How gamification can influence the web design and the customer to use the e-banking systems

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ABSTRACT

The gamification is growing in e-business and the banks are looking for new ways to get more customers on their websites. Therefore, it is important to study what are the most appreciated features of the website that could influence the behaviour of the customer to use an electronic banking system with game features. The gamified e-banking suggests that rich elements/features associated with the games could influence other variables and therefore increasing the client loyalty, to spend more time and increasing the transactions on the website. The aim of this study is to look into the influence of gamification in the e-banking system. Based on the research of 180 publications and 210 variables that could influence the intention to use a certain technology this study develops a theoretical model representing the gamification influence on ease of use, information, web pages characteristics, web design and on the intention to use an e-banking with game features. The results from an online survey of 219 e-banking customers show that the gamification had a positive impact on all variables; special has a medium positive influence in web design and information and a large positive influence on customer intentions to use. Further analysis shows that the website ease of use plays has also a medium positive influence on the intention to use an e-banking gamified. Our findings also show that the clients give more importance to an attractive graphical and architecture website design, and less to web pages with so much information or having pleasure in using an e-banking system.

Categories and Subject Descriptors

H.1.2 [User/Machine Systems]: Human factors; G.3 [Probability and Statistic]: Correlation and regression analysis; J.1 [Administrative Data Processing]: Business and Marketing; K.4.4 [Electronic Commerce]: K.8.0 [General]: Games.

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General Terms

Management, Measurement, Design, Economics, Experimentation, Human Factors, Theory.

Keywords: e-banking, Gamification, Web design, Games, Structural Equation Modelling, Loyalty, TAM.

1. INTRODUCTION

The commercial success of online gaming, computer applications and their influence on the behaviour of users (confidence, pleasure, ease of use, loyalty), [58] leads us to consider the development of business applications with features of games will be able to also influence e-banking customers to increase their use and loyalty. The theme of games and electronic business suggests the main question: which elements/features and variables that can influence the use of e-banking with game features?

This study focuses on identifying the elements of web design and gaming features, and on which variables that positively influence the intention to use the e-banking system gamified. The goal is to identify which specific issues that may prevent the customer to interact successfully with the e-banking system, through an online questionnaire only for the e-banking users.

To identify the variables/questions that are most likely to ask in the questionnaire, it was performed a literature research on studies related to the intention to use of websites, web design, serious games and e-banking systems. In globally, we have identified 180 publications, which analyses the 210 possible variables that could influence on using a certain technology.

Based on the literature we consider 6 constructs as the most important for the theoretical model explaining the intention of the use of websites with game elements (gamification website; website ease of use; design of the website; web pages characteristics; website information and website intention to use).

The development of applications and websites with game elements puts us another question:

- Gamification characteristics influence the behaviour of the customer to use the e-banking system?

2. OBJECTIVES

The present study aims to identify the web design elements and characteristics that affect the acceptance of use the banking website gamified. A theoretical model was developed to summarize and describe the conceptual variables, measuring attributes, and the relevant studies on the acceptance to use an e-banking gamified. The client engages in online transactions often takes into account various factors and the need for trade-off decisions to maximize individual satisfaction. This information was created to provide support for future research on the variables that could influence for user acceptance and adoption of e-banking systems.

In this study, we extend and adapted the TAM (Technology Acceptance Model, [16] to develop and propose a change to include a gamified web design with game features, which could influence the behaviour of the customer in using and performed more transaction on banking websites.

Our study will include an analysis of a theoretical model and the influence of six variables and relationships between these variables in terms of influence for the intention of the use of e-banking with game features. Based on data collected through the online questionnaire, we can highlight the observed variables, the relationships between the variables not observed, identify new variables and conclude about the intention of the use of e-banking systems gamified.

According to the investigation of development and testing of business software with game elements in e-banking [45], we explore the characteristics and elements of electronic channels and what their influence on the client's intention of the use the e-banking systems. Therefore, the main objective of this study is to describe the impact in the web design and characteristics of a bank website with in game's characteristics. Another objective of the present study are the features of the e-banking gamified and the analysis of the elements assessed by the bank client and what are the key variables that lead to changing the behaviour to use and transact more on the electronic banking system.

