environments, titles of the environments and theoretical foundations in the analyzed literature. Finally, we report causal relationships used in the literature.

Since the entire data has 213 unique causal paths, it is necessary to limit the scope. We decided to focus on direct predictors of purchase behavior in the collected literature. This leaves us with 66 and 23 unique causal paths where purchase intention and behavior are dependent variables, respectively.

3.1. Reviewed studies

The inclusion process resulted in 30 research papers for further analysis and they are represented in Table 1. When counting also different sub-studies, the total number of experiments is 34. The studies have been published between years 2008 and 2015, but most frequently and uniformly since year 2011. Most of the published studies are journal articles and only 3 are conference papers. Sample sizes have wide variation because of extreme value of 264,934 in a study that differs from others by using log data instead of mainstream method of questionnaires. Excluding this study from the count, we get sample sizes ranging from 38 to 2481 with a mean of 447.

3.2. Environments, theories & methods

The frequencies of different environment types are shown in Table 2. Clear majority of the studies were interested on purchasing behavior of virtual goods in social virtual worlds with a frequency of 15. Followed by this, social network games (6), online games (5), massively multiplayer online games (3), social networking sites (2), not specified (2) and mobile games (1).

Table 2: Frequencies of environment types.

Service Type	n
Social Virtual World	15
Social Network Game	6
Online Game	5
MMORPG	3
Social Network Site	2
Not specified	2
Mobile Game	1

We also went further into more specific level of environments by coding actual titles of the services and their frequencies are reported in Table 3. Most of the studies did report their scope to span over more than single service (7). Nearly as frequently, the studies did not report any title or their investigation didn't concern any specific titles (6). Among the reported titles, most of the studies did use Second Life or Habbo Hotel social virtual worlds, both with frequencies of 5. Moreover, Cyworld social virtual world was investigated in 3 studies. Most frequent game was World of Warcraft but with frequency of only 2. Rest of the reported titles were used in single studies.

Table 3: Frequencies of virtual environment titles.

Service	Service Type	n
Multiple	-	7
n/a	-	6
Second Life	Social Virtual World	5
Habbo Hotel	Social Virtual World	5
Cyworld	Social Virtual World	3
World of Warcraft	MMORPG	2
Renren	Social Network Site	1
Mystery of Crystal Portal	Mobile Game	1
QQ China	Social Network Site	1
Maple Story	MMORPG	1
Puppy Red	Social Network Game	1
iPart	Social Virtual World	1

For better generalization of research results, sharing similar variables and theoretical backgrounds with other studies is beneficial. Unfortunately, our review reveals that this is mostly not the case as clear majority of the studies didn't specify any clear theoretical foundation or used variety of variables from different other frameworks or studies (see Table 4). Moreover, the adoption of specific theories and models is rather scattered. However, technology acceptance model [43], theory of planned behavior [44] and unified theory of acceptance and use of technology [45] were found in more than one study.

Table 4: Frequencies of theoretical backgrounds.

Theoretical Background	n
Various	12
Technology Acceptance Model	4
Stimulus-Organism-Response Model	2
Theory of Planned Behavior	2
Expectancy Disconfirmation Model	2
Transaction Cost Theory + UTAUT	2
UTAUT	1
Theory of Consumption Values	1
Virtual Experiential Marketing	1
Customer Value Theory	1
Self-Presentation Theory	1
Social Capital Theory	1

The analysis methods are reported in Table 5. Clear majority of studies used structural equation modeling as their analysis method. Most of the studies employed covariance based SEM (13) while partial least squares SEM was also rather frequent (12). Minority of the studies conducted common regression analyses (5).

Table 5: Frequencies of data analysis methods.

Analysis Method	n
CB-SEM	13
PLS-SEM	12
Regression	5

3.3. Purchase intention

Among the two variables measuring behavior in the literature, purchase intention and behavior, intention to purchase virtual goods was adopted by clear majority of the studies. It refers to the user perception of how strongly one intends to perform given behavior in the near future [46]. It is a common variable in the most widely used behavioral theories such as theory of reasoned action, theory of planned behavior and technology acceptance model.

Table 6 reports all of the direct predictors of purchase intention in descending order of frequency (k number of studies) and secondly in ascending alphabetical order of independent variable. Tables also contain information about cumulative sample size, weighted mean of the effect by sample size as well as minimum and maximum findings in the strength of the effect.

