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# The adoption of Gamification in e-banking

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## ABSTRACT

The development of multiple web applications with features of video games gave way to a new trend called Gamification. However, there isn't a clear explanation that allows the connection of the elements of the game applications with non-game features, mainly in traditional highly regulated financial sector. The aim of this study is to investigate the acceptance of a business application Gamified in e-banking. Based on the Technology Acceptance Model (TAM), the results from an online survey of 183 customers show that the Gamified application had a positive impact on the acceptance of this new concept in e-banking. Our findings show that perceived ease-of-use have a strong positive influence on costumers intentions and on the perceived usefulness. Further analysis and model modification show that perceived usefulness and enjoyment have positive influence on perceived ease-of-use. The results also show that the customers have accepted and used the Gamified application to manage their investments and bought more mutual funds thus increasing the chance to win the game.

**Keywords:** e-banking, Gamification, Serious Games, Structural Equation Modelling, TAM, TRA.

## 1. INTRODUCTION

The recent literature on the subject of e-banking showed that increased confidence can help reduce the impact of key inhibiting factors, as customer fear of using the e-banking [62]. Even with the increased use of e-banking services in recent years, banks face a dilemma, while the e-banking has benefits of convenience and economy, the ease-of-use of e-banking services allows greater customer change to other banks who linked up with more traditional forms of banking systems and as a consequence it reduces the long-term customers' commitment and loyalty [53]. Although we find few empirical studies on this subject it has not been carried out research on the factors that influence the behavior of the players [70].

The Gamification on e-banking suggests the following questions: "What is the customer acceptance in using new business applications with game characteristics?" and "What are the benefits for the e-banking business?"

## 2. THEORETICAL BACKGROUND

### 2.1. TRA-Theory of Reasoned Action

TRA was established in 1967 to provide strength to the studies of the relationship between the behavior and attitudes [21]. Behavioral intention is determined by attitudes and subjective norms [21]. However TRA is very general, "designed to explain virtually any human behaviour" [13, 21] introduced an adaptation of TRA, the technology acceptance model (TAM) to explain computer usage behaviour. TAM uses TRA as a theoretical basis for specifying the causal linkages between perceived usefulness and perceived ease of use, and the users' attitudes, intentions and actual computer adoption behaviour.

In the present study we have used the ability of TRA and TAM (Technology Acceptance Model), to predict and explain the customer perceived intention to use this new concept of Gamification, and identify other variables to better determine the intention to use the game to purchase financial products in e-banking.

### 2.2. TAM – Technology Acceptance Model

TAM was developed by Davis in 1986 to explain computer-usage behavior. TAM was designed to understand the causal relationship between external variables of user's acceptance and the actual use of the system, seeking to understand user's behavior through knowledge of usefulness and perceived ease-of-use. This model is useful not only to predict, but also to describe how researchers and professionals can identify the reason to reject a particular technology or system and consequently implement the appropriate corrective steps [14].

### 2.3. Electronic games

Electronic games are amongst the most popular entertainment media in the world [24]. As online games grow in importance as an electronic commerce application, researchers and practitioners increasingly believe that understanding online game player behavior is critical to the success of online business [70].

The Electronic Games has come a long way since the launch of Pac-Man by Namco released initially in Japan in May 22, 1980. With a high popularity since its launch to the present, Pac-Man is one of the classic games of industry, being considered as synonymous of video games, and an icon of popular culture of the 1980s, it became a social phenomenon and a sales success [50].

According to [40] there are various levels of involvement, where the game mechanics have measurable impact. Understanding these mechanisms, offers a powerful tool to change consumer behavior,

product perception and influencing the decision-making process. In this context video games and game aspects have been studied as potential means to shape user behaviour [22].

### 2.4. Serious games

The "Serious Games" seem to be a recent phenomenon. A market survey showed that the world market value of serious games was € 1.5 billion in 2010 [2]. [42] define "Serious Games" as the games that don't have entertainment, enjoyment or fun as its main objective. The serious games use the same characteristics of the games, but in a way that allow customers to enquire and perform their operations and financial transactions in an eye-catching [19]. The first Serious Game was developed by the U.S Army (www.americasarmy.com), who developed a free game and distributed over the Internet in 2002, in two years they registered more than 17 million downloads. The game simulated military training exercises and shooting, leading players to perform combat missions with the main objective to promote the army of the United States and to serve as a tool for recruiting young people from 16 to 24 year of age [20].

### 2.5. Gamification

Gamification is defined as the use of game design elements in non-game contexts [17]. The first document with the application of this term is from 2008, but the term Gamification has only been used generally in the second half of 2010, It was only after the implementation of numerous software applications across productivity, finance, health; education among others who offered "Gamification" as a service layer of: rewards, points, badges, levels and leader boards [17] that several players of the sector and speakers at conferences acknowledged its importance. Gamification describes a number of design principles, processes and systems used to influence, engage and motivate individuals, groups and communities to drive behaviors and producing the desired effect. According with [72] the Gamification software can increase the use of a service and change the user behaviour. From the electronic game industry, many of these pioneering concepts now play a key role in the guidance and management of incentives that the best companies in the world built-in scenarios to influence customer's behavior.

### 2.6. Game theory on e-banking

Game Theory initially developed by John Von Neumann in 1928, became known after the book "The Theory of Games and Economic Behavior" by John von Neumann and Oskar Morgenstern in 1944. Later in 1951 John Forbes Nash improved the Game Theory with a modern concept of Game Theory, Nash equilibrium in which is defined the term mixed strategies, where players choose a probability distribution over possible actions. [45] analyzed the importance of game theory in e-banking and confirms that this has already been applied in e-banking, giving an example of an application in e-business for stock exchange and bonds trading between customers and brokers or in financial online auctions.

## 3. ACTUAL APPROACHES

### 3.1. How can banks get benefits from Gamification?

The e-banking has experienced significant growth and have become one of the main channels of banks for the distribution of

products and services [3]. Most e-bankings has adopted a strategy of supermarket, offering a wide range of services and products supported by attractive and appealing Web Design in order to create value for their current customers and attract new customers. These websites are technically sophisticated, attractive, and convenient and allow access to various financial products and services.