3. MOTIVATION

Given the social importance of the games and be an activity that involves millions of players, the lack of studies and research on the characteristics and web design that influence clients are still insufficient [33]. Research and studies on games can be seen as an academic response to the issues of the gaming industry in the development and sale of these products [34]. The online games grow in importance as computer applications of electronic business for it professionals and academics increasingly believe that understanding the behaviour of the online customer is critical [60]. The websites that do not act as a game, the new generation of users will not pay attention [56].

The use of games as a factor in reduction of perception barriers to use the e-banking, such as the difficulty of human relationship with the computer and the internet, usability, the lack of security and ease of use were developed in computer applications [32, 61].

TAM assumes that a user's attitude to a technology is determined by its lack of usefulness and ease of use of this technology and that this attitude influences its intention to use technology [50]. The utility is the main determinant of behavioral intention for a user to use a technology with ease of use and pleasure, to act as secondary determinants [11].

The website designers should pay more attention to the design to improve its usability and ease of use of an e-business website [10]. A good understanding of web-based interaction is crucial for a useful and effective website design, especially in the context of e-business [40].

4. THEORETICAL BACKGROUND

4.1 Intention of use of technology

To understand the factors that can influence e-banking clients to use a website with game features we conduct a research on the published literature focusing on studies of the adoption of theoretical models based on TRA (Theory of Reasoned Action, [21]), TAM, UTAUT (Unified Theory of Acceptance and Use of Technology, [53], on the explanatory variables that can influence the intention to use a particular information technology, like a website, a business application or a computer system.

4.2 Website Design

The introduction of mechanisms of games is the art and science of transforming the everyday interactions of its customers in games that serve business purposes [63]. In this sense, the quality of website design is very important for any online store to attract customers [22].

When customers interact with an online store that they prefer to do it through a technical interface and not through any employee, so that the design of the website, acts as the interface, which plays an important role influencing the behavior of the customer [59]. The design of the website positively influences the overall customer satisfaction and perceived service quality [35]. Also affects positively the intention of purchase [43].

There are still some concerns about the web design, for example, if the websites should have an initial web page with a short description that summarizes what the company does, write a window title with good visibility in search engines and favourites, emphasize high-priority tasks on the website, include a search box, hyperlink names start with the most important keyword use graphics and other various important points [41].

Researchers that study the human interaction with the computer try to understand the elements of web design (technical, visual and content) that are most appreciated and those that currently produce a shortfall between expectations and experience [49].

Studies such as [2] (data quality, organization, attractive, technical adequacy) [4] (data quality, usability, interaction, reliability), [20] (page features, information, content) and [44] (content features, design, presentation, navigation, security, speed, tracking), have developed survey-based studies on the important factors that define the characteristics of the design of the websites. However, no specific studies were found in the design and characteristics of banking websites. The design of the website has influence on the performance and attitudes of customers shopping online [42].

The design of the website should allow customers and visitors to browse without difficulty and efficiently through the various web pages and hyperlinks [15].

The design of websites can influence the decision of customers and visitors to revisit and buy online [52].

4.3 Web pages characteristics

According to [55] in your research about the characteristics of the web pages of banks in the United Kingdom concluded there are

no strict rules that apply to the content and layout of the web page. A website attractive is far more likely to generate a positive impression, keep clients and visitors longer on your website, thus increase visits and loyalty of existing clients, and drum up new clients.
So it is important to study what the features most appreciated by customers of e-banking, i.e. identify what your preferences about the colours of the web pages, the type and format of the text, the graphics, the image quality and the type of 2D or 3D images and even the simplicity of the organization and structure of web pages. Also the web page usability enables or is a perception by clients and visitors is an important factor because it determines the ease of interaction with the content, the ease of finding and showing what is important, the speed of navigation, loading of pages and to the extent or size of pages. According to [1], the usability is one of the most important metrics to measure the quality of websites, especially e-commerce websites. The features of the website pages are directed related to the satisfaction of the use of the website [58].
Still remains relatively unexplored empirically are how the characteristics of the website pages affect user's usage intentions and consequently influence the effectiveness of the website [52]. In the study of cross-cultural and cognitive aspects of navigation on websites, [36] found that experiences the cognitive type of balance between the challenges and the perceived control are all of the website content features.
The characteristics of innovation include those innovative features that lead eventually to the acceptance or denial of use by clients. The use of innovation is attributed to their characteristics; that is, the decision to accept innovation depends on the perception of the characteristics of innovation, by users [46]. The characteristics and content of web pages, keeps the interest of customers all over the website and are an important factor in the buying decision online [43].

