

Application of theories and models for information and communication technologies acceptance in banking activities modernization

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Abstract — The paper identifies the factors that influence the banks customers' usage of the Internet facilities for performing the banking activities and to renounce to visit the branches of the banks in order to interact with the banks officer's. The user acceptance of Internet as new technologies that transform some traditional services and activities is a topic of interest for many professionals and researchers working in various domains. The focus of the paper is on the formulation of the hypotheses that have to be tested in order to validate a model for the Internet acceptance in banking activities, based both on the content of the main theories employed in assessing the technology acceptance as Information Diffusion Theory, Decomposed Theory of Planned Behaviour, trust and security and on other factors revealed by empirical studies conducted at European Union and particularized for Romania. Also, there are provided some recommendations to improve the current development of e-banking and also to encourage more banks' customers to take advantage by the opportunity raised because of Internet use in performing banking activities and benefit fully from the e-banking services provided in Romania.

Keywords — banking activities, Internet, incentive factors, classical theories, Innovation Diffusion Theory, The Decomposed Theory of Planned Behaviour, empirical studies.

I. INTRODUCTION

In an increasingly-developing society, a strong, viable economy is vital for any country that seeks to survive on the global market and to provide upwardly living standards for its citizens [1]. Recognizing the above mentioned points as mandatory, Romania is taking steps to develop its electronic banking services to meet 21st century global standards. Together with the increasing rate of Internet and mobile services penetration, significant changes regarding the conduct of economic transactions are witnessing. Simultaneously, bank service providers have been constantly adapting to these changes and at the same time they have met consumers' requirements with new services. The core of banks new strategic orientation currently consists of developing new alternative for the distribution channels for their traditional services.

In Olteanu's opinion the mobile phones, personal computers and the Internet are regarded as an option that was taken into consideration [2]. Thus, since their emergence services like Internet Banking, Home Banking and Mobile Banking were launched on the market very rapidly. It is worth mentioning that these services have gained popularity among users in a relatively small period of time. The premise of this kind of transaction emergence is the computerization of banking operations, the irreversible characteristic of the bank management. Electronic banking services included under the umbrella term of e-banking are divided into three categories: Internet Banking, Home Banking and Mobile Banking. According to the definition provided by the current Romanian legislation, e-banking refers to a system that allows bank customers to perform banking

activities without going to the banking institution and includes the three categories mentioned above [3]. The difference within the three variants of online banking is made by technical aspects regarding the way to connect to the banks' servers. The common element is the remote access to banking information and services that replace the customers' interaction with the banks' officers.

The Romanian e-banking market has witnessed an increasing number of vendors positioning themselves for a stake of the modern banking solution opportunity, with 43 of e-banking solutions, now offered by 33 banks from the Romanian banking system, as it can be seen in the Table no. I, as is shown below:

TABLE I
ONLINE SERVICES PROVIDED BY ROMANIAN BANKS
IN 2009

Year	2009
Services provided by banks	
Total number of banks providing e-banking services:	33
	Internet Banking: 31
Remote access	Home Banking: 5
payment instruments	Mobile Banking: 6
	Phone Banking: 1

Source: Ministry of Communications and Information Society and banking sites from the Romanian banking system, study accomplished on 31.08.2009

TABLE II
ELECTRONIC BANKING ANALYSIS INDICATORS AND THEIR EVOLUTION

Year	Value of transactions		Number of users		Total number of transactions	
	Euro equivalent	Evolution	Number	Evolution	Number	Evolution
2003	23,308,987,478.00	-	18,259	-	5,498,742	-
2004	35,604,679,462.00	+5275	44,538	+143.92	7,818,435	+42.19
2005	65,427,504,401.00	+83.76	100,799	+126.32	11,144,494	+42.54
2006	125,230,756,333.87	+91.40	621,275	+516.35	16,601,209	+48.96
2007	139,740,734,012.03	+11.59	1,540,622	+147.98	22,528,790	+35.71
2008	229,063,783,656.60	+63.92	3,079,366	+99.88	35,255,827	+56.49
2009	72,076,782,975.00	-68.53	3,466,870	+12.58	20,922,408	-40.66

Source: MCSI, Summary regarding the number of banking institutions and remote access payment instruments approved between 2006 and 2009 [4]

II. INCENTIVE FACTORS FOR E-BANKING ADOPTION

The success of services included in e-banking category is strongly influenced by their design so as to lead not only to users satisfaction but to move to the next stage of making them enthusiastic which may have

Regarding the Romanian banking system, it had witnessed a positive trend concerning the number of users, the number of transactions conducted in euro and the value of transactions until 2008. These are the main indicators on which the comprehensive statistical analysis of electronic banking in the Romanian system is based.