In the banking sector Gamification plays an important role in the stimulation of exciting behaviors in financial operations with the goal of increasing customer's loyalty and financial involvement while purchasing products.

### 3.2. Financial product Gamification

The financial product used in this study is the mutual funds promoted by an electronic bank where customers have access to all operations available to purchase, sell and portfolio management like showed in Figure 1.

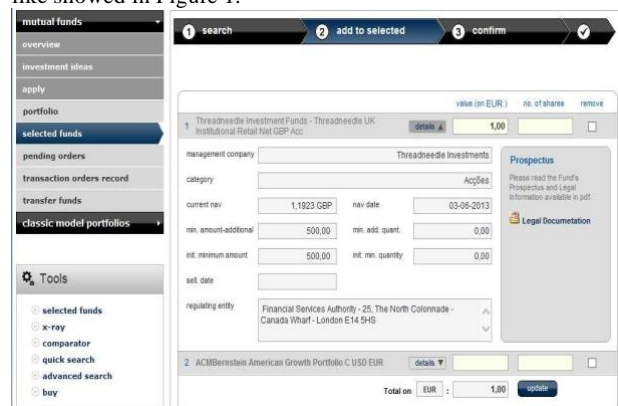


Figure 1. Example of a traditional mutual funds purchase webpage

The Business application called "FuteBank" (Figure 3) is a digital animation based in mutual funds portfolio management, using an animated model of a Soccer League. The game established the main relationship between a football team to a portfolio investments funds and the positions of the players on the field with the risk rating assigned to a specific mutual fund.

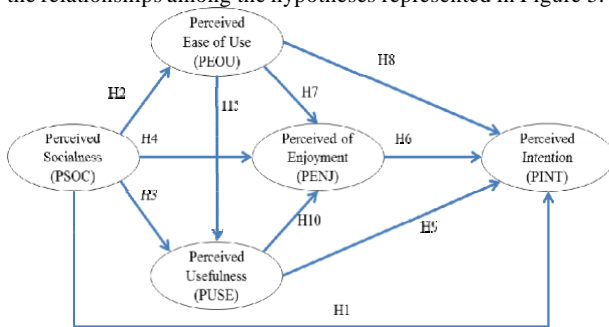
The application was only available for customers with mutual funds in their portfolio with the main objective to transform a complicated process of choosing, selecting and purchase funds, in a nice, simple, funny and attractive process.



Figure 2. FuteBank mutual funds portfolio

## 4. RESEARCH MODEL

Online games have grown in importance as an ecommerce applications, professionals and researchers increasingly believe that understanding the behavior of online game player is critical, [70]. In an attempt to identify the variables that influence the customers behavior in using the application Gamified and the intention to use it, was applied the theoretical model adapted from [66] and based on the TRA and TAM, tested from the customers responses to an online questionnaire in order to empirically study the relationships among the hypotheses represented in Figure 5.



**Figure 3. Conceptual Model, adapted from Wakefiel *et al.*, (2011)**

To determine the customers' behaviour and use intention of the new application, ten hypotheses have been established grouped by five latent variables not observed (constructs) used in the proposed research, as well twenty-five endogenous variables observed and used in the measurement of the model (Table 1).

**Tabla 1. Construct Variables and Items**

| Construct Variable         | Acronym | Items | Description                                                                                                                                               | Source               |
|----------------------------|---------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Perceived Socialness       | PSOC    | 6     | Which is a user perception when they treat computers as social actors after detecting social presence as a result of the use of social cues on a Website. | [49, 55, 66]         |
| Perceived Ease of Use      | PEOU    | 4     | Which is a user perception of the effortlessness of a computer system.                                                                                    | [14, 59, 61, 66]     |
| Perceived enjoyment        | PENJ    | 5     | Which is a activity of using the computer is perceived to be enjoyable in its own right.                                                                  | [15, 60, 66]         |
| Perceived Usefulness       | PUSE    | 5     | Which is a user perception of the ability of a computer to increase job performance when performing a task.                                               | [8, 14, 43, 66]      |
| Perceived Intention to Use | PINT    | 5     | Which is a user predicting of the intention to use a system.                                                                                              | [14, 51, 56, 57, 66] |

## 5. HYPOTHESES

In the context of e-commerce, [38] suggests that it's the interactive component of websites that enables consumer's perception while shopping online. When users are exposed to online websites with advice or consumer reviews, the website is perceived as more social and more useful [38]. Therefore, it is

expected that the business application changed into a game, affects customers perceptions, decreasing the cognitive effort required to use the new application, increasing in this way the perception of ease-of-use and intention to use.

This study attempts to answer the following hypotheses:

- H1 - PSOC will have a positive influence on PINT.
- H2 - PSOC will have a positive influence on PEOU.
- H3 - PSOC will have a positive influence on PUSE.
- H4 - PSOC will have a positive influence on PENJ.
- H5 - PEOU will have a positive influence on PUSE.
- H6 - PENJ will have a positive influence on PINT.
- H7 - PEOU will have a positive influence on PENJ.
- H8 - PEOU will have a positive influence on PINT.
- H9 - PUSE will have a positive influence on PINT.
- H10 - PUSE will have a positive influence on PENJ.

PEOU is a perception of the user referenced in the TAM that, along with the PUSE determines the attitudes and intentions of the users to adopt a particular technology. [44] suggest that the largest interactivity with the technology increases the likelihood of users socially response to technology.

The enjoyment construct was originally set as a supplement in the use of a computer that was nice, without taking into consideration the consequences of performance [15]. The perception of enjoyment of use technology is influenced by game characteristics according to Customer's perception (that is, nice or fun) [4, 43] and on purchase intentions on the Internet [31, 37]. In these studies enjoyment has been identified as a catalyst for greater intentions to use technology and the Internet. [60] continued these studies, analyzing the role of enjoyment in the acceptance and use of the websites and set the enjoyment and fun as determining factors for the use of a website.

The enjoyment derived from social interaction was found to be dominant motifs in the frequency of play online Games [10]. In commercial transactions carried out in the traditional Business (not Internet), studies show that consumers want social interaction to increase the enjoyment of shopping experience [46]. Similarly, [67] found that the social perceptions of the website had a positive relationship with enjoyment.