4.4 Website Information

[28] it is concluded that the use of an Avatar (virtual character) in the e-business to provide information about the products, leads to increased use of the website. The availability of a research tool product offerings on a website and can attract new clients, retain existing clients and reduce client friction with the computer [9]. In addition, the information about the product can also play an important role in the purchasing decision [40]. Online shopping brings benefits to consumers in terms of convenience, search ability and detailed information about the products [62].
Some studies [2, 8, 42] investigated the variables that influence the electronic business, such as information on the content, the privacy, security design, the quality of the website, the quality of the contents, the type of content, technical compatibility and the design of the websites. These studies among others, confirm that, in the perception of users the content or quality of information is only one dimension of the quality of the design of the website. Therefore, the design and acceptance of the website should be assessed using models with multiple variables that combine other perceptions of clients and visitants, not only the informational content, contrary to the theory of [6] the basic purpose of a website is just providing information.

4.5 Website Ease of Use

Ease of use is being the most important variable influencing the intention to use a website (as identified in the findings in our study and in the literature), because of that is essential add and to the study the influence of this variable in order to use the e-banking.
The ease of use of e-banking services allows greater movement of users to other banks and even in alternation with other more traditional forms of the banking system, hence reduces the long-term commitment of the client and their loyalty [48]. The positive attitudes and acceptance of e-commerce can be inhibited by the lack of contact with the product and the lack of interaction with a representative of the organization [5]. Richer interactions with e-commerce products and sales procedures in computer systems can induce positive attitudes for e-commerce, increasing the intentions of their use [26].
Lack of user-friendliness (perceived ease-of-use) is the degree to which a person believes that he can use a particular system without effort [16].

4.6 Gamification

The gamification is the term that designates the use of elements of game design in non-game contexts. This sets it apart from the actual games and design for playful interactions [18]. The 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 results of the desired effect.
The introduction of computer applications gamified to a large audiences promises new developments to the rich and diverse research in finding existing design patterns and dynamics of games, [57]. Given the need to understand, what clients want in a website is important for researchers of information systems to develop and validate a variety of websites to test, measure extensively and capture the attitudes and behavior of customers of electronic banking [51].
According to the [37], there are various levels of involvement, where the game mechanics have a measurable impact (Figure 1). The brand or employer, where users interact with a product, service or process. The individual commitment allows self-exploration within the environment. Finally, the communal involvement allows interactions with other people in the community.

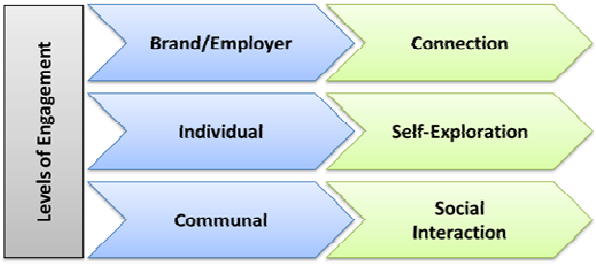

Figure 1. Levels of engagement - Gamification in 2012, M2Research.

Understanding these mechanisms provide a powerful business tool for conveying information, change consumer behaviour, influencing the decision-making process, and client loyalty. The game mechanics (Figure 2) deployed in e-banking offers a great opportunity to increase the participation of clients in use the banking's websites.

Figure 2. Games Mechanisms, Gamification in 2012, M2Research.

5. RESEARCH MODEL

Online games have grown in importance as an e-commerce application, professionals and researchers increasingly believe that understanding the behaviour of online game player is critical, [60]. In an effort to identify the variables that influence the client behaviour in using the e-banking system with game features, was defined the theoretical model adapted from the literature review and based on the TRA and TAM, tested for the e-banking customers´ responses to an online questionnaire in order to empirically study the relationships among the hypotheses represented in Figure 3.

