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Discovering Factors Associated with Online Gaming Behaviors

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Abstract— This study examined the correlation of individual and behavioral factors and factors related to user intention to use online games. The questionnaire data was collected to determine statistically significant association among these factors and examined using the Pearson correlation coefficients and T-test. The results of study were achieved by identifying and interpreting statistically significant correlation among factors and statistically difference between males and females. The findings confirm significant association reported in previous studies and present significant association not reported previously among: Hedonic Motivation factor; UTAUT factors; and individual and behavioral factors of gamers. The practical implication is responsible to provide advice for those who are responsible to boost/reduce the factors through the enhancing/diminish the factors associated with behaviors of online gamers.

Keywords— online gaming behaviors; hedonic motivation; correlation coefficients

I. INTRODUCTION

Online games are one type of entertainment and internet based technology enabling players to escape from the boredom of daily life to fantasize world [1], [2]. Many researchers conduct study on factors affected online gaming behaviors [3], [4], [5]. They mentioned that education and gender affected on game playing behavior.

Online gaming behaviors are interesting issue in the context of user intention studies. This study is developed from the main research in adoption of online games technologies in Indonesia by the author [6] that discussed the causal and moderating effect of factors in model proposed in the research. No much researches in online gaming that report their studies in context of correlation factors except a study conducted by [7] that investigating the correlation of factors in the use of personal Internet Banking Service. Most of these researches conduct and report their studies in context of causal and moderating effect of their factors. They also did not report the correlation between personal characteristic factors and other factors to expose online gaming behavior except on study conducted by author [5] that focus on online gaming behaviors among adolescent.

Because of interesting findings on the researches [5] and [6], new study is required to expose the findings on factors having statistically significant correlations among them and statistically significant difference between males and females and to reveal the findings in graphical representation of this correlation. This study aims to expose factors associated with online gaming behaviors through answering two research questions "What factors are correlated with online gaming behaviors?" and "How is the graphical representation of this correlation?" The findings of this study have not been reported in previous studies in the context of factors associated with behavioral intention to use online games technologies.

II. FACTORS IN PREVIOUS STUDIES AND THEIR MEASUREMENT

Based on the study in the main research [6], several variables are employed and investigated in this study. The selected variables were identified and classified into three groups: five factors which are included in the UTAUT (Unified Theory of Accepted and Use of Technology) factors [8] including Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Conditions (FC), and Behavioral Intention (BI); two factors related to the Hedonic Motivation (HM) including Perceived Enjoyment (PCE) and Flow Experience (FE); and six factors related to the individual and behavioral factors of respondents including Age (A), Gender (G), Experience (E), Number of hour in playing online game (H), Number of times each week in playing online game (W), and Number of Hours Each Week in playing online game (H/W).

Reference [9] defined Hedonic Motivation as the fun or pleasure derived from using a technology. It was conceptualized as perceived enjoyment in Information System research. Enjoyment was realized in the flow state that is indicative of the intense focus and loss of self-consciousness in playing online games.

Individual and Behavioral Factors are individual differences that perform a crucial role in the acceptance of online games technology. Several previous studies established correlations among these factors. Gender and age were almost always used in online games research as individual difference as in [2], [10], [11], [12], [13] and [14]. Experience is also used as personal characteristics in several previous studies as in [2], [10], and [14]. Level of education was employed as personal characteristics as in [2], [11], and [13]. Three factors in duration of gaming sessions; Number of hour in playing online game, Number of times each week in playing online game, Number of Hours Each Week in playing online game were employed by [11].

III. METHODOLOGY

This study used data from the main research [6] employed eight hundred and ninety five respondents (895). One thousand and thirty questionnaires (1030) were distributed to students on Junior High School, Senior High

School, or College/ University and examined using descriptive statistical techniques for data analysis after passed data preparation step.

The factors relate to variables on causal effect of model employed on main study [6] have passed validity and reliability test using principal component factor analysis and Cronbach Alpha Coefficient. The last, the correlations among factors were investigated using the Pearson correlation coefficients and T-test to get factors associated with online gaming behavior and their relationship.

IV. DATA PREPARATION AND ANALYSIS

The distributed questionnaires were returned in one thousand and three (1003) and these were analyzed using SPSS software. Table 1 summarized the three stages used to prepare and process 1003 questionnaires to get the final 895 usable samples questionnaires.