The enjoyment in the use of online games has shown to be significantly related to the positive attitude of the Users like the game [28]. Similarly, the enjoyment in the use of an e-Commerce website was significantly related to increased customers satisfaction [15, 33] studied the significant effect of enjoyment on the intentions of using computers at work. [36] found that the affective or emotional response of users to a website is a key factor for future visits.

[48] States that as the perception of usefulness, the perception of ease-of-use also plays an important role in shopping on the Internet because it is supposed to have beneficial results, however, the complexity of navigating a website with little interaction or difficult to use may be complicated for some consumers, so the perception of ease-of-use is associated with the perception of the usefulness of the website.

The behavioral intention depends on the cognitive choice of a potential buyer respond favorably or unfavorably for online shopping. The choice "likes or dislikes" will be based on whether the compensation of purchase is beneficial (as helpful and easy to use) unlike other forms of purchase at traditional stores [48]. [48] concluded that the perception of ease-of-use and the perception of enjoyment had positive influence on intention purchase online. This suggests that the ease-of-use of technology and customers satisfaction on online shopping experience is imperative in the prediction of the intention for future online purchases. Moreover this study concludes that Users would only

buy through the Internet, if they thought that the website is nice and easy to use. The same conclusion is supported by [47] in which the perception of enjoyment was identified with being related to the activities of interaction with customers, when purchasing on the website.

In table 2, we summarize the relationships among the variables under review studied by the authors referred to in other investigations in different areas than games in e-banking.

**Table 2. Relationships between Variables**

| ypothesis | Independe<br>nt Variable | Dependent<br>Variable | References                                         |
|-----------|--------------------------|-----------------------|----------------------------------------------------|
| H1        | PSCO                     | PINT                  | [1, 52]                                            |
| H2        | PSOC                     | PEOU                  | [30, 44, 71]                                       |
| H3        | PSOC                     | PUSE                  | [29, 32, 37, 43, 63, 71]                           |
| H4        | POSC                     | PENJ                  | [10, 12, 28, 33, 36, 46, 67]                       |
| H5        | PEOU                     | PUSE                  | [14,16, 47, 64]                                    |
| H6        | PENJ                     | PINT                  | [4, 9, 10, 15, 29, 31, 37, 43, 48, 58, 60, 65, 67] |
| H7        | PEOU                     | PENJ                  | [15, 60]                                           |
| H8        | PEOU                     | PINT                  | [14, 25, 28, 36]                                   |
| H9        | PUSE                     | PINT                  | [14, 25, 33, 48, 60, 64]                           |
| H10       | PUSE                     | PENJ                  | [12, 36]                                           |

## 6. RESEARCH METHODOLOGY

In the context of the game available on the website in a Bank it was analyzed the costumer reactions in the use of the game for PSOC, PEOU, PUSE, PENJ and PINT through the response to an online questionnaire (Appendix A). All endogenous variables and latent variables included in this study are measured by five items Likert scales (1-strongly disagree to 5-strongly agree).

The SEM (Structural Equation Model) approach was adopted in our data analysis since it has many advantages over traditional methods, such as multiple regressions [5, 25]. SEM allows the confirmation and the exploration of the theoretical model, in other words, if the data are suitable for use in test and development theory.

### 6.1. Questionarie, sampling and profiling

In this case study was analysed the behaviour of 862 Customers who used the computer application and study 183 responses to an online questionnaire available in the application.

The questionnaire was pretested by a small sample of users who had prior access to the game, to measure and evaluate the reliability of the survey and modify in advance any questions that could create confusion. Some questions had to be reformulated to improve its comprehension and others adapted to e- banking.

The data and the characteristics of the players included in this study are unique since they were collected at the individual customer's level. The data were collected through an online

questionnaire between April and May, 2012. From the 183 respondents 88% were male, 62% were aged between 25 and 40 years and 35% had more than 40 years. Regarding the education 62% had a graduated degree, 14% had a bachelor's degree, and 24% had high School.

Data analysis was performed through the Software SPSS (Statistical Package for Social Sciences) v.20 and the result

are shown in Appendix A, we note that the question with the lowest average (3.46) QPENJ2 and the question with highest average (4.13) was the QSOC5. Kurtosis Statistic was calculated in the Software SPSS AMOS v. 18 and most of the values are less than 3 (Platykurtic distribution), flatter than a normal distribution with a peak higher, however the QINT4 presents data away from the sample means because it has a Kurtosis value equal 4.265 (more than 3) i.e. has an Leptokurtic distribution type which means high probability of extreme values.

### 6.2. Reliability analysis

To assess the validation of the constructs and the reliability of variables, the Cronbach's Alpha for each latent variable and the underlying measurement Items was performed. Passing this test is a prerequisite for further analyses [18] The results of all the coefficients of reliability (Appendix B) are above the recommended minimum of 0.70 Cronbach's Alpha [26], demonstrated that the results of the latent variables (constructs) and the underlying elements (variables) are highly reliable, so it was proceed the statistical test through Structured Equations Model to estimate the causal relationships between the constructs of the model and validate the causal hypotheses.

### 6.3. Measurement model

SEM has become one of the most used techniques for researchers in various disciplines and it has become an important tool to social sciences. The model that best fit the data is not globally accepted mainly due to variety of available measures and indicators [27]. Absolute adjustment indexes determine how the model "a priori" fits better in data collected [41] and demonstrates that the proposed theoretical model has the higher setting. Are included in this category the Chi-square tests, RMR, GFI, IFI, and CFI.

The Chi-Square translates a wide idea about the fit of the model. The null hypothesis is that the model fits perfectly to the population, so it is important not to reject. Using the Software SPSS AMOS 18 to calculate the direct effect of the FuteBank Model and the results obtained when we process the data about the model:  $X^2 = 220\ 1406.101$  ( $P = 0.000$ ),  $DF = 220$ ,  $RMR = 0.1161$ ,  $CFI = 0.660$ ,  $IFI = 0.663$ . According to the measures of good fit model recommendations of [26] (GFI-Goodness of fit statistic greater than 0.9; CFI-Comparative Fit Index greater than 0.9; NFI-Normed Fit Index greater than 0.9) and [6] (IFI-Incremental fit index greater than 0.9) and [23] (CMIN/DF between 1 and 5), and [7] (RMR-Root Mean Square Residual less or equal than 0.05), these results are indicating of poor model fit to the data, and imply that the relationships in the data are not well described by direct-effect model.

