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Managing uncertainty in service production with mobile systems - Case waste management company

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THE HEDONIC AND UTILITARIAN VALUE OF DIGITAL GAMES AT PRODUCT CATEGORY LEVEL

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Abstract

Consumers' product evaluation, choice, and use are driven by both utilitarian and hedonic considerations. Digital games, that are typically considered to be a homogenous product category, are often claimed to be high on hedonic value. However, there is a multitude of digital games genres available. Differences in their appeal, gameplay, and purpose in practice indicate that digital games vary significantly in their proposed outcome.

In this research paper, we present results from an observational survey study in which digital games were investigated at subcategory level. We found differences in weights consumers place on hedonic and utilitarian value at the product subcategory level, and also observed differences between evaluations of experienced and inexperienced consumers. The results indicate that subcategories act as a more assuring source of information than the general product category of digital games. Furthermore, higher gaming experience may lead to more optimistic evaluation on subcategories.

Rather than grouping digital games into one category and treating them all as hedonic products, they should be discussed at their specific subcategory level, by researchers and practitioners, alike.

Keywords: digital games, hedonic value, utilitarian value, product categories

1 INTRODUCTION

Since the 1980's, various studies in consumer goods and services (Dhar et al. 2000; Okada 2005); information systems (Davis 1989; Van der Heijden 2004), and digital games (Choi et al. 2004; Hsu et al. 2005) have shown that consumer choice and use of different products and services are driven by both utilitarian (UT) and hedonic (HED) considerations.

Hirschman and Holbrook's (1982, p. 99) early outlook to hedonistic consumer behavior is that "*hedonic consumption designates those facets of consumer behavior that relate to the multisensory, fantasy and emotive aspects of one's experience with products*". In other words, hedonic or pleasure oriented consumption is expected to be motivated by the desire for sensual pleasure, fantasy and fun (Strahilevitz et al. 1998, p. 436). In contrast, utilitarian or goal oriented consumption is "*more cognitively driven, instrumental, and goal oriented and accomplishes a functional or practical task*" (Dhar et al. 2000 p. 61; Strahilevitz et al. 1998).

Earlier research has found major differences between the perceived value of utilitarian and hedonic software applications, also in the context of digital games (Davis 1989; Raessens et al. 2005). Digital games are most often assumed to be high on hedonic value (Batra et al. 1990; Chen 2007; Hirschman et al. 1982; Hsu et al. 2005; Voss et al. 2003), and the motives for using hedonic systems, such as digital games, are different than those for utilitarian systems, such as office information systems (Van der Heijden 2004).

Digital game production has grown to be a significant sector of software business (Crandall et al. 2006; Siwek 2007). Even though digital games are often treated as a product category among other, relatively heterogeneous consumer products (e.g. paper clips, beer, blue jeans) Batra et al., (1990), Voss et al., (2003), there are multitudes of different types of games, and the reasons to play them vary greatly: games can be played, for example, for educative purposes, or mainly just for fun. The great differences in the appeal and use of games in practice suggest that instead of studying games as one general category, we should be looking at the subcategories.

In this study, we will analyze the perceived hedonic and utilitarian value of digital games in different game subcategories. We will also explore the differences in these values between experienced and inexperienced players, as expressed in recommendations to others.

The structure of this paper is as follows: In section 2, we present our theoretical background. In section 3 we introduce the hypotheses and research model. We then describe our research method and the empirical study setting in section 4, and present the results of our study in section 5. Section 6 summarizes and concludes the paper.

2 THEORETICAL BACKGROUND

Our study builds on the Motivational theory (Deci 1975) to understand the motivation of players of digital games, and on the theories of consumer behavior (Ajzen et al. 1980, see e.g.; Bettman et al. 1980) to understand the effect of prior knowledge and experience on the perceived value of the games.

2.1 *Motivation of Game Playing*

One of the objectives of game developers is to optimize game experience by designing elements of gameplay that motivate the player to continue playing without too much anxiety or boredom (Chen 2007). Specifically, in digital games production, this concept of *flow experience* (Csikszentmihalyi 1975) is widely used to provide outcomes such as enjoyment, pleasure, and

fun, and to maintain the flow at the desired level. The flow experience is a part of an individual's motivation to play games and has been defined as *"an extremely enjoyable experience, where an individual engages in an on-line game activity with total involvement, enjoyment, control, concentration and intrinsic interest."* (Hsu et al. 2004).