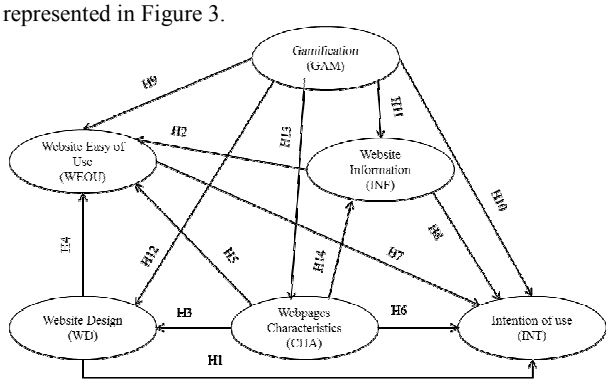

Figure 3. Conceptual model-features of e-banking gamified

6. HYPOTHESES

According the literature review and the study of various models based on explanatory TAM on the adoption of e-commerce systems, we have analyzed the variables related to the development of websites in the context of gamification. To assess the influence on the adoption of e-banking with online game features, we will test 14 hypotheses grouped by 6 latent variables not observed (constructs) used in the proposed research, as well 34 endogenous variables observed and used in the measurement of the model (Table 1).

Table 1. Construct variables and items.

Constructs	Ref.	Variables observed	Description	Sources
Web design	WD	5	Web design is the design process relating to the development of the website front-end.	[10, 42, 52, 54]
Ease of use	WEOU	5	Is the degree to which the user believes he can use a given system effortlessly.	[10, 16, 39, 54]
Gamification	GAM	6	Gamification is the use of elements of game design in non-game contexts.	[18, 31, 39, 55]
Information	INF	6	Information is data that have been published on the website in different formats.	[10, 17, 47, 52, 55]
Webpage characteristic	CHA	6	The characteristics of the website pages are directly related to the satisfaction of the use of the website.	[30, 40, 55, 58]
Intention of use	INT	6	Is the variable in the model TAM that determines the influence and the behavioral attitude of the users to the possible intention to use a technology.	[12, 16, 39, 54]

This study attempts to test the causal relations of the conceptual model to define the following hypotheses (Table 2):

Table 2. Hypotheses to be tested.

Hypotheses	Causal relationship	Hypotheses	Causal relationship
H1	WD → INT	H8	INF → INT
H2	INF → WEOU	H9	GAM → WEOU
H3	CHA → WD	H10	GAM → INT
H4	WD → WEOU	H11	GAM → INF
H5	CHA → WEOU	H12	GAM → WD
H6	CHA →INT	H13	GAM → CHA
H7	WEOU → INT	H14	CHA → INF

7. RESEARCH METHODOLOGY

In the context of a hypothetical e-banking system with game elements, it was analysed the costumer reactions to the variables GAM, WD, CHA, DES, WEOU, INF and PINT through the response to an online questionnaire (Appendix A). Five items measure all endogenous variables and latent variables included in this study 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 [3, 24]. 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.
The methodology adopted for this study was the following:

- Literature research
- Construction of theoretical model
- Surveys on research studies of intention of use of websites
- Preparation of a set of issues resulting from previous research
- Validation, testing and preparing the final questionnaire
- A collection of responses to the questionnaire via an online survey
- Analysis of data
- Model validation
- Conclusions

In this study, we did an extensive review of the literature on website design, in order to establish a comprehensive model of web design, features and gamification and its influence on the intent of the website to use. Our study is divided into six areas, which cover the theoretical model variables, website, ease of use, website design, web pages, the website features, information, loyalty programs of website and website intension for use.

7.1 Questionnaire

During our research, we identify 61 possible questions split between in 6 different variables. To eligible and reduce the number of the questions we have performed a pre-tested with a small group of 31 e-banking clients with the goal to determine whether concepts and questions are understood by respondents and in the same way oriented to the intended research.
The pre-test questionnaire replies can also be used to evaluate other aspects of respondents ' tasks, such as the use of records to answer the questions of research or his understanding of the purpose of the interview. In addition, respondents can be helpful in determining the reason for the claimed misunderstandings. Sometimes, the results of the show one question are superfluous and can be eliminated. Alternatively, additional questions may be needed to include in the final questionnaire.
Further, given that the questionnaire items that exhibit kurtosis were used in previous studies that used SEM [14], and that these studies were concerned with only the significance levels of the path coefficients, it is assumed that these departures from normality can be justifiably disregarded.
To withdraw the problematic questions we have used SPSS and analyses the statistic of Normality Test, Skewness, Kurtosis and Variance values. The process to select the most appropriate questions we performed the following approach:

- Removes all the questions that have been identified have confusing, misinterpreted, or not appropriated for the primary purpose of our study.
- Use SPSS v. 20, to check the correlation between independent variables, that is, how likely it is that a feature of respondents is associated with another feature of our respondents.
- Use SPSS v. 20 in order to identify and remove all the independent variables with higher value of Kurtosis or Variance that could indicate the existing of outliers and avoid the miss assumption of normality variable.