Analyzing the information provided in Table II we may notice that in 2009, the only indicator that evolves positively refers to the number of users. This aspect takes place after the number of users increased significantly from year to another with percentages ranging from 99.88% to 516.35% until 2008. In 2009, the slow increase of the number of employees is accompanied by a decrease in the number of transactions and traded values.

Considering that 2009 is a year marked by financial and economic crisis, it can be said that despite the drastic diminishing of traded value, the number of users is increasing. It can be said that banks have achieved at least one of their purposes thus making e-banking large scale service among their clients. The statistics does not the difference between the operations conducted by individuals or companies.

direct consequences on the number of users increasing. Whether e-banking's development is analyzed regionally or globally, it is to be mention the existence of certain difficulties and obstacles which are greater or lower depending on a number of factors that have a significant influence and which have their origin in economic, social, technological, cultural domain, etc. Together

with the acceptance of online trading as an alternative solution for conducting banking operations, the issue of determining the factors that have a major role in e-banking's transformation into a mass service raises more frequently. Due to the diversity and complexity of factors that act on the taking the decision of accomplishing the transition from traditional banking transactions to online banking transactions, the model development and, implicitly, the hypotheses that they have to be tested in order to validate the model, several stages should be taken into account.

In a first stage, an inventory of theories that are used to identify factors influencing the decision to adopt the Information Technology and Communications was accomplished, as a way of conducting services and particularly of those which relate to banking activity. Since the transition from physical distribution to the virtual one generated significant changes in the mentality of all banking products and services users, the study focused out of the available motivational theories on the theory of reasoned action, Theory of Planned Behaviour. Moreover Trust and Security were also considered, as they take into account both technical and psychological elements. An important contribution is brought about by the empirical studies, which emphasize a number of factors included in classical theories and which have an important impact on decision adopting by users. In this respect, a study was conducted concerning online banking services provided by the Romanian banks and the factors on which they stop when they redesign the services they offer.

III. METHODOLOGY

The system of factors is structured in two main categories: factors identified in classical theories that explore the acceptance of innovative elements in the conduct of traditional services and factors identified due to empirical studies. The research methods used are adapted to each of the above-mentioned type of theories. First of all a review had been conducted concerning all classical theories and were chosen those that were used to determine factors that influence the decision of using the Internet and the traditional ways of performing a service, particularly those that deal with modernizing banking services via Internet. For each of the selected theories, certain factors were chosen considered as having a significant influence on the adoption of e-banking services. To determine the empirical factors, were taken in account two distinct studies conducted at different level [5]. First, were analyzed some factors put

in evidence by European Union's studies conducted in order to evaluate the e-banking adoption and some incentive factors [6]. Then, within the mentioned research project, a study was made concerning the Romanian banking system.

A. REVIEW OF THE INCENTIVE FACTORS IN CLASSICAL THEORIES

1. INNOVATION DIFFUSION THEORY: The first theory taken in consideration is the Innovation Diffusion Theory (IDT) that explains individuals' intention to adopt a technology as a modality to perform a traditional activity. The theory is developed by Roger's [7]. The critical factors that determine the adoption of an innovation at the general level are the following: relative advantage, compatibility, complexity, trialability and observability [8]. Researchers as and Tan and Teo, Gerrard and Cunningham and Nor and Pearson had tested the theory on the e-banking adoption [9], [10], [11]. The nominalised factors that influence the e-banking adoption are complexity, triability and observability.

2. THE DECOMPOSED THEORY OF PLANNED BEHAVIOR: The second reviewed theory is the Decomposed Theory of Planned Behaviour (DTPB). The theory was developed by Taylor and Todd [9]. The theory postulates that the intention to use a certain technology is influenced by attitude, subjective norm and perceived behavioural control. Starting from the research conducted by Nor and Pearson, Karahanna, Straub, and Chervany, certain influencing factors were selected [9], [13], [14]. They belong to the Attitude Toward Behaviour and the Perceived Behavioural Control categories and include: perceived usefulness, ease of use, compatibility, self efficacy and technical resources.