### 6.4. Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis (CFA) is a form of structural equation modeling. The results of previous statistics have showed that there is no appropriate data adjustment to the proposed model therefore it was decided to conduct this statistical technique and analyze the covariance values between the variables with the aim of reassessing the hypothetical structure and the relationships between the individual variables.

According to [27] structural equation modeling complexity makes the determination that a proposed model tuning is poor however some modifications can be made to substantially improve the results. In this sense it is good practice to evaluate the fit of each construct and each variable observed individually to determine whether there are any Items which are particularly weak.

The relations between variables are assumptions due to a number of underlying factors that may or may not be correlated. For this reason we have to improve the good fit model through the statistical technique of confirmatory factor analysis for structural equation modeling that allows reducing the number of variables in order to achieve a better adjustment of the data to the model.

For individual validation of the constructs CFA analysis was carried out and some relationships have been removed for those variables with high-value Kurtoses (high probability of extreme values) or squared multiple correlation (R2) with values less than 0.20 (this is an indication of very high levels of error) or covariance matrix (Phi ( $\phi$ )) values of 1.0 indicates that the two constructs are measuring the same thing or modification indices are also possible candidates for deletion and are likely to be causing the discriminant validity problem. For this purpose we analyse each latent variable and the related variables the results of the dropped variables are in table 3. By deleting indiscriminant items, Model Fit is likely to improve and is unlikely to have any major theoretical repercussions, however to confirm and explore the theoretical model with SEM Technique it is advise that each construct should have at least two Items (Byrne, 1998), and that was respected.

**Table 3. Variable removed after CFA**

| Item   | Why dropped                                                        |
|--------|--------------------------------------------------------------------|
| QSOC1  | High covariance value =1.416                                       |
| QSOC5  | Highest average = 4.13                                             |
| QPEOU2 | High covariance =0.899 & Variance not significant                  |
| QPENJ2 | High covariance =1.332                                             |
| QPENJ3 | High covariance =1.276                                             |
| QPUSE3 | High covariance =1.024                                             |
| QPUSE4 | High covariance =1.064                                             |
| QPINT1 | Pearson Correlation are not significant and high covariance =2.206 |
| QPINT4 | Kurtosis > 3 indicate high probability of extreme values           |
| QPINT5 | R2<0.2 indicators with high error levels                           |

\*Indicates dropped item to increase construct reliability in the final analysis

## 6.5. Results of hypothesis testing of structural model

After CFA the hypotheses tests was conduct again using SPSS AMOS v.18 and the results of model fit was:  $X^2 = 180.2$ ; (P = 0.000); DF = 55, RMR = 0.507; GFI = 0.873, CFI = 0.913, IFI = 0.914. The fit statistics are now indicative of a good model fit the data, although GFI is below the recommended minimum of 0.09 may be biased downward due to model complexity the values, in practice, GFI values above 0.8 are consider to indicate a good fit [54]. The standardized path coefficients with absolute values less than 0.10 may indicate a “small” effect, values around 0.30 a “medium” effect and with absolute values greater than 0.50 a “large” effect [11].

The results indicate that not all standardized coefficients for all hypothesized paths in structural model are significant (P<0.05). PENJ have no positive influence on PINT (H6,  $\beta = 0.036$ ), PUSE have no positive influence on PINT (H9,  $\beta = -0.192$ ) and PUSE have no positive influence on PENJ (H10,  $\beta = -0.298$ ). All the others hypothesized paths are significant, PSOC have a medium positive influence on PINT (H1,  $\beta = 0.491$ ) and PEOU (H2,  $\beta = 0.392$ ) and PUSE (H3,  $\beta = 0.426$ ) and PENJ (H4,  $\beta = 0.438$ ).

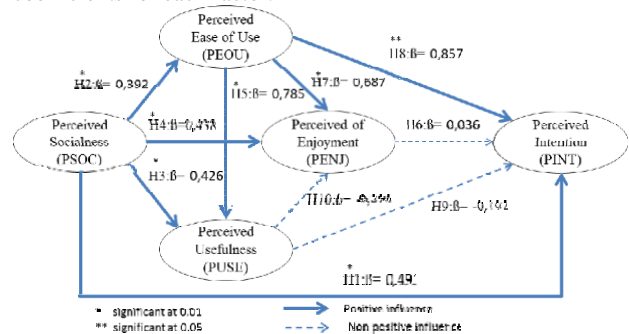
Finally PEOU have a large positive influence on PENJ (H7,  $\beta = 0.687$ ), on PUSE (H5,  $\beta = 0.785$ ) and on PINT (H8,  $\beta = 0.857$ ).

**Table 4. Regression Weights with Model Fit and after CFA.**

| Hypothesis | Dependent Variable | Independent Variable | Regression Weights (b) | P     | Hypothesis test result (positive influence?) |
|------------|--------------------|----------------------|------------------------|-------|----------------------------------------------|
| H1         | PSOC               | PINT                 | 0,491                  | 0,006 | Medium                                       |
| H2         | PSOC               | PEOU                 | 0,392                  | ***   | Medium                                       |
| H3         | PSOC               | PUSE                 | 0,426                  | ***   | Medium                                       |
| H4         | PSOC               | PENJ                 | 0,438                  | ***   | Medium                                       |
| H5         | PEOU               | PUSE                 | 0,785                  | ***   | Large                                        |
| H6         | PENJ               | PINT                 | 0,036                  | 0,892 | Rejected                                     |
| H7         | PEOU               | PENJ                 | 0,687                  | 0,001 | Large                                        |
| H8         | PEOU               | PINT                 | 0,856                  | 0,037 | Large                                        |
| H9         | PUSE               | PINT                 | -0,192                 | 0,459 | Rejected                                     |
| H10        | PUSE               | PENJ                 | -0,298                 | 0,065 | Rejected                                     |

\*\*\*absolute value is less than 0,001

The results of multivariate test of the structural model are provided in the following Figure 1 which outlines the regression coefficients for each factor.