After performing, the analysis of the questionnaire for pretesting through SPSS and with the comments received from the respondent we decided to remove the following 27 questions (Table 3 and Appendix C):

Table 3. Questions removed from the pretested questionnaire.

Variable	Why removed?
WD6	High Variance = 1.206
WD7	Identify has confused or miss understandings
WEOU6	Identify has confused or miss understandings
WEOU7	Identify has confused or miss understandings
WEOU8	Identify has confused or miss understandings & high variance = 1.114
GAM7	High variance = 1.386
GAM8	Identify has confused or miss understandable & high kurtosis = 3,211
GAM9	High variance = 1.114
GAM10	Identify has confused or miss understandable & high variance = 1.006
GAM11	Identify has confused or miss understandable & high variance = 1.090
INF7	Identify has confused or miss understandable & high kurtosis = 4.435
INF8	Is more related with trust
INF9	Identify has confused or miss understandings
INF10	High variance = 1.056
INF11	High variance = 1.492
INF12	More related to trust
CHA7	High variance = 1.191
CHA8	Identify has confused or miss understandings
CHA9	High variance = 1.013
INT7	High variance = 1.159
INT8	Identify has confused or miss understandings
INT9	Identify has confused or miss understandings
INT10	High variance 1.189
INT11	Identify has confused or miss understandable & high Variance = 1.065
INT12	High variance = 1.323
INT12	High variance = 1.112
INT13	Identify has confused or miss understandings

7.2 Sampling and profiling

The data collected through the online questionnaire with 34 questions (Appendix A) were disclosed through Facebook and Linkedin and was available during 6 weeks, eligible only for customers of e-banking services. The descriptive analysis of the data collected through the valid responses was carried out via the software SPSS (Appendix B). The sample of this study consists of 219 e-banking customers, 69% are men, 58% are over the age of 40 years, 56% have masters or higher studies and 63% have high computer skills. The question with the lowest average was GAM2 (2.92) and the question with highest average was the WD4 (4.09). Kurtosis statistic was calculated in the Software SPSS AMOS v. 18 and all values are less than 3 meaning that we are present to a Platykurtic distribution.

7.3 Reliability analysis

After the descriptive analysis of the data, we 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 [19]. The results of all the coefficients of reliability (Table 4) are above the recommended minimum of 0.70 Cronbach's Alpha [25], demonstrated that the results of the latent variables (constructs) and the underlying elements (variables) are highly reliable, so it was proceeded the statistical test through SEM to estimate the causal relationships between the constructs of the model and validate the causal hypotheses.

Table 4: Cronbach's Alpha Test - by variable.

Variable	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N. of Items
WD	0.835	0.834	5
WEOU	0.801	0.802	5
GAM	0.839	0.839	6
INF	0.796	0.798	6
CHA	0.707	0.702	6
INT	0.857	0.857	6

According to [29] SEM complexity makes the determination that a proposed model tuning is poor, however, some modifications can be made to improve substantially 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 that 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 CFA (Confirmatory Factor Analysis) for SEM 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 was carried out and some relationships have been removed for those variables with high-value Kurtosis (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 (φ)) 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 analyses each latent variable and the related variables resulting in the dropped variables (Table 5). By deleting indiscriminate 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 advised that each construct should have at least two items [7], and that was respected.

Table 5. Variable removed in order to improve the model fit.

Variable	Why removed?
WD3	Kurtosis = - 0.017
WEOU4	High variance = 0.945
GAM3	Kurtosis = - 0.076
GAM6	Identify has confused or miss understandings
INF3	High kurtosis = 0.901
INF4	Skewness = 0.051
INF6	Identify has confused or miss understandings
CHA4	Identify has confused or miss understandings
CHA5	Skewness = 0.041
INT1	High variance = 0.915
INT2	Identify has confused or miss understandings

7.4 Measurement model

Absolute adjustment indexes determine how the model "a priori" fits better with data collected [38] and demonstrates that the proposed theoretical model has the higher setting.