B. INCENTIVE FACTORS IN EMPIRICAL STUDIES CONDUCTED BY EUROPEAN UNION

1. GEOGRAPHICAL POSITION: According the data published by Eurostat, the Statistical Office of the European Communities, the Europeans use e-banking to conduct their banking activities to quite different degrees [15]. Across the Europe, adoption rates decrease from north to south and rich to poor. In fact, GDP per capita and latitude explain statistically around 80% of the variation in Europe – as suggested by a simple regression analysis.

2. COST: e-banking grows – usually, but not always at the expense of branch visits performed by the

customers who chose to conduct their banking activities by interacting with the bank's officers. Some empirical studies show that banks customers in Europe strongly increased their use of e-banking because of the cost of the banking transaction conducted at the bank's branches. In France and Italy, the customers visited bank's branches more often, however.

3. SECURITY: Security concerns are an often voiced impediment to e-banking. Many Romanian companies adopted Internet banking and consequently enjoy the e-banking effectiveness. However currently hackers' intrusion in the e-banking system has been frequently reported and many people are increasingly worried by the possibility of losing their money. There is a negative correlation between security concerns and e-banking adoption. French banks customers are somewhat exceptional in that they show medium adoption rates despite having the most concerns regarding the security. It has to be mentioned that security fears are not based on bad experience. Across Europe, there is no robust correlation between e-banking adoption and actual cases of information abuse or fraudulent payment card use. This suggests that public perception highlights the risks even when bad experiences are missing.

4. PREVIOUS EXPERIENCE IN CONDUCTING ONLINE ECONOMIC TRANSACTIONS: Europeans do not discriminate between e-banking and e-commerce when they act online. There is a current tendency that those who shop online are also more willing to bank online. Nordic countries are generally more responsive to e-banking than their share of online shoppers would suggest while Germans and the British show a more reserved attitude.

5. AGE: Share of online bankers does not decrease with age. All the statistics show that Internet usage declines with age. But relative to Internet users, the share of online users of e-banking in the EU is remarkably stable for those over 24 years – i.e. out of those who use the Internet for different purposes, around 40% also use e-banking, irrespective of age. As it appears, reluctance to approach the Internet in the first place is the biggest hurdle to further proliferation of e-banking among older clients of the banks.

6. DEGREES: Europeans with higher formal education are more likely to use the Internet and do economic and financial transactions online. Better educated people are typical early adopters and have fewer reservations against technology, including the Internet. In addition, they probably feel more confident

to protect themselves against security threats. Financial incentives can convince some to go online, but security concerns are the most important hurdle for many customers.

7. ACCESSIBILITY: Many customers wish support from human advisors before they conclude a transaction online. This need increases with the complexity of the product. All the e-banking providers should not ignore the importance of the human touch.

Reviewing the above mentioned studies and statistics conducted by the European Union's institutes, it can be identified the following factors: geographical position, costs, security, and previous experience in conducting online economic transactions, degrees and accessibility.

C. INCENTIVE FACTORS IN EMPIRICAL STUDIES CONDUCTED IN ROMANIA

1. TRUST AND SECURITY: Trust is defined as a willingness to be vulnerable to the actions of others [14]. On the other hand, security is connected with the techniques employed to maintain security within a computer system [15]. Without customer confidence in security system, people who wish to perform banking activities do not intend to use a public network like the Internet. Some of the security threats are theft and violation of individual privacy and confidentiality. It can be said that trust refers to the way in which individuals assess the risk and exposure level whereas security is mainly connected to technical solutions. Many researchers conducted studies in order to evaluate the influence of trust and security on individuals' intention to engage in online activities [18]. Moreover, trust has been suggested to be one of the obstacles that hinder individuals to use the Internet as a tool in performing their banking activities [9].

Analyzing the data provided in Table III we can notice that the Romanian banks which are active on e-banking market have implemented at least one measure for securing services. It could be observed that a tendency towards modern solutions transition that ensures greater security as well as the use of Digipass and Token devices and digital certificate. In conclusion, it is shown that the role of security is recognized by banks as an important factor in the increasing number of e-banking users.

2. CULTURAL FACTORS: Culture is defined as the total of material and spiritual values created by the mankind. Culture also includes the institutions necessary to make these values available. Researchers as Erumban

and Jong suggest that culture influences the level of information technology adoption [19]. The same opinion is hold by Dinev, T., who confirmed the hypothesis by testing the trust perception due to an empirical study conducted simultaneously in SUA and in Italia [20]. The selection of the participants' nationality relied on a system of values which was completely different.