Because technology acceptance model (TAM) and theory of planned behavior (TPB) were identified as ones of the most frequently adopted theoretical backgrounds (Table 4), it is no surprise that variables such as attitude, subjective norm and perceived ease of use are among the most frequently measured predictors of purchase intention. Moreover, as services that allow purchases of virtual goods, such as games and social virtual worlds, are mostly used for hedonic purposes, it is also quite expected that use of enjoyment is popular. The table also contains a number of variables that have been examined only by single studies which's effect size estimates are naturally less reliable than estimates of paths with multiple measures.

Based on the weighted means of more frequently studied paths, the strongest variable affecting purchase intention is satisfaction with virtual goods with path coefficient of 0.686. Moreover, both self-presentation and attitude towards purchasing virtual goods are rather strong with values of 0.467 and 0.437, respectively. Also, subjective norm has noticeable effect of 0.301 on purchasing intention, but with very large variance. Moreover, perceived playfulness shows some positive findings with weighted mean of effect of 0.413 based on two studies. Other more frequently studied variables seem to have rather small effects or weighted means near zero (see Table 6).

Based only on single studies, variables related to the appearance of virtual items and perceived value they offer such as aesthetics, emotional value, integrated value, product value, show strong effects on purchase intention.

3.4. Purchase behavior

The second and clearly less frequently measured purchase related dependent variables was the actual purchase behavior which reflects the actual behavior of the user as opposed to the mere intentions.

The direct predictors of purchase behavior are reported in Table 7 with the same fields as the previous table had. Again, as most frequently adopted theoretical model was TAM, it is no surprise that the effect of purchase intention on behavior was most frequently studied causal path with purchase behavior as dependent variable. However, this causal paths has still only a frequency of three studies.

The second most frequently studied predictor was habit with only a frequency of 2 while other variables were studied only by a single study. The strongest predictors of purchase behavior were the purchase intentions, social reasons and average time spent in store in virtual world all with extremely similar measures ranging from 0.360 to 0.362. Also the habits in purchasing virtual goods was relatively important factor (0.288). There was also findings for significant negative relationships in predictors relaxing and frequency of visiting virtual worlds similarly with path coefficients of -0.350 and -0.358, respectively. As these results are based on a single studies, the results are obviously less reliable.

Table 6: Purchase intention.