Therefore, the motivational theory by Deci, (1975) lays the basis for the understanding of how digital games are chosen and why they are played. From motivational perspective of consumption, hedonic goods entail intrinsic value, whereas utilitarian entail more extrinsic values. Intrinsic motivation has been defined as *"the inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore, and to learn it is performing an activity for the satisfaction of the activity itself"* (Ryan et al. 2000, p. 70). Extrinsic motivation, in turn, is expected to lead to performance of an activity, in order to attain some separable outcome (Ryan et al. 2000).

Different products and services often vary greatly in their proposed outcomes (Hirschman et al. 1982). For instance, many services intend to provide an outcome closer to hedonistic value (e.g. movies, concerts) rather than utilitarian value provided by many packaged goods (e.g. shoe laces, hammers). Different digital games are similar in their delivery format, but many times distinct in their proposed outcome, making the analysis of the game subcategories necessary.

A category exists *"when two or more distinguishable objects or events are treated equivalently"* (Mervis et al. 1981, p. 89). This equivalent treatment means different ways of labeling distinct objects or events with the same name, or performing the same action on different objects. Consumers have been found to rely on the categorizing process: Evaluation of a product depends on the particular category to which it is perceived to belong (Blackwell et al. 2006, p. 110). Given this, specific brands can be built around these consumer segments (Rust et al. 2004).

We define digital games as examples of social systems which have information technology embedded in them (Land 1992). In practice, digital games are software applications, the purpose of which is to entertain (Hsu et al. 2004) – or with some games, educate – the users.

There is a multitude of ways to categorize digital games: gameplay, technology platform, delivery channel, age limit, language, graphics, user type, purpose, producer, temporality, price, and character, to name a few (Mäyrä 2008; Rutter et al. 2006). In this study, we classify different subcategories of digital games by their proposed gameplay experience, which has been defined as *" a complex dynamics of interaction between the player and a game in which the structure of game including characters, virtual space, rules and story elements are at central focus"* (Ermi et al. 2005). Digital game sub-categories, such as, sports games, massively multiplayer online role playing games (MMORPGs), racing games, and so on, are commonly identified segments which can be benchmarked with competitive analysis and product positioning (Rust et al. 2004). Most importantly, the labels of these categories are also those used by the consumers who play the games.

2.2 Experience

The essence of consumer behavior has been described as a choice between different product and service alternatives (Ajzen et al. 1980). This is based on the assumption that behavioral changes related to choice are often dominated by cognitive processes and systematic use of available information, even if people often strive to simplify their decision making (Howard et al. 1969). Nevertheless, consumer decisions are context dependent and subject to, for instance, the influence of product type and category (Zeithaml et al. 2006). Additionally, individual differences drive consumers to manage their deliberative processes differently, depending on many factors and situations (Foxall 2005). Decision making involves many environmental factors that lie outside the control of the individual. Foxall (2005) maintains that social, business, cultural and

economical factors affect the consumers' stimuli and attention. When information is received, it is recorded either on the short or long term memory, and processed depending on the consumer's prior experiences, beliefs, attitudes, goals and other evaluation criteria.

Consumers' choice criteria are influenced by prior knowledge and experience (Bettman et al. 1980). People with little prior knowledge and experience tend to simplify their product evaluation process and decision making. While they acknowledge the benefits of additional product information, the perceived high cost of information processing discourages search for and processing of more information. In contrast, people with high levels of prior knowledge face low search costs; yet, they tend to shortcut the search process, as they rely on previously acquired information. People with some prior knowledge have both the ability and motivation to process new information available to them. Prior experience shapes the decision process through other heuristic effects, as well. For example, consumers with high levels of experience tend to engage in brand comparisons, while less experienced consumers rely more on product attribute information (Bettman and Park 1980). Most importantly, an experienced user has different, typically higher, enjoyment related expectations than inexperienced user (Atkinson et al. 1997).