Are included in this category the 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), [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). 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 to calculate the direct effect of the model and the results obtained when we process the data about the model.

After CFA the hypothesis tests were conducted again using SPSS AMOS and the results of model fit indicative of a good model fit the data [25]: $X^2 = 310.3$; (P = 0.000); DF = 216, RMR = 0.05; CFI = 0.95, IFI = 0.95. 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 [13].

The results (Table 6) indicate that not all standardized coefficients for all hypothesized paths in structural model are significant (P<0.05). GAM has a large positive influence on INT (H10, β = 0.53), and the WEOU has medium influence on INT (H7, ß = 0.23). The CHA has a positive influence in the WD (H3, ß = 0.52) as the GAM but smaller (H12, ß = 0.22). As a result, GAM has influence on all variables.

Table 6. Regression Weights with Model Fit and after CFA.

Hypothesis	Dependent Variable	Independent Variable	Regression Weights (ß)	P	Hypotheses test result (positive influence?)
H1	WD	INT	-0.05	0.510	Rejected
H2	INF	WEOU	0.03	0.588	Rejected
H3	CHA	WD	0.52	***	Large
H4	WD	WEOU	0.08	0.338	Rejected
H5	CHA	WEOU	0.06	0.628	Rejected
H6	CHA	INT	0.14	0.218	Rejected
H7	WEOU	INT	0.23	0.008	Medium
H8	INF	INT	0.00	0.926	Rejected
H9	GAM	WEOU	0.15	0.020	Small
H10	GAM	INT	0.53	***	Large
H11	GAM	INF	0.25	0.002	Medium
H12	GAM	WD	0.22	***	Medium
H13	GAM	CHA	0.10	0.027	Small
H14	CHA	INF	0.24	0.130	Rejected

***absolute value is less than 0.001

The results of multivariate test on the structural model are showed in (Figure 4) that outlines the regression coefficients for each factor.

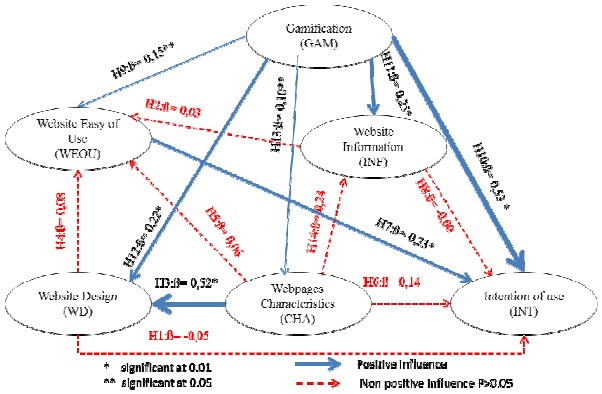

Figure 4. Structural Model Results.

8. DISCUSSION

After all, it is proven that the gamification can be employed to explain the acceptance of bank websites with game features. The e-banking clients might be willing to use e-banking systems gamified if there is perceived value of the game characteristics in the bank website and if is ease of use. Therefore, with the experience and results of this study can somehow 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 gamification in the e-banking design and on the intention to use an e-banking system with games characteristics.

9. LIMITATIONS AND FUTURE RESEARCH

The questionnaire was restricted only to customers of e-banking systems so the results cannot be generalized to all customers' bank customers or future customers. While the theoretical basis for the various perceptions analyses in this game is supported in this empirical study, the implementation of various types of game´s characteristics in different contexts of e-banking requires further study.

It is essential to emphasize the fact that Portuguese culture is different from the country where the earlier search was carried out. Researchers predicted that the familiarity and economic benefits of the use of the internet has a significant impact on the acceptance of online banking services.