Independent Variable	k	$\sum n$	w. mean	min	max	# p<.05	# n.s.	% of p<.05
Subjective Norm	9	4219	0.301	-0.019	0.660	6	3	67 %
Enjoyment of Core Service	7	4553	0.040	-0.107	0.156	3	4	43 %
Flow	7	2393	0.199	0.050	0.550	5	2	71 %
Attitude	6	3366	0.437	0.263	0.648	5	1	83 %
Value for Price	6	1513	0.255	0*	0.694	5	1	83 %
Service Use Intention	4	5272	0.224	0.078	0.377	2	2	50 %
Perceived Ease of Use	4	1825	0.105	-0.020	0.200	2	2	50 %
Self-Presentation	4	853	0.467	0.311	0.580	4	0	100 %
Gender (Male)	3	764	0.002	-0.130	0.090	2	1	67 %
Perceived Network Size	3	4751	0.260	0.207	0.302	3	0	100 %
Satisfaction with Virtual Goods	3	1021	0.686	0.530	0.850	3	0	100 %
Social Presence	3	2624	0.038	0.029	0.079	1	2	33 %
Advancement	2	503	0.050	-0.097	0.196	2	0	100 %
Age	2	414	0*	0*	0*	0	2	0 %
Community Relationship	2	976	0.227	0.167	0.268	2	0	100 %
Customization	2	503	0.236	0.186	0.287	2	0	100 %
Effort Expectancy	2	503	0.203	0.158	0.248	2	0	100 %
Enjoyment of Shopping	2	469	0.208	0.020	0.760	1	1	50 %
Interaction	2	976	0.083	0.058	0.100	0	2	0 %
Perceived Behavioral Control	2	264	0.220	0.169	0.524	2	0	100 %
Perceived Playfulness	2	450	0.413	0.225	0.600	2	0	100 %
Performance Expectancy	2	503	0.171	0.098	0.245	1	1	50 %
Pleasure	2	976	0.158	0.135	0.191	2	0	100 %
Satisfaction with Experience	2	670	0.062	0.040	0.086	0	2	0 %
Sense	2	976	0.070	0.069	0.070	0	2	0 %
Virtual Community Tenure	2	414	0*	0*	0*	0	2	0 %
Added Value of Game App	1	225	0.313			1	0	100 %
Aesthetics	1	225	0.510			1	0	100 %
Affective Involvement	1	176	0.542			1	0	100 %
Availability	1	1045	0.138			1	0	100 %
Challenge/Competition	1	214	-0.090			0	1	0 %
Character Competency	1	335	0.039			0	1	0 %
Character Identification	1	327	0.256			1	0	100 %
Cognitive Absorption	1	1225	0.337			1	0	100 %
Cognitive Involvement	1	176	-0.160			1	0	100 %
Concentration	1	119	0.001			0	1	0 %
Control	1	119	0.230			1	0	100 %
Emotional Value	1	421	0.620			1	0	100 %
Enjoyment of Items	1	335	0.313			1	0	100 %
Fantasy / Role Playing	1	214	-0.107			0	1	0 %
Functional Quality	1	225	0*			0	1	0 %
Innovativeness	1	350	-0.040			0	1	0 %
Integrated Value of Purchasing	1	327	0.397			1	0	100 %
Knowledge Creation	1	216	0.190			1	0	100 %
Passing Time / Escapism	1	214	0.043			0	1	0 %
Perceived Consequence	1	38	0.023			0	1	0 %
Perceived Risk	1	311	-0.490			1	0	100 %
Perceived Security	1	350	0.040			0	1	0 %
Personal Innovativeness	1	38	-0.332			1	0	100 %
Price	1	335	0.014			0	1	0 %
Privacy Concerns	1	350	0.020			0	1	0 %
Product Value	1	343	0.516			1	0	100 %
Promotion	1	335	0.253			1	0	100 %
Purchase Motivation	1	216	0.410			1	0	100 %
Self-Efficacy	1	1045	0*			0	1	0 %
Social Interaction	1	214	0.119			0	1	0 %
Social Relationship Support	1	225	0*			0	1	0 %
Social Value	1	421	0.120			1	0	100 %
Status	1	253	0.126			1	0	100 %
Telepresence	1	354	0.000			0	1	0 %
Trust in Other Users	1	1225	0.171			1	0	100 %
Usefulness of Using Service	1	1045	0.152			1	0	100 %
Usefulness of Shopping	1	350	0.030			0	1	0 %
Usefulness of Virtual Currency	1	311	0.290			1	0	100 %
Visual Authority Value	1	335	0.049			0	1	0 %

* Zero assigned non-significant unreported path coefficients. Weighted means of single findings represents the only measurement.

Table 7: Purchase behavior.

Independent Variables	k	Σ n	w. mean	min	max	# p<.05	# n.s.	% of p<.05
<i>Self-reported Purchase Behavior as dependent variable</i>								
Purchase Intention	3	729	0.361	0.212	0.691	3	0	100 %
Habit	2	503	0.288	0.239	0.337	2	0	100 %
Avg Time Spent in Store	1	104	0.362			1	0	100 %
FB Friends (#n)	1	124	-0.070			0	1	0 %
Frequency of Visiting VWs	1	104	-0.358			1	0	100 %
Horizontal Collectivism	1	124	-0.040			0	1	0 %
Horizontal Individualism	1	124	-0.070			0	1	0 %
Neighbors	1	124	0.140			0	1	0 %
Pass Time	1	124	-0.040			0	1	0 %
Perceived Behavioral Control	1	226	0.168			1	0	100 %
Relax	1	124	-0.350			1	0	100 %
Social	1	124	0.360			1	0	100 %
Status	1	124	0.090			0	1	0 %
Vertical Collectivism	1	124	0.180			0	1	0 %
Vertical Individualism	1	124	0.040			0	1	0 %
<i>Binary Purchase Behavior as dependent variable</i>								
Age	1	264934	-0.010			1	0	100 %
Gender (Male)	1	264934	-0.090			1	0	100 %
No. of Beans	1	264934	0.000			1	0	100 %
No. of Visits	1	264934	0.020			1	0	100 %
No. of Friends	1	264934	0.020			1	0	100 %
Time Spent Playing	1	264934	0.000			1	0	100 %
Virtual Goods Given	1	264934	0.620			1	0	100 %
Virtual Goods Received	1	264934	0.040			1	0	100 %

4. Discussion

This paper reviewed 30 quantitative addressing the questions of what explains why people buy virtual goods. The study reviewed types of services, theoretical backgrounds, used methodologies as well as causal path coefficients covered in the relevant literature. The goal of the paper was both to provide an overview to the literature and to investigate reasons for virtual good purchase. We used sample size-based weighted averaging for summarizing the effect sizes explaining purchase behavior in the body of literature. However, future work should proceed deeper in analysis and adopt more sophisticated meta-analysis methods for synthesizing research findings and generating more accurate estimates on effect strengths. This literature review-based study can be regarded as the initial mapping of the area.