Experienced consumers are expected to be more confident sources of recommendations than inexperienced consumers. Word-of-mouth (WOM) recommendation has been depicted to be an effective method to influence consumers in their choice process. According to Brown and Reingen (1987), WOM –type of recommendation can be divided into two distinct sources. Firstly, strong tie sources are those that are socially relevant to the consumer and known personally (e.g. friends and family). Strong ties have been shown to be important at the micro level of referral behavior. Secondly, weak tie secondary sources are those seldom contacted acquaintances, or those not known personally at all, that have been found to play a crucial role in the flow of WOM information across groups (Brown et al. 1987 p. 360). Most importantly, recent research evidence suggests that a simple response to a question “How likely is it that you would recommend this product to a friend or colleague?” would actually reveal how loyal a consumer is to a specific product or a brand (Reichheld 2006). Even though our focus is on the strong tie elements, we acknowledge that the weak tie effects of larger social communities have a great importance in individual's behavior (Granovetter 1973).

In essence, digital games are experience goods, the quality of which can be determined only through consumption (Bryce et al. 2006; Zeithaml et al. 2006). Information in different forms (e.g. demonstration versions) and from different sources (e.g reviews on websites and WOM) helps the consumers in obtaining critical pre-purchase product information (Klein 1998). Intentional or not, these different sources of information act as recommendations which influence consumers' product evaluation process positively or negatively (Smith et al. 2005).

3 PROPOSED RESEARCH MODEL AND HYPOTHESES

In this study, we propose that different digital games vary by their perceived hedonic (HED) and utilitarian (UT) value. Following that, we propose that HED is a better predictor of recommendation than UT.

We formulate our hypotheses as followed:

Hypothesis 1 (H1) = Consumer's prior experience significantly influences his/her perceived level of both HED and UT value of digital games at the product subcategory level.

We report this by creating a scatter plot of the summated variables and comparing statistical differences between single, summated, and latent factor variables.

Hypothesis 2 (H2) = Consumer’s perceived HED value of digital games predicts better strong-tie recommendation than the UT value.

We measure the effect of HED and UT latent factor variables on recommendation with a multiple linear regression model: $Recommendation = constant + HED + UT$. Specifically, we are interested in the proportion that HED and UT explain recommendation (see Figure 2.).

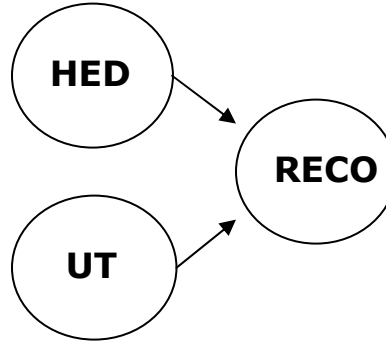


Figure 2. Research model.

4 RESEARCH METHOD

According to Voss et al. (2003), the hedonistic and utilitarian constructs can be reliably observed by using five variables in both latent constructs. We adapted these variables for our survey questionnaire (see Table 1). The questionnaire item labels were translated from English to Finnish. Due to the translation issues (e.g., synonyms and overlapping terms), only four of the suggested five terms were used. Due to these issues, two attributes (Enjoyable and Useful) could not be measured as variables within their respective original constructs as they are used to define HED and UT constructs. Thus, they were observed separately as two HED/UT (single) variables. We used semantic differential scaling from -3 to +3 in questionnaire items, however, the final results were transformed to scale from 1 to 7 for easier comparability with prior research.

Hedonic variables			Utilitarian variables	
Not enjoyable	Enjoyable	← single HED/UT	Useless	Useful
Dull	Exciting	→ HED/UT constructs	Not functional	Functional
Not delightful	Delightful	→ HED/UT constructs	Unnecessary	Necessary
Not thrilling	Thrilling	→ HED/UT constructs	Impractical	Practical
Not fun	Fun	→ HED/UT constructs	Ineffective	Effective

Table 1. Utilitarian and hedonic variables used in questionnaire (adapted from Voss et al., (2003))

The questionnaire form was first commented and pre-tested by five colleagues and pilot users. A web server based application called Webropol (webropol.com) was used to create and conduct the survey. The respondents were students in a Finnish Business School, taking a course on “Personal Computing Skills” in September, 2008. The empirical set of data was processed using the SAS Enterprise Guide, version 4.1.