**Figure 4. Structural Model Results**

Comparing the model-based results without CFA and after CFA we conclude that have changed the regression coefficients and confirm the hypothesis H1, that PSOC have a medium positive influence on PINT (H1,  $\beta = 0.491$ ).

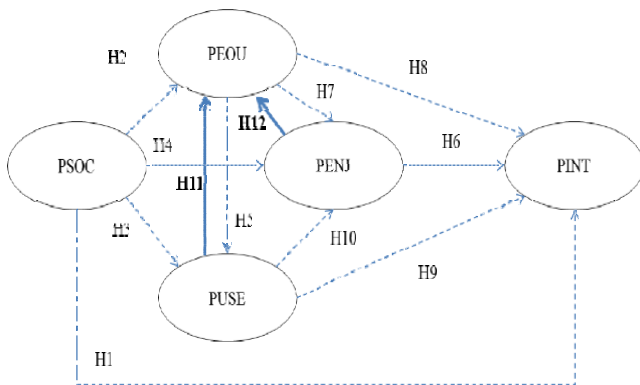
## 7. MODEL CHANGE RESULTS

The success of e-banking primarily depends on the acceptance and adoption of information technology based products and services by customers [69]. From the literature review in the context of technology acceptance, TAM attempts to predict and explain systems use by positing that perceived usefulness (PUSE) as a positive influence positive in perceived ease of use (PEOU)

to influence the user attitude toward using a technology [14]. Also users are motivated to use a system because they expect an intrinsic and/or extrinsic benefit from the activity, which is a determinant of their beliefs and attitudes about the technology (PEOU, PUSE) and their intentions to use it [16]; TRA). Empirical studies support the direct relationship between enjoyment and intentions to use technology [15, 36]. However during our study we identify other

relations that might influence customer's perception. Based on the current study and from data analysis we decided to test the relationship between PUSE, PEOU and PENJ.

Therefore using the same data and conceptual model we tested the reverse influence direction in H5 and H7 stabilising two new hypotheses (Figure 6) : H11 – The perceived usefulness (PUSE) will have a positive influence on perceived ease of use (PEOU), and H12- The perceived of enjoyment (PENJ) will have a positive influence on perceived ease of use (PEOU).



**Figure 5. Conceptual Model with new two hypotheses**  
Source: adapted from Wakefiel et al. (2011), modified to measure the influence of PUSE and PENJ in PEOU.

The two new hypothesis tests was conduct using SPSS AMOS v.18 and the results of the model fit was the same has the previous statistics  $X^2 = 180.2$ ; ( $P = 0.000$ );  $DF = 55$ ,  $RMR = 0.507$ ;  $GFI = 0.873$ ,  $CFI = 0.913$ ,  $IFI = 0.914$  and indicate that these new two hypothesized paths in structural model are significant ( $P < 0.01$ ). PUSE have positive large influence on PEOU ( $H11$ ,  $\beta = 0.517$ ) but lower than the reserve ( $H5$ ,  $\beta = 0.785$ ) and PENJ have positive medium influence on PEOU ( $H12$ ,  $\beta = 0.474$ ) but again lower than the reverse ( $H7$ ,  $\beta = 0.687$ ).

[35] propose a modification in TAM to measure the internet technology use for e-banking adoption where PUSE could influence PEOU, however did not tested like we have made in our study. The implication of modified TAM helps banks in planning, designing, and developing e-banking services that suit customers perception toward e-banking acceptance and adoption, factors such (i.e. information online, security and privacy, trust, enjoyment, internet connectivity, and risk), help to clear understand the adoption of e-banking.

## 8. DISCUSSION

Given the social importance of the games and being activities that involves hundreds of millions of players around the world, the lack of studies and researches on the characteristics and contents of the games influence the players is still insufficient [34]. So hopefully with the experience and results of this study can somehow to give up other studies and research in the field of serious games or Gamification in e-banking.

The results of our study can contribute with important information about the role of social usefulness, enjoyment and perception of ease-of-use on the intention to use Gamification

in e-banking as demonstrated in the results of the theoretical model in which PEOU turn has a large positive influence on PINT and PUSE hasno positive influence on PINT.

The answers with mean higher than 4 that show that customers have considered the game interactive (QSOC5, mean = 4.13), and the most relevant item is their intention to talk to friends (QINT3, mean = 4.05) that indicate a strong recommendation to friends "Word-of-Mouth". With lower mean we found that the Players did not feel significantly the spirit of adventure while navigating on this website (QPENJ2, mean = 3.46), willingness to use (QPINT1, mean = 3.51), or enthusiasm (QENJ3, mean = 3.51), or would not be time consuming to purchase (QPEOU3, mean = 3.53), this less positive feelings might be correlated with to the fact that the game was available only for existing customers, with real portfolio of mutual funds (MIFIED complex product) and buying players reflected a real financial transactions.

## 9. LIMITATIONS

The game was only available for existing customers and represented a real investment with a minimum of six investment funds on their portfolio, the results cannot be generalized to all customers of e-banking, or future customers with or without the type of financial product used in this game. While the theoretical basis for the various perceptions analyzed in this game is supported in this empirical study, the implementation of various types of 'social' technologies in different contexts of e-banking requires further study.

## 10. FUTURE RESEARCH

It will be interesting to study why some variables in this study do not have a positive influence in the intention to use the game (PINT), such as the perception of enjoyment (PENJ) and the perception of usefulness (PUSE) which may suggest that the use of real money to buy players / funds and risk investment is a serious matter. Future research is needed to determine the extent to which the perceptions of the customers on the use of this application changed to game can contribute to using Gamification in e-banking. Previous research does not show any studies about Gamification in e-banking, therefore it was not possible a direct comparison of this study with the results of previous studies.