The results of the review reveal that there has been a significant increase in the literature on the topic from year 2011 onwards till today. The body of literature has focused on a variety of environments of virtual goods purchase behavior such as social virtual worlds, social networking sites and different type of games. The body of literature also shows a large divergence in the employed theoretical backgrounds although some

common ground has been established by the use of popular behavioral theories TAM, UTAUT and TPB in the body of literature. Moreover, studies share a very close-knit repertoire of methods by mostly concentrating on using regression and structural equation modeling.

The actual results in the body of literature (see full list in Table 6 and 7) reveal interesting insights into why people purchase virtual goods. Purchase behavior is explained primarily with purchase intention but also with habits. Purchase intention in turn is most strongly driven by how satisfied people are with the use of virtual goods and whether they have a positive attitude towards using real money in virtual environments. Moreover, people seem to purchase virtual goods in order to give a favorable image of themselves. Furthermore, interestingly the enjoyment of using the core service where the virtual goods are sold in does not predict virtual good purchases while it is thought as one of the main reasons for using the service. These results could be in line with past literature that suggests that game operators attempt to increase demand for virtual goods by intentionally inconveniencing players by limiting some aspects of the game or making the game more burdensome to play. Therefore, enjoyment may have a double role in explaining purchases; enjoyment of the game is

needed for retaining players and thus increasing the likelihood of purchases but on the other hand, negative enjoyment is needed for the player to feel the need to purchase more (see e.g. [3, 7, 21]).

This review used standardized path coefficients (also known as betas) as effect size measure. These measures were from structural equation modeling or regression analyses of previous studies. However, path coefficient estimates are dependent of model structure and presence of other predictor variables which likely added bias to results of this review. Future research could eliminate dependency of effect size measures by using zero-order correlations between variables instead of standardized path coefficients.

Since this study intended to provide descriptive view at the study field, we did not utilize any of the theoretical frameworks in the analysis and inspected relationships independently by limiting the scope into direct effects of purchase behavior related variables. However, research models commonly had multilevel structures which was therefore not taken into account. For example, attitude seems relatively strong predictor of purchasing intention but is rather abstract in its own. Indeed, every individual study using attitude in their research model had also different predictors for attitude. Future efforts could go further into the models and also analyze indirect effects. Perhaps one could pool correlation matrix from previous researches and use meta-analytic structural equation modeling to investigate certain theory with the large scale data.

All of the reviewed studies, and therefore also this study, focused only on operator-condoned virtual goods purchase behavior. However, the literature also offers several studies that investigate the so called “real money trading” outside the service in secondary markets (and black markets) between players [4, 47, 48, 49] and the motivations for purchasing there might differ. Future analyses could take the so called real money trading into account.

Studies in this review used several theories in their research models and as mentioned, the model structure can affect estimates significantly. While the use of popular theories such as TAM is favorable for quantitative reviews, it might suppress new interesting effects. Future studies could pay more attention on whether their model structure conceals significant dependency between variables.

Our review reveals that the studies have been conducted in variety of environments ranging from social virtual worlds and networking sites to different genres of games. However, these environments are notably different from each other and are most likely used for different reasons and therefore motivations for purchasing virtual goods are also expected to

differ. Future efforts could inspect this with proper division in type of environments.

As we were particularly focused on quantitative research literature and used weighted averaging for providing perception on generalized effect strength, several studies are needed for more reliable estimates. However, due to the relatively low number of studies and especially because of scattered nature of research literature, this review contained rather low frequencies of findings for some causal paths. While fortunately most of the findings in included studies were rather uniform, some causal paths preferably would need more independent results for better generalization.

We made decisions in estimating unreported non-significant effects and weighted averaging sub-group results of single study which both affected our results. While these inclusions underestimated some weak effects and added slight bias to some measurements, extending the coverage of studies instead of rejecting these findings was thought as a better option.

Finally, we would like to emphasize scholars not to hide measures such as non-significant path coefficients and total variance in dependent variable explained by independent variables (R^2) in the research model. Unreported non-significant path coefficients are especially unfortunate from the view point of reviews, but also not reporting the R^2 -values conceals the predictive performance in the model.

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