During the first two actual data collection sessions out of five in total, 71 respondents were asked to categorize the adjectives used in the questionnaire by their perceived meaning as utilitarian or

hedonic words. All used adjectives were correctly grouped under their respective, expected constructs.

After answering questions measuring background information, the subjects assessed digital games without any reference to any specific game brand or subcategory. For general digital games category, respondents were asked to answer to a question in which the level of HED (enjoyable) and UT (useful) was measured by using them as opposite terms.

Thereafter, respondents were asked to answer questions on 16 different digital game product categories (see Appendix 2). Users were asked to evaluate different categories such as, sports games or massively multiplayer on-line role playing games as a whole. Each questionnaire page with a product category started always with two to nine real digital game package cover pictures. The objective was to create better understanding of real-life products related to the evaluation of images rather than only by using text. All selected games were relatively well known and widely spread, and mostly published for consoles, handheld consoles and PC platforms.

After assessing the psychometric values for game categories, the respondents were asked about their experience during past twelve months in each category. The order of the variables was randomized, but they were in the same order at each product subcategory level. We deemed it unlikely that all respondents had either awareness or experience on every category. For better reliability, each psychometric questionnaire item also included an option to respond “I can not say”.

5 RESULTS

5.1 Descriptive statistics

There were 135 usable responses out of 136 in total (1 uncompleted form). Forty-eight percent of the respondents were female, and 52 % were male. The respondents were between 18-31 years, 20.4 years being the average age and 20 years the median. As many as 44 % of the respondents reported to be active game players, while the remaining 56 % had not played at all in the past 12 months. The average age of starting playing digital games was 7.6 years (Table 2.).

	Total (N)
Respondents (#)	135
Men / Women (#, %)	70 (52 %) / 65 (48%)
Age in years (average, median, min-max)	20.4, 20.0, 18 - 31
Age when first time played digital games (years, median, min-max)	7.6, 7.0, 2-15
Players vs. Non-players (#, %)	59 (44%), 76 (56%)
Average weekly playing time (average, median, range).	3h, 11h, 2, 6min - 16h

Table 2. Descriptive statistics on the respondents

There were only a few missing answers. Generally, with few exceptions, those who reported being experienced game players answered to all questions. There were only two categories which had relatively high amount of “I can not say” responses (*professions* and *text based adventure*). In all other categories, the number of "I can not say" -responses ranged from 3 to 28 inexperienced respondents.

5.2 Data analysis

To the general question about digital games HED/UT value level, respondents evaluated digital games to be more fun or entertaining than useful (in a scale of 1-5). Experienced respondents' (n=59) average was 3.93, while it was 3.61 for the inexperienced (n=76). Furthermore, the difference between experienced and inexperienced respondents was statistically significant (t-value = 2.46, $p < 0.05$).

We first produced a correlation analysis and calculated the reliability score for both HED and UT variables in general digital game and subcategory levels. All the used variables fit well into their responding latent factor variables (Cronbach's Alpha > 0.86). Then, we formed a single composite summated measure of both HED and UT by combining their respective variables (Hair et al. 1984).

To test our hypotheses, we first created a summated scatter plot that presents the perceived HED/UT value for each category and between experienced and inexperienced respondents (Figure 3) (for detailed statistical data, see Appendix 2 and 3).