## 11. CONCLUSIONS

This paper examined the relationship between perceived socialness, perceived ease-of-use, perceived usefulness, perceived enjoyment and intention towards using an e-banking mutual funds application Gamified. Results show that customers that use the application Gamified perceived that the ease-of-use has a large positive influence on the intention to use the application and also highlights the importance that the perceived ease-of-use as on perceived usefulness. The perceived ease-of-use has a positive influence in the perception of enjoyment, showing that the easier is the use the more the application is enjoyable, which is according with the study of [48] that also concludes the ease-of-use of technology induces positively the intention of use online shopping.

In response to the questions "What is the customer's acceptance in using new business applications with game characteristics?" and "What are the benefits for the e-banking business?" the results of hypotheses test show that the game had a positive impact on customers and that show future intention this type of applications Gamified in e-banking. The study of the business impact through

this new application with game characteristics the results show a positive impact on the business in terms of customers participation and the business values: customers access to the website: + 16%; visitors access to website: + 37%; total participants: 862; total customers of participants with investments funds: 232; investments funds purchase through the game: 11%; total amount on mutual funds portfolio: + 15%. The relationship between the mutual funds and the soccer players as resulted in a good acceptance, and as proven the intention of use, and the recommendation to friends (Word of Mouth) that is an important factor for business along with loyalty and customers' satisfaction [39].

Overall the new application Gamified, results on innovation, differentiation of selling products from other e-banking websites, more business with a complex financial product. The costumers perceptions results in a less effort to use the new software application, perception of usefulness and enjoyments when they have used the new mutual funds application. In this sense Banks should be encouraged to develop business applications with game features in their websites, not only to increase the loyalty of customers, but also to engage the customer to buy complex products in a different and simple way, since games are easy to use and pleasing - The influence to engage with existing and potential customer has been proven in this study.

Finally understanding the influence of PUSE and PENJ on PEOU will help banks to develop e-banking applications that suit customer's usage.

The implications of these findings is expected to be interesting to researchers focusing on adoption of innovative IT business software with games characteristics and business managers who are involved on web applications for e-banking.

## 12. REFERENCES

- [1] Agarwal, R. and Karahanna, E. 2000. Time flies when you're having fun: cognitive absorption and beliefs about information technology usage. *MIS Quarterly*, 24(4). 665-94.
- [2] Alvarez, J., Alvarez, V., Djaouti, D., and Michaud, L. 2010. Serious Games: Training & Teaching-Healthcare-Defence & security-Information & Communication. *IDATE*.
- [3] Amato-McCoy, D. 2005. Creating virtual value. *Bank Systems and Technology*, 1(22).
- [4] Atkinson, M., and Kydd, C. 1997. Individual characteristics associated with World Wide Web use: An empirical study of playfulness and motivation. *The Database for Advances in Information Systems*, 28. 53-62.
- [5] Bagozzi, R.P. and Yi, Y. 1989. On the use of structural equation models in experimental designs. *Journal of Marketing Research* 26. 271-284.
- [6] Bollen, K. A. 1989. Structural equations with latent variables. *NY: Wiley*.
- [7] Byrne, B.M. 1998. Structural Equation Modelling with LISREL, PRELIS and SIMPLIS: Basic Concepts, Applications and Programming. *Mahwah, New Jersey: Lawrence Erlbaum Associates*
- [8] Chen, L.-d., Gillenson, M., and Sherrell, D. 2002. Enticing online consumers: an extended technology acceptance Perspective. *Information and Management* (39). 705-719.
- [9] Chung, J. and Tan, F. B. 2004. Antecedents of perceived playfulness: an exploratory study on user acceptance of general information-searching websites. *Information & Management*, 41(7). 869-881.
- [10] Choi, D. and Kim, J. 2004. Why people continue to play online games: In search of critical design factors to increase customer loyalty to online contents. *Cyberpsychology & Behavior*, 7(1).
- [11] Cohen, J.W. *Statistical Power Analysis for the Behavioural Sciences 2nd ed.* Lawrence Erlbaum Associates, 1988.
- [12] Compeau, D. R., Higgins, C. A., and Huff, S. 1999. Social cognitive theory and individual reaction to computing technology: A longitudinal study. *MIS Quarterly*, 23(2). 145-158.
- [13] Davis, F. D. 1986. *A Technology Acceptance Model for Empirically Testing New End-User Information Systems: Theory and Results*. Doctoral dissertation. Sloan School of Management, Massachusetts Institute of Technology.
- [14] Davis, F.D., Bagozzi, R. P., and Warshaw, P. R. 1989. User acceptance of computer technology: a comparison of two theoretical models. *Management Science*, 35(8). 982-1003.
- [15] Davis, F.D., Bagozzi, R.P., and Warshaw, P.R. 1992. Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of Applied Psychology*, 22 (14). 1111-1132
- [16] Deci, E. *Intrinsic Motivation*. Plenum Press, New York, 1975
- [17] Deterding, S., Dixon, Khaled, R., D., and Nacke, L. 2011. From Game Design Elements to Gamefulness: Defining "Gamification". <http://dl.acm.org/citation.cfm?id=2181037.2181040>.
- [18] DeVellis, R.F. 1991. Scale Development. Sage, Newbury Park, CA.
- [19] Dickey, M. D. 2005. Engaging by Design: how engagement strategies in popular computer and video games can inform instructional Design. *Educational Technology, Research & Development*, 53. 67-83.
- [20] Djaouti, D., Alvarez, J., Jesseh, J. and Rampnoux, O. 2011. Origins of Serious Games. *IRIT, Toulouse III University (France)*.
- [21] Fishbein, M., and Ajzen, I. *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*. Reading, Addison-Wesley, MA, 1975
- [22] Fogg, B.J. *Persuasive Technology. Using Computers to Change What We Think and Do*. Morgan Kaufman Publishers, San Fransisco, 2003.
- [23] Garcia, M. A. M., and Sanchez, J. F. 1992. Análisis confirmatorio de la estructura dimensional de un cuestionario para la evaluación de la calidad de la enseñanza. *Investigaciones Psicológicas*, 11. 73-82.
- [24] Graft K. 2010, Average Gaming Time On The Rise In U.S. Retrieved June 2011. From Gamasutra: [http://www.gamasutra.com/view/news/28729/Average\\_Gaming\\_Time\\_On\\_The\\_Rise\\_In\\_US.php](http://www.gamasutra.com/view/news/28729/Average_Gaming_Time_On_The_Rise_In_US.php)
- [25] Gefen, D., Straub, D.W., and Boudreau, M.C. 2000. Structural equation modeling and regression: Guidelines for research practice. *Commun AIS*, 4. 1-77.
- [26] Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., and Tatham, R. L. *Multivariate Data Analysis (6th ed.)*. Upper Saddle River, Pearson Education Inc, NJ, 2006,
- [27] Hooper, D., Coughlan, J. and Mullen, M. 2008. Structural Equation Modelling: Guidelines for Determining Model Fit. *Electronic Journal of Business Research Methods Volume 6 Issue 1 2008*. 53-60.
- [28] Hsu, C.L., and Lu, H.P. 2004. Why do people play Online games? an extended TAM with social influences and flow experience. *Inf. Manage.*, 41(7). 853-868.
- [29] Igarria, M., Parasuraman, S., and Baroudi, J. 1996. A Motivational Model of Microcomputer Usage. *Journal of Management Information Systems, Vol.13, No. 1*. 127-143.