10. CONCLUSIONS

The development of gamified business applications in banks opens new paths in research on design patterns and the dynamics of games in order to increase the client loyalty and the number of transactions in e-banking [57]. This paper examined the influence of the web design, ease of use, information, web pages characteristics and gamification on the bank customers and their intention towards using the e-banking system with game features. Results show that the e-banking customers perceived that the gamification has a large positive influence on the intention to use the banking website gamified and highlights the positive influence in the all other variables in this study. In addition, we conclude that the web design of e-banking with a nice graphics, good position of the navigation bar, menus and hyperlinks are very important in the website navigation. The ease of use with a good search tool and the products well categorized to facilitate the purchasing process, is also important and is the main goal of a modern e-banking system (proved through the higher means response like, WD1, WD4, WEOU1 and WEOU2).

Regarding the question about "which elements/features and variables that can influence the use of e-banking with game features?", we conclude that the web pages characteristics have a large positive influence in the website design, showing that the contents, style, graphics and digital animations are important elements to have in considering by the web developer in the web design of the e-banking systems.

In response to the other question "Gamification characteristics influence the behaviour of the customer to use the online bank?" the results of the hypotheses testing show that the gamification had a large influence in the intention of use and medium influence in the website design and information. This could indicate that the gamification characteristics can help the customers to find information or learn more about financial products. In addition, the website design with an attractive and a nice graphic design have a positive influence on the customer behaviour.

Overall the gamification and the ease of use, drives an important role in the e-banking systems architecture to influence the customer to use more the e-banking, became more loyalty and finally conduct to perform more transaction that will increase the electronic business of the banks.

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

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Appendix's

Appendix A. Final questionnaire, after pre-test questions.

Variable (WD)	Importance of the web design	Authors
WD1	An e-banking with an attractive graphical environment captivates clients	[52]
WD2	A good division of the spaces on the pages of an e-banking is attractive to clients.	[52]
WD3	An e-banking should have a nice design.	[54]
WD4	The position of the navigation bar, menus and links influence the navigation and the design of the website.	[52]
WD5	An e-banking must have an interactive design.	[10]
(WEOU)	**The ease of use of the e-banking**	**Authors**
WEOU1	An e-banking must have a good search tool.	[10]
WEOU2	An e-banking should have the products are well categorized facilitate the purchasing process.	[10]
WEOU3	An e-banking should allow quick shopping.	[54]
WEOU4	A website must have a 'banking' with a simple interface which facilitates the lack of client perception.	[54]
WEOU5	The use of an e-banking should not require a great mental effort.	[39]
(GAM)	**e-banking with game features**	**Authors**
GAM1	Learn financial literacy during a game on a banking website would be nicer.	[31]
GAM2	Pleasure in the use of a website with features of games.	[39]
GAM3	I feel good while playing a game on an e-banking.	[31]
GAM4	I would like to participate games in an investment e-banking.	[31]
GAM5	I think that an e-banking with content and animated elements is secure.	[55]
GAM6	The e-banking should reward their clients through a system by points.	New.
(INF)	**Information provided on the website**	**Authors**
INF1	An e-banking should have comparative information between products and prices.	[10]
INF2	Too much information in a single page of an e-banking may confuse the client.	[52]
INF3	Often have trouble finding the information I need in the e-banking.	[55]
INF4	The e-banking must use Avatars or digital animations facilitate learning.	New.
INF5	The e-banking must have a good categorization of information.	[52]
INF6	The quality of information from a website favoring the intention of client's online purchase.	[47]
(CHA)	**Characteristics of website pages**	**Authors**
CHA1	3D content banking websites are better suited to the 2D?	[40]
CHA2	The design of the pages of the bank websites is an important factor for a good visualization of the contents.	[55]
CHA3	The style of the text of the pages of the bank websites is an important factor.	[55]
CHA4	The use of graphics in banking websites is an attraction factor.	[55]
CHA5	The use of digital animations in the pages of the e-banking is an important factor.	[55]
CHA6	The contents of the pages of the bank websites should be of light colours for ease of reading.	[30]

(INT)	Intention to use the e-banking with game characteristics	Authors
INT1	An e-banking with challenges raises I want to use it.	New.
INT2	An e-banking with animation and rich in interactivity increases my use of a banking website.	New.
INT3	I am more willing to use a banking website if you have a visually appealing and funny web design.	[39]
INT4	Would recommend to friends using banking websites with features of games.	[39]
INT5	The website must provide banking products or services with prizes, bonuses or points (and recognize clients with medals or trophies).	[54]
INT6	An e-banking should create feelings of pleasure during searching for information.	[12]