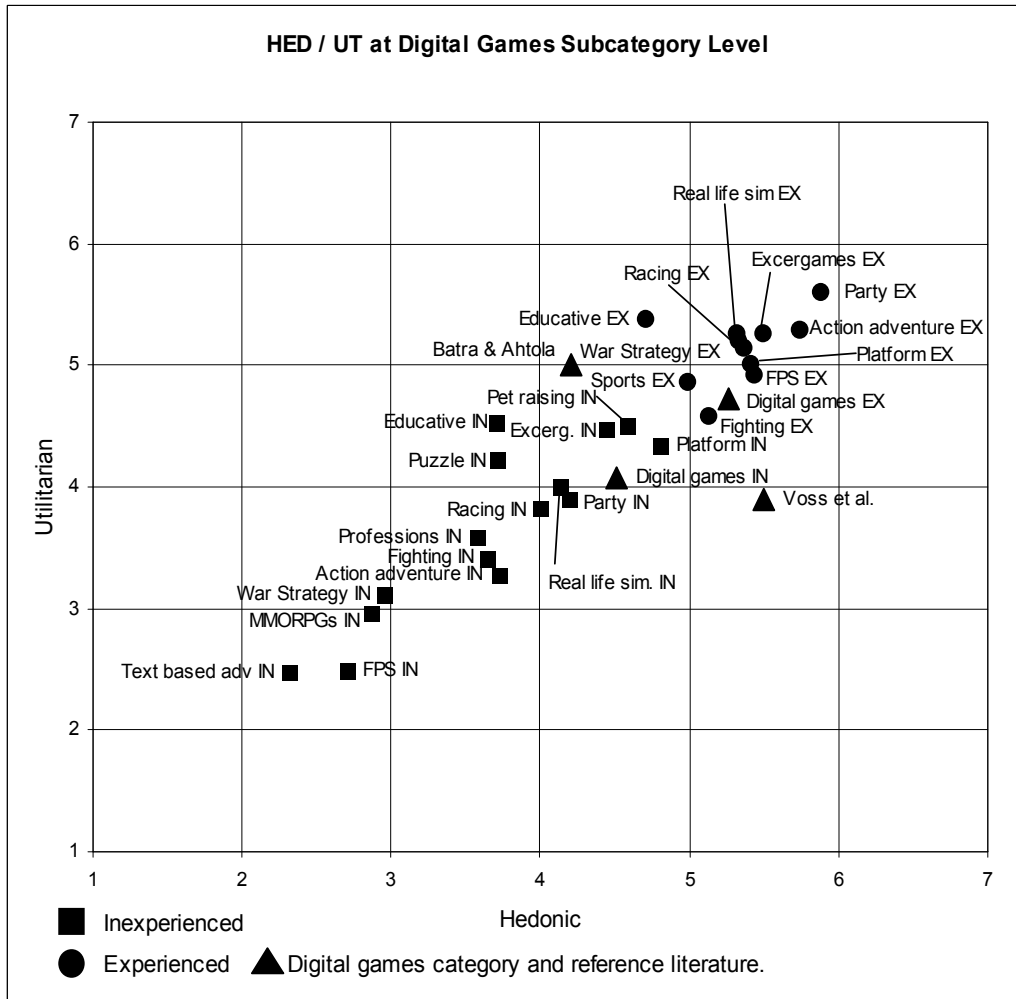


Figure 1. HED / UT summated scatter plot

We then computed factor scores for both HED and UT in all subcategories by using principal component analysis without rotation. These latent variables were used to measure the effect of HED and UT on recommendation with a linear regression model.

The summated HED/UT scatter plot indicates that there is no game subcategory which would be high on only hedonic or on utilitarian value. The experienced respondents seem to be more coherent in their opinions, and there was less variation between the game subcategories for them than for the inexperienced respondents. The inexperienced assess mainly more HED/UT value for playing games generally, but at the product subcategory level their beliefs and attitudes become more negative, decreasing both HED and UT. In contrast, the experienced game players mainly assess the subcategories higher than the digital games in general. The results indicate that higher experience may lead to more optimistic evaluation.

The most notable difference (mean difference => 1.99 - 2.74) between experienced and inexperienced respondents in both HED and UT was in games in which war and violence are the focus of the gameplay (FPS as *first person shooters*, *war strategy* and *action adventure* games). The greatest perceived hedonic value among experienced was assessed to *party games* with a significant difference to inexperienced game players. Singing, dancing and playing together is perceived as a hedonic act also in real-life and those not experienced are probably not interested in these acts in real-life, either.

The least difference in HED and UT was assessed to the general category of *digital games* and to *exercergames* (games incorporating real physical exercise). *Excergames* is a new subcategory in which especially Nintendo (Wii) has been very active, promoting the console as a new way of experiencing digital games. It can also be stated, that this category is marketed to inexperienced consumers with a purpose of enlarging the market potential for game industry. These were followed by *educative* and *platform* games. *Educative* games are probably perceived to include beneficial outcomes for their players. In this research setting, the examples of *platform* games were well known game characters such as Mario and Sonic. The extensive brand building efforts by the brand owners and earlier experiences from the respondents' childhood could have added to the positive image.