- [30] Jahng, J., Jain, H., and Ramamurthy, K. 2007. Effects of interaction richness on consumer attitudes and behavioural intentions in e-Commerce: some experimental results, *European Journal of Information Systems*, 16(3). 254–269.
- [31] Jarvenpaa, S. L., and Todd, P. A. 1996. Consumer reactions to electronic shopping on the World Wide Web. *International Journal of Electronic Commerce*, 1(2). 59-88.
- [32] Karahanna, E., and Straub, D.W. 1999. The Psychological Origins of Perceived Usefulness and Ease-of-Use: Extending Technology Acceptance Theory. *Information and Management*, 35, 1999. 237-250.
- [33] Khalifa, M. and Liu, V. 2007. Online consumer retention: contingent effects of online shopping habit and online shopping experience. *European Journal of Information Systems*, 16 (6). 780-792.
- [34] King, D.L., Delfabbro, P.H. and Griffiths, M.D. 2010. The role of structural characteristics in problem video game playing: A review. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, 4(1), article 6.
- [35] Klomsiri, P. 2010. Technology Acceptance of IT Innovative Services: Adoption of E-banking by Customers. Naval Education Department, Royal Thai Navy. Retrieved February, 15, 2013, from Bangkok University: [http://www.bu.ac.th/knowledgecenter/executive\\_journal/july\\_sep\\_11/pdf/aw7.pdf](http://www.bu.ac.th/knowledgecenter/executive_journal/july_sep_11/pdf/aw7.pdf)
- [36] Koufaris, M. 2002. Applying the technology acceptance model and flow theory to online consumer behavior. *Information Systems Research* 13 (2). 205–223.
- [37] Koufaris, M., Kambil, A. and Labarbera, P. A. 2001. Consumer Behavior in Web-Based Commerce: An Empirical Study. *International Journal of Electronic Commerce*, vol. 6, no. 2, 2001. 115-138.
- [38] Kumar, N., and Benbasat, I. 2006. The Influence of Recommendations on Consumer Reviews on Evaluations of Websites. *Information Systems Research* (17:4). 425-439.
- [39] Liao, S.H., Chung, Y.C., Hung, Y.R. and Widowatiin, R. 2010. The impacts of brand trust, customer satisfaction, and brand loyalty on word-of-mouth. *Industrial Engineering and Engineering Management (IEEM)*.
- [40] M2 Research.2012. Gamification in 2012 Market Update - Consumer and Enterprise Market Trends. Retrieved February, 15, 2013, from M2 Research: <http://gamingbusinessreview.com/wp-content/uploads/2012/05/Gamification-in-2012-M2R3.pdf>.
- [41] McDonald, R.P. and Ho, M.H.R. 2002. Principles and Practice in Reporting Statistical Equation Analyses. *Psychological Methods*, 7 (1). 64-82.
- [42] Michael, D and Chen, S. *Serious games: Games that educate, train, and inform*. Thompson Publishing, NY, 2005.
- [43] absorption on perceived usefulness and perceived ease of use in on-line learning: An extension of the technology acceptance model. *Information and Management*, 42. 317– 327.
- [44] Sarel, D., and Mamorstein, H. 2003. Marketing Online banking services: The voice of the customer, *Journal of Financial Services Marketing*, 8 (2). 106.
- [45] Seyal, A., Rahman, M. and Rahim, M. 2002. Determinants of academic use of the Internet: a structural equation model. *Behaviour and Information Technology* 21 (1). 71-86.
- [46] Steuer, J. and Clifford N. 1993, “Voices, Boxes, and Sources of Messages Computers and Social Actors,” *Human Communication Research*, 19 (4). 504–527.
- [47] Sykes, T.A., Venkatesh, V., and Gosain, S. 2009. Model of Acceptance with Peer Support: A Social Network Perspective to Understand Employees' System Use. *MIS Quarterly* (33:2), 2009. 371-393.
- [48] Tang, L-L. and Nguyen, H. 2011. Common causes of trust, satisfaction and TAM in online shopping: An integrated Model. *Graduate School of Management. Yuan Ze University, Taiwan, ROC (CSQ)*.
- [49] Vallerand, R.J. Toward a hierarchical model of intrinsic and extrinsic motivation. In M. Zanna (Ed.), *Advances in experimental social psychology*, Academic Press, NY, 1997, 271-360.
- [50] Van der Heijden, H., 2003. Factors influencing the usage of websites: the case of a generic portal in The Netherlands. *Information & Management* 40 (6). 541–549.
- [51] Van der Heijden, H. 2004. User Acceptance of Hedonic Information Systems. *MIS Quarterly*, 28 (4).
- [52] Van der Heijden, H., Verhagen, T., and Creemers, M. 2003. Understanding online purchase intentions: contributions from technology and trust perspectives. *European Journal of Information Systems* (12). 41–48.
- [53] Vatanasombut, B., Igbaria, M., Stylianou, A. C., and Rodgers W. 2008. Information Systems continuance intention of web-based applications customers: The case of Online banking. *Information & Management*, 45(7). 419.
- [54] Venkatesh, V. 1999. Creation of favourable user perceptions: Exploring the role of intrinsic motivation. *MIS Quarterly*, 23. 239–260.
- [55] Venkatesh, V., and Morris, M. G. 2000. Why don't men ever stop to ask for directions? Gender, social influences, and their role in technology acceptance and usage behaviour. *MIS Quarterly*, 24(1). 115-139.
- [56] Venkatesh, V. and Speier, C. 1999. Computer Technology Training in the Workplace: A Longitudinal Investigation of the Effect of Mood. *Organizational Behavior and Human Decision Processes*, 79(1). 1-28.
- [57] Wakefield, R. L., Wakefield, K. L., Baker, J., and Wang, L. C. 2011. How Website socialness leads to Website use. *European Journal of Information Systems*, 20(1). 118–132.
- [58] Wakefield, R.L. and Whitten, D. 2006. Mobile computing: A user study on hedonic/utilitarian mobile device usage. *European Journal of Information Systems*, 15(3). 292-300.
- [59] Wang, L., Baker, J., Wagner, J. and Wakefield, K. 2007. Can a retail web site be social? *Journal of Marketing* 7. 143–157.
- [60] Wentzel, J.P., Wentzel, J.M., Sundar, D.K. and Yadavalli, S. Drivers of E-Commerce/E-Business Success: Constructs, Antecedents & Moderators in Adoption of Technology Enabled Products & Services. *Proceedings of the 41st International Conference on Computers & Industrial Engineering, Los Angeles*, 2011, 23-25
- [61] Wu, J., and Liu, D. 2007. The effects of trust and enjoyment on intention to play online games. *Journal of Electronic Commerce Research*.
- [62] Xiao, B. and Benbasat, I. 2007. E-Commerce Product Recommendation Agents: Use, Characteristics, and Impact. *MIS Quarterly*, (31: 1).
- [63] Zichermann, G. and Cunningham, C. 2011. *Gamification by Design: Implementing Game Mechanics in Web and Mobile Apps*. Sebastopol, CA: O'Reilly Media.