TABLE I.   SUMMARY OF THE PREPARATION OF THE FINAL SAMPLE

			Gender		
			Males	*Females*	*Sum*
Number of Questionnaires		**Returned**	461	542	1003
	Stage One	*Removed (Incomplete)*	17	13	30
		Remaining	444	529	973
	Stage Two	*Removed*	9	11	20
		Remaining	435	518	953
	Stage Three	*Removed (Outliers)*	39	19	58
		Remaining	396	499	895

a) In Stage-One, thirty (30) questionnaires were removed because of incomplete values for some factors. In Stage-Two, missing values for some factors (20) was removed. Finally, in Stage-Three, after a descriptive statistical analysis was carried on the remaining questionnaires, fifty eight (58) questionnaires were released from the sample by reason of they included an outlier measure [6]. Consequently, the final sample size is eight hundred and ninety five (895).

b) The construct validity and the equivalence reliability of the resulting indicators for UTAUT and HM factors were examined by Principal Component factor analysis and Cronbach Alpha Coefficients and the results of the equivalence reliability are showed in Table 2. The table reveal that the all of indicators as a part of each factor fulfill the construct validity and equivalence reliability. As an example indicators pe1, pe2, and pe3 are convergent on PE factor and have Cronbach Alpha Coefficient 0.910 (excellent).

c) T-test was used to describe the statistically significant difference ($p < 0.5$) between the means of the distribution for males and females. Only four of individual and behavioral factors (E, H, W, H/W), four of UTAUT factors (PE, EE, FC, and BI), and one of HM factors (PCE) have a statistically significant difference between the means

for males and females with the greater distribution for males than for females.

TABLE II.   CONSTRUCT VALIDITY AND EQUIVALENCE RELIABILITY

Indicator	PE	BI	EE	PCE	SI	FE	FC	Cronbach Alpha Coefficient
pe2	**.899**	.117	.114	.104	.147	.019	.082	
pe1	**.877**	.140	.034	.171	.104	.020	.061	0.910 Excellent
pe3	**.868**	.130	.106	.082	.190	-.008	.065	
bi3	.140	**.897**	.092	.130	.052	.021	.148	
bi2	.122	**.876**	.093	.152	.047	.049	.103	0.894 Good
bi1	.119	**.821**	.145	.155	.079	.027	.193	
ee2	.014	.098	**.868**	.102	.052	.060	.079	
ee3	.023	.122	**.842**	.164	.042	.074	.128	0.794 Acceptable
ee1	.260	.090	**.686**	.144	.006	.054	.181	
pce3	.120	.153	.183	**.811**	-.028	.071	.139	
pce2	.221	.169	.120	**.794**	.078	.069	.130	0.820 Good
pce1	.045	.136	.140	**.777**	-.014	.181	.170	
si2	.073	.048	-.010	.076	**.858**	-.002	-.024	
si1	.155	.022	.096	.119	**.820**	.034	.014	0.711 Acceptable
si3	.131	.074	-.006	-.182	**.664**	-.073	.115	
fe3	.013	.026	-.013	.061	-.069	**.836**	-.037	
fe2	.062	.048	.071	.044	.052	**.804**	-.030	0.716 Acceptable
fe1	-.049	.004	.096	.140	-.025	**.733**	.103	
fc1	.065	.104	.034	.052	.062	.027	**.831**	
fc3	.072	.147	.115	.144	.076	-.024	**.751**	0.709 Acceptable
fc2	.032	.173	.383	.283	-.085	.047	**.627**	

The Pearson correlation coefficients were used in measuring associations among all of the factors excluding Gender shown in Table 3. The correlation among Gender and others factors is shown in Table 4.

V. FINDINGS AND DISCUSSION

The graphical representation of the statistically significant correlations and the statistically significant difference in the means of the distribution for males and females are shown in Figure 1. Four symbols are used in Figure 1 to describe the significant associations among factors in this study. The circle represents a factor. The rectangular boundary represents the group of factors in boundary. The bidirectional arc between two factors indicates that those factors are significantly positive correlated and a bidirectional dash arc indicates significantly negative correlated. The association between the factor and all factors within the rectangular boundary is indicated by a bidirectional arc or a bidirectional dash arc between a factor and a rectangular boundary. A directional arc represents the significant differences between the means of the distribution for males and for females.

It is seen from Figure 1 that:

a) In duration of gaming sessions, gamers with high number of times games played each week have more number of hours each time games played and more number of hours per week games played.

b) Individuals with high level in three factors in duration of gaming sessions hold high experience; sense more fun in gaming; hold higher belief that using gaming system will help them to attain personal gains; find easier to use the gaming systems; hold higher belief that there is organizational and technical infrastructure to support use of gaming system; and hold more intention to use gaming systems in the future.