In four categories, there were not enough experienced respondents to make reliable comparisons. These were *pet raising* (targeted at children), *professions* (targeted at young girls), *text based adventure* and *MMORPGs*.

We then tested the interaction effect of HED/UT latent factor variables to recommendation (RECO) by using multiple linear regression model in all subcategories. Furthermore, the means procedure and t-tests were computed (see Appendix 3). Among the experienced respondents recommendation for all game categories was high (>4.2) as for inexperienced respondents it was relatively low (<3.0). In all subcategories differences were statistically significant (t-test between means, $p < 0.5$). Generally, digital games were recommended based on their hedonic value, which is similar to the finding for the single variable (HED vs. UT) item. Further, the level of adjusted coefficient of determination, r^2 , is notably higher in the subcategory level than in the general category of digital games. This indicates that HED and UT explain better RECO in subcategory level and respondents are more confident about their opinions.

The largest differences between experienced and inexperienced users can be found in games with war and violence (*FPS*, *war strategy*, *action adventure*). The highest recommendation would be given for *party games* among experienced and for *educative and exercergames* among inexperienced consumers.

Our first hypothesis (H1) was supported. Experience significantly influences the perceived level of both hedonic and utilitarian values of digital games at the product subcategory level. The experienced have constantly higher perceived HED and UT for different subcategories.

For the second hypothesis (H2), we may conclude that even though recommendation can be explained by using hedonistic and utilitarian value, the main interacting variable varies between product categories. There is no general, systematic evidence that only HED would explain recommendation but that it depends on the subcategory. Hence, H2 was rejected.

6 SUMMARY AND CONCLUSIONS

In this study, we set out to investigate the hedonic and utilitarian values of digital games, as perceived by the consumers. Using Business School students as subjects, we conducted a survey to test our hypotheses.

Results of our empirical study demonstrate that, digital games, in all observed subcategories, provide more perceived hedonistic than utilitarian value. However, our analyses suggest that digital games are *not only high* on hedonic value, but that the level of perceived HED and UT depends on the user's gaming experience and the product subcategory. Hence, digital game evaluation and product positioning should be done at the product subcategory level, rather than generalizing all games being equal in their proposed outcome.

Secondly, we classified the respondents into experienced and inexperienced players. Experience was clearly found to be a differentiating factor for evaluation of the different outcomes of digital games. To accomplish these objectives we used psychometric measurement instruments, specifically hedonic and utilitarian values of information systems as an operational tool.

Statistically, HED and UT variables strongly correlate in all different kinds of data analysis and among different subcategories. This would suggest that perceived hedonic and utilitarian values are not separate constructs, but that, in the context of digital games, they are processed simultaneously in product evaluation situation.

The consumer's perception about the digital game subcategory affects the beliefs about specific products within it. Digital games subcategories act as a more confident source of information for the consumers than the general category of *digital games*. Further, the results indicate that higher experience on games within a subcategory may lead to a more optimistic evaluation of HED and UT. This finding has clear implications for the practitioners in the digital game development business who intend to attract new players for their games.

There are some limitations in this study. First, the dualistic perspective in which complex sensory and emotional experiences are measured by using two quantitative constructs such as HED and UT within a survey may be misleading. HED and UT do not fully explain what is the true meaning of these games for the users and *why* certain game categories are preferred. Therefore, a more in-depth qualitative study by interviewing game players is needed to understand why these differences may occur. Another limitation is the use of students as our subjects. This sample did, however, work well to accomplish our objective of differentiating different types of game categories.

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Appendix 2. HED/UT sample size, means, and statistical differences in means.