Appendix A. Descriptive Statistic (SPSS v20)

| Measurements items | Variable | Mean Statistic | Mean Std. Error | Std. Deviation Statistic | Variance Statistic |
|--------------------|----------|----------------|-----------------|--------------------------|--------------------|
| Friendly           | QSOC1*   | 3.82           | 0.08            | 1.19                     | 1.42               |

|                                                                                           |         |      |      |      |      |
|-------------------------------------------------------------------------------------------|---------|------|------|------|------|
| Helpful                                                                                   | QSOC2   | 3.61 | 0.07 | 1.06 | 1.14 |
| Informative                                                                               | QSOC3   | 3.68 | 0.07 | 1.02 | 1.05 |
| Intelligent                                                                               | QSOC4   | 3.86 | 0.07 | 1.02 | 1.05 |
| Interactive                                                                               | QSOC5*  | 4.13 | 0.07 | 1.02 | 1.04 |
| I can quickly find the information I need on this game                                    | QPEOU1  | 3.78 | 0.07 | 0.98 | 0.97 |
| It is easy to select the players/Mutual Funds                                             | QPEOU2* | 3.70 | 0.07 | 0.95 | 0.90 |
| It would not be time consuming to purchase an Mutual Fund                                 | QPEOU3  | 3.53 | 0.06 | 0.90 | 0.82 |
| My interaction with this game is clear and understandable                                 | QPEOU4  | 3.81 | 0.06 | 0.88 | 0.78 |
| During the navigation process, I felt excitement with the game animation                  | QPENJ1  | 3.82 | 0.07 | 1.03 | 1.07 |
| While navigating on this website, I felt a sense of adventure                             | QPENJ2* | 3.46 | 0.08 | 1.13 | 1.28 |
| The enthusiasm of this website is catching; it picks me up                                | QPENJ3* | 3.51 | 0.08 | 1.15 | 1.33 |
| This website it entertains me with the soccer championship analogy                        | QPENJ4  | 3.73 | 0.06 | 0.92 | 0.84 |
| I enjoyed being immersed in exciting connection with the serious application and the game | QPENJ5  | 4.02 | 0.06 | 0.81 | 0.66 |

|                                                                                                       |         |      |      |      |      |
|-------------------------------------------------------------------------------------------------------|---------|------|------|------|------|
| This website provides good quality information to manager my players / funds and may team / portfolio | QPUSE1  | 3.66 | 0.07 | 1.00 | 1.00 |
| This website is useful for selecting the best players / Mutual Funds                                  | QPUSE2  | 3.63 | 0.07 | 0.95 | 0.90 |
| Follows my Mutual Funds from this website wold fit my interests                                       | QPUSE3* | 3.91 | 0.07 | 1.01 | 1.03 |
| Information sharing is useful                                                                         | QPUSE4* | 3.63 | 0.07 | 1.03 | 1.07 |
| I would be willing to use this website                                                                | QPINT1* | 3.51 | 0.11 | 1.48 | 2.21 |
| I intend to use this game in the future                                                               | QPINT2  | 3.63 | 0.07 | 1.06 | 1.13 |
| I'm likely to recommend this website to my friends                                                    | QPINT3  | 4.05 | 0.08 | 1.16 | 1.34 |
| Awards increases my involvement in the game                                                           | QPINT4* | 4.05 | 0.06 | 0.85 | 0.72 |
| Social network connection increase my participation                                                   | QPINT5* | 3.87 | 0.08 | 1.08 | 1.16 |

\*Indicates dropped item to increase construct reliability analysis

#### Appendix B. Cronbach's Alpha - SPSS Reliability

| Constructs                      | Cronbach's Alpha | N of Items |
|---------------------------------|------------------|------------|
| PSOC-Perceived Socialness       | 0.907            | 5          |
| PEOU-Perceived Ease of Use      | 0.794            | 4          |
| PENJ-Perceived Enjoyment        | 0.876            | 5          |
| PUSE-Perceived Usefulness       | 0.815            | 4          |
| PINT-Perceived Intention to Use | 0.750            | 5          |