Appendix B. Descriptive Statistic

Items	Mean	Std.Deviation	Variance	Skewness	Kurtosis
WD1	4,02	,821	,674	-,695	,179
WD2	3,97	,809	,655	-,832	,893
WD3	3,96	,861	,742	-,582	-,017
WD4	4,09	,878	,771	-,753	-,111
WD5	3,94	,791	,625	-,681	,398
WEOU1	4,00	,911	,830	-,854	,594
WEOU2	4,02	,818	,669	-,744	,580
WEOU3	3,88	,906	,821	-,846	,782
WEOU4	3,98	,972	,945	-,901	,449
WEOU5	3,80	,910	,828	-,743	,697
GAM1	3,51	,950	,902	-,276	-,338
GAM2	2,92	,983	,966	,107	-,520
GAM3	3,35	,898	,807	,089	-,076
GAM4	3,44	,873	,762	-,283	-,171
GAM5	3,37	,865	,748	-,365	,082
GAM6	3,66	,932	,868	-,467	-,173
INF1	3,92	,879	,773	-,942	1,011
INF2	4,05	,937	,879	-,935	,427
INF3	3,87	,949	,901	-,618	-,310
INF4	3,35	,898	,807	,051	-,450
INF5	3,94	,934	,873	-,972	,688
INF6	3,86	,862	,743	-,773	,798
CHA1	3,07	,896	,802	,745	,159
CHA2	3,76	,861	,742	-,565	,016
CHA3	3,68	,883	,780	-,849	,989
CHA4	3,82	,830	,688	-,434	-,235
CHA5	3,22	,851	,725	-,041	-,297
CHA6	3,61	,778	,606	-,555	,520
INT1	3,11	,956	,915	,001	-,293
INT2	3,14	,925	,856	-,145	-,632
INT3	3,71	,911	,830	-,758	,255
INT4	3,57	,923	,852	-,740	,324
INT5	3,48	,978	,957	-,491	-,046
INT6	3,69	,875	,766	-,553	,258

Appendix C. Questions removed after pre-test questions.

Variable	Questions	Author
WD6	Use of a colour theme helps user to recognize the e-banking?	[52]
WD7	The e-banking should be informative.	[54]
WEOU6	The e-banking should have a user-friendly interface.	[10]
WEOU7	For me it takes too long a time to learn how to use the e-banking.	[39]
WEOU8	Using an e-banking should not require a lot of mental effort.	[39]
GAM7	An e-banking with digital animation slows the navigation	[52]
GAM8	Using game features in e-banking stimulates my curiosity and leads to my exploration into the website.	[39]
GAM9	The e-banking should also transmit some humour features?	[30]
GAM10	Most people in my group play an *online* game in an e-banking frequently.	[31]
GAM11	The e-banking should also transmit some humour features?	[30]
INF7	The presentation of information in the e-banking should be user-friendly?	[52]
INF8	I believe the information on e-banking.	[55]
INF9	The e-banking should have a complete detail description of the product and services.	[55]
INF10	The e-banking should provide an *online* forum for clients to share information.	[10]
INF11	I am not always comfortable giving financial or personal details over the e-banking.	[55]
INF12	I do not always believe what I read on the e-banking.	[55]
CHA7	The web pages of e-banking should not be bigger than 2 screens (scroll).	New
CHA8	I dislike web pages with too much information about them in e-banking.	[55]
CHA9	I like an easy game interface to use, graphics and sound management in my e-banking.	[27]
INT7	Financial applications with serious games increase my intention to use the e-banking.	New
INT8	During the navigating process, I would like to feel the excitement of the hunt.	[54]
INT9	An e-banking with a sense of adventure during the navigating on this website and with a feel of a sense of adventure increase my intention to use.	[54]
INT10	I would be willing to make a purchase on the website with game characteristics.	[54]
INT11	The likelihood that I would make a purchase on this website rich in animation and videos is very high.	[54]
INT12	The e-banking would offer products/services with rewards and badge would be a good value for the money.	[54]
INT13	The e-banking should provide enjoyed the experience and fun during the research for product information.	[54]
INT14	The rewards given had a positive influence towards on the continuation of using the e-banking.	[12]