Category	HED - UT S*	HED- UT F*	HED - UT Si*	HED M	HED M	UT M	UT M	MD HED **	MD UT **	n Ex/In	
	SSD	SSD	SSD	EX	IN	EX	IN	EX/IN	EX/IN	HED	UT
Digital games	YES	YES	YES	5.26	4.51	4.73	4.08	0.75	0.65	59/73	59/70
FPS	YES	YES	YES	5.44	2.70	4.92	2.50	2.74	2.42	50/75	50/73
War strategy	YES	YES	YES	5.37	2.95	5.14	3.11	2.42	2.03	47/78	47/76
Action adventure	YES	YES	YES	5.74	3.72	5.28	3.28	2.02	1.99	49/74	49/74
Party games	YES	YES	YES	5.89	4.19	5.60	3.89	1.70	1.72	87/36	87/34
Sports games	YES	YES	YES	4.99	3.49	4.86	3.60	1.50	1.26	63/64	63/62
Fighting	YES	YES	YES	5.13	3.64	4.58	3.41	1.49	1.17	34/79	34/78
Racing games	YES	YES	YES	5.33	3.99	5.19	3.82	1.34	1.37	62/61	62/60
Excergames	YES	YES	YES	5.50	4.44	5.25	4.47	1.06	0.79	38/77	38/8
Puzzle	YES	YES	YES	4.77	3.71	5.15	4.22	1.06	0.94	65/53	65/52
Educative	YES	YES	YES	4.71	3.70	5.37	4.53	1.00	0.85	36/84	36/81
Platform	YES	YES	YES	5.42	4.80	5.00	4.34	0.63	0.66	39/79	39/79
Real life simulation	YES	YES	YES	5.33	4.13	4.85	4.00	1.19	0.84	23/83	23/83
MMORPG	-	-	-	-	2.87	-	2.97	-	-	16/95	16/91
Pet raising	-	-	-	-	3.03	-	3.26	-	-	6/104	6/101
Professions	-	-	-	-	3.58	-	3.59	-	-	2/79	2/78
Text based adventure	-	-	-	-	2.32	-	2.48	-	-	2/72	2/68

* Statistically significant diff. $p < 0.05$, summated scale (S), factor scale (F), single variable (Si). - = Few observations.

** MD = Mean difference

Appendix 3. RECO sample size, mean differences, and results on linear regression (HED/UT).

Category *	RECO Mean		MD Reco	n	r ²	n	n M **	HED C ***	UT C ***	HED i %	UT i %	MIV ****
	EX	IN		EX/IN	Adj.							
Digital games	4.53	3.09	1.43	59/76	0.28	107	28	0.42	0.16	72	28	HED
FPS	4.64	2.01	2.63	50/84	0.75	105	30	0.35	0.53	39	61	UT
War strategy	4.91	2.46	2.46	47/87	0.72	107	28	0.56	0.30	65	35	HED
Action adventure	5.12	2.87	2.26	49/83	0.66	107	28	0.32	0.51	39	61	UT
Party games	5.63	3.64	1.98	88/45	0.78	109	26	0.74	0.15	83	17	HED
Sports games	4.71	3.07	1.64	63/71	0.63	113	22	0.39	0.43	48	52	
Fighting	4.29	3.00	1.29	34/99	0.70	99	36	0.48	0.37	57	43	
Racing games	4.74	3.50	1.24	62/70	0.53	114	21	0.47	0.28	63	37	HED
Excergames	4.95	4.08	0.86	38/95	0.58	104	31	0.68	0.09	88	12	HED
Puzzle	4.68	3.71	0.97	65/65	0.48	113	22	0.29	0.44	40	60	UT
Educative	5.06	4.12	0.93	36/99	0.50	110	25	0.07	0.66	9	91	UT
Platform	4.78	3.68	1.09	40/92	0.57	114	21	0.48	0.30	62	38	HED
Real life simulation	4.65	3.46	1.19	23/107	0.60	99	36	0.52	0.28	65	35	HED
MMORPG	-	2.50	-	16/117	0.65	94	41	0.55	0.27	67	33	HED
Pet raising	-	2.86	-	6/129	0.48	94	41	0.27	0.45	37	63	UT
Professions	-	3.47	-	2/129	0.48	69	66	0.31	0.41	43	57	
Text based adventure	-	2.86	-	2/130	0.51	62	73	0.38	0.36	51	49	

* All linear regression models and differences (means t-test) were statistically significant at $p < 0.05$.

** Non-used observations

*** Variable coefficient, **bold** = statistically insignificant variable.

**** **MIV** = Main interacting variable.