TABLE III.　CORRELATION COEFFICIENTS

Factors	EDU	N	H	H/W	A	E	FE	fe1	fe2	fe3	PCE	pce1	pce2	pce3	PE	pe1	pe2	pe3
EDU	1																	
N	.057	1																
H	.025	.219	1															
H/W	.038	.666	.803	1														
A	.434	.051	-.017	.011	1													
E	.079	.347	.400	.429	.078	1												
FE	-.057	.066	.160	.119	-.103	.020	1											
fe1	-.023	.097	.243	.199	-.088	.112		1										
fe2	-.075	.066	.098	.087	-.075	-.004		.395	1									
fe3	-.040	.000	.048	.005	-.085	-.055		.451	.523	1								
PCE	-.025	.296	.322	.355	-.068	.288	.237				1							
pce1	-.014	.285	.249	.299	-.040	.222		.254	.193	.174		1						
pce2	-.048	.238	.300	.318	-.070	.243		.161	.129	.126		.584	1					
pce3	-.002	.240	.279	.298	-.064	.274		.186	.139	.114		.589	.637	1				
PE	.021	.151	.242	.256	-.027	.173	.042				.320				1			
pe1	.037	.134	.236	.245	-.035	.146		.040	.066	.021		.204	.348	.278		1		
pe2	.026	.162	.229	.248	-.018	.182		.012	.093	.010		.187	.326	.240		.799	1	
pe3	-.006	.123	.205	.213	-.021	.150		-.023	.067	.001		.160	.304	.208		.725	.788	1
EE	-.033	.241	.237	.268	-.071	.228	.155				.394				.250			
ee1	-.048	.230	.219	.260	-.076	.223		.121	.104	.065		.266	.317	.319		.256	.299	.316
ee2	-.003	.200	.182	.211	-.050	.184		.150	.104	.054		.253	.249	.263		.106	.170	.131
ee3	-.033	.180	.197	.209	-.053	.170		.158	.135	.058		.308	.264	.327		.134	.180	.163
SI	-.046	-.009	.003	-.026	.026	-.021	-.028				.068				.315			
si1	-.025	-.013	.021	-.013	.004	.005		.004	.082	-.008		.086	.182	.092		.256	.275	.319
si2	-.077	-.044	-.009	-.046	-.005	-.046		-.016	.033	-.041		.022	.114	.045		.189	.208	.240
si3	-.011	.033	-.006	-.004	.062	-.012		-.064	-.025	-.115		-.064	.008	-.074		.154	.217	.213
FC	.054	.268	.250	.293	.026	.274	.070				.409				.214			
fc1	.054	.211	.181	.212	.062	.197		.073	.019	-.002		.224	.207	.202		.132	.168	.134
fc2	.049	.287	.286	.330	-.025	.309		.153	.085	.045		.367	.369	.419		.151	.166	.148
fc3	.022	.146	.137	.168	.014	.157		.073	.003	-.022		.260	.267	.255		.176	.167	.177
BI	-.024	.245	.203	.274	.036	.226	.093				.392				.322			
bi1	-.032	.216	.173	.242	.006	.185		.090	.071	.041		.279	.333	.322		.261	.266	.277
bi2	-.006	.230	.179	.243	.055	.238		.068	.111	.057		.291	.316	.308		.273	.257	.251
bi3	-.027	.222	.202	.262	.038	.192		.066	.066	.042		.273	.330	.286		.294	.270	.272

Factors	EE	ee1	ee2	ee3	SI	si1	si2	si3	FC	fc1	fc2	fc3	BI	bi1	bi2
EE	1														
ee1		1													
ee2		.507	1												
ee3		.495	.686	1											
SI	.100				1										
si1		.121	.130	.136		1									
si2		.051	.036	.055		.603	1								
si3		.052	.030	-.007		.360	.389	1							
FC	.397				.094				1						
fc1		.210	.165	.178		.078	.072	.095		1					
fc2		.393	.370	.447		.049	-.050	-.003		.451	1				
fc3		.255	.201	.253		.137	.069	.064		.433	.459	1			
BI	.305				.153				.385				1		
bi1		.267	.231	.279		.143	.138	.079		.259	.348	.324		1	
bi2		.220	.200	.231		.122	.078	.107		.206	.300	.255		.672	1
bi3		.239	.205	.227		.115	.113	.097		.257	.316	.269		.715	.794

Notes:
(a) Correlation coefficients in bold type are statistically significant (p < 0.05)
(b) Correlations in italics are negative
(c) Shaded cells correspond to the correlation among groups of factors (personal characteristics, UTAUT, HM)

c) There is a positive correlation among Experience, three factors in duration of gaming sessions, level of education, Age, Perceived Enjoyment, Performance Expectancy, Effort Expectancy, Facilitating Conditions, and Behavioral Intention. Individuals with more experience in gaming have a high level of education and age; spend a lot of time in online gaming; feel more fun in gaming; hold stronger belief that using gaming system will help them to attain personal gains; find easier to use the gaming systems; hold stronger belief that there is organizational and technical infrastructure to support use of gaming system; and hold more intention to use gaming systems in the future.

d) Older individuals have high level of education. Importantly, younger individuals feel more fun in gaming; find easier to use the gaming systems; and feel more involved in online gaming.

e) Furthermore, those who feel much more involved in online gaming feel more fun; find easier to use the gaming systems; have stronger belief that there is organizational and technical infrastructure to support use of gaming.
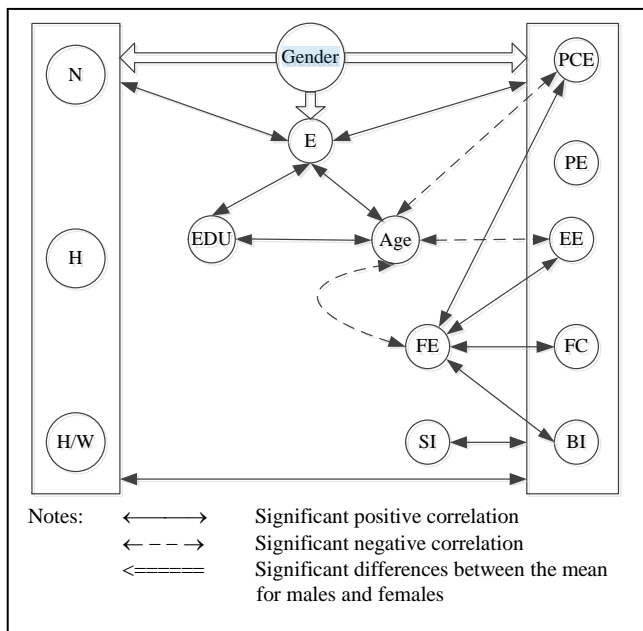

Notes:
⟷ Significant positive correlation
←---→ Significant negative correlation
⟸===== Significant differences between the mean for males and females

Fig. 1. Significant associations among the factors

f) Significant difference due to gender where found on four factors related to individual and behavioral factors (Experience; Number of times games are played each week; Number of hours each time games are played; and Number of hours per week playing games), four factors related to UTAUT factors (Performance Expectancy; Effort Expectancy; Facilitating Conditions; and Behavioral Intention) and one factor related to HM factor (Perceived Enjoyment).

g) T-tests were used in examining differences between males and females. Significant difference due to gender for five factors related to UTAUT and HM factors is shown in Table 10. Males spend more time and hold more experience in online gaming than females. Males feel more fun in gaming; hold stronger belief that using gaming system will help them to attain personal gains; find easier to use the gaming systems; have stronger belief that there is

organizational and technical infrastructure to support use of gaming system; and have stronger intention to use gaming systems in the future than females.

VI. CONCLUSIONS

From the theoretical perspective, this study reveals unreported findings in the previous studies. Social Influence is proposed to be replaced with Perceived Enjoyment from HM factors in group of UTAUT factors. The reason is that the new group of UTAUT factors with Perceived Enjoyment instead of Social Influence has positive correlation to five of individual and behavioral factors (Gender, Experience, Number of times games are played each week, Number of hours each time games are played, and Number of hours per week playing games) and they have positive correlation to each other. In Addition, Social Influence has no correlation to all factors of individual and behavioral factors. Age only has positive correlation with Experience and Level of education and it only has negative correlation with Perceived Enjoyment, Effort Expectancy, and Flow Experience. Three of behavioral factors have positive correlation to all factors except Level of education, Age, Flow Experience, and Social Influence.

The results reveal that behaviors of online gamers are influenced by: the highly elaborate form of their enjoyment of online games; their high perception of the performance and effort expectancy of use of online games; their high perception of the supporting of facilitating condition in playing online games; their high experience in online gaming. The behaviors of online gamers among individuals are not strongly influenced by age, level of education of players, flow experience, and social influence. The last, the males have more correlation with other factors than females in playing online games.

From the practical perspective, this study has objectives to provide advice for those who are concerned to behaviors of online gamers. The advices are relevant to boost/reduce factors through the enhancing/diminish these factors associated with behaviors of online gamers shown in Table 5 who should be targeted because these are the characteristics of those who are utilizing online games.

TABLE IV. CHARACTERISTICS OF INDIVIDUALS UTILIZING ONLINE GAMES

Characteristic	Target Group		Comment
	Males	**Females**	
Experience (E)	14 months or less	10 months or less	The experience of gamers in utilizing online games, the number of times games are played each week , the number of hours each time games are played, and the number of hours per week playing games are played each week are higher in males than females
Number of times games are played each week (W)	7 times or less	6 times or less	
Number of hours each time games are played (H)	4 hours or less	2 hours or less	
Number of hours per week playing games (H/W)	25 hours or less	13 hours or less	

This study is mainly conducted to reveal the other side of the discussion on correlation factors that were no discussed on the previous research by the author [6]. This study only reveals the correlation aspects of variables and does not

reveal the causal effects among them. Through the revealing of the findings on graphical representations, this study can contribute on new model in presenting the findings.

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