In Romania, the habit of paying cash is identified as a cultural factor which is specific to the consumers from this country. The hypothesis was tested by comparing the way the amount of card-transferred money, namely the amounts that are used for payments which are compared with those withdrawn immediately after being transferred and used for cash payments. According to

the National Bank of Romania (NBR) statistics, the Romanians withdrew 78.8 milliard RON from ATMs in 2008 whereas the card payments worked out at only 12.8 milliard RON (Romanian national currency), therefore the withdrawals were 6 times higher than the payments. In the same year card payments made in EU worked out at 1680 milliard euro whereas the withdrawals amounted at 1298 milliard euro, consequently the ratio was 1/3. The opposite place is taken by Denmark, recording a withdrawal/payments ratio of 1/17. Deviations that so high compared with the average are actually strengthening the importance of the cultural factor in the decision of using e-banking services by the people of different countries [21].

TABLE III
 SECURITY ELEMENTS IN E-BANKING SERVICES FROM THE ROMANIAN BANKING SYSTEM

Security Elements	Internet banking	Home banking	Mobile banking
User-selected password	8	3	5
Variable Password (Digipass, Token)	25	1	
Digital Certificate	22	1	
VeriSign Certificate	6		
Users awareness concerning possible threats	17		
SMS Notification (over-the-limit transaction)	3		
Bank Signature			1
Total banks providing the service	31	5	6

3. TIME, COST AND ACCESSIBILITY: Time is the main online-service users' advantage, factor which is acknowledged by banks and which is displayed in the e-banking service presentation list. Cost is another important factor in the transition to the employment of online banking services [22].

Analyzing the cost policy for online banking services applied by Romanian banks, a great variety can be noticed which means that banks considered the price policy an important factor. Therefore there is the monthly subscription system and payment charged per transaction. Around 50% of the Romanian banks that provide Internet banking services do not charge any bank charges and regarding the banks that perceive bank charges they work out at 0.3 euro to 9 euros. Cost per operation is estimated in a percentage charged from the cost of the transaction conducted at the counter and it may vary between 25% and 80%. Price policy is regarded as highly important by banks, which means that they identified the role played by the cost paid for the transaction in taking the decision of giving up the

traditional way of conducting banking activities and adopt the online way for conducted them.

Accessibility is another factor which is considered important by the customers in taking their decision of using the online transactions for their financial activities. Banks that provide e-banking have done their best to be as close as possible to the users and to make the online interaction easier by offering supplementary services. The steps taken by banks in their continuous effort to increase the accessibility of their online services are synthesized in Table IV.

Reviewing the above mentioned studies conducted at the level of Romanian banks system, it can be identified the following factors: trust and security, cultural factors and time, cost and accessibility. A part of them are the same with those identified in the empirical studies conducted at the European Union (EU) level [23]. The common ones were included in the construction of the model.

TABLE IV
 MODALITIES OF ENSURING E-BANKING SERVICES ACCESSIBILITY FROM ROMANIAN BANKING SYSTEM

Accessibility	Internet banking	Home banking	Mobile banking
Online Financial Advice (email)	23	0	
Financial advice over the telephone	27	3	
Users Guide	11	1	3
Demo version available on site	6	0	2
SMS Access			5
WAP Access			2
3G Access			1
Multiple-networks access			4
International access			4
Online Financial Advice (email)	23	0	
Total banks providing the service	31	5	6

IV. CONCLUSIONS

This paper has provided an overview of the classical theories that previous researchers have used to examine individuals' acceptance of different economic activities and e-banking, in particular. Also, within this study could depicted some issues for banking and policy-makers to consider when they face the creation of the environment necessary for promoting successful e-banking transactions, especially in Romania:

- develop a dialogue to discuss these issues within a diverse, large, and informed community of stakeholders;
- promoting e-banking as an alternative way to deal with the banks;
- promoting the e-banking legal framework;
- develop the necessary human capital capacity in order to successfully transfer the technology to local developers by involving the Universities;
- study the best practice cases of the developed countries and learn positive and negative aspects;

The theories reviewed in this paper are not considered to be exhaustive as there are many other

models and theories dedicated to technical progress and/or innovation adoption. Nevertheless, they were selected out of the most-frequently used ones in Information Technology and Communications (ITC) and especially Internet acceptance determination in the current banking activities.

The summaries of some empirical studies were provided, too. A part of reviewed studies and statistics results interpretation were conducted at the EU level. Other studies were conducted in Romania by the author and the team of the acknowledged research project were also provided. The factors revealed by the empirical studies were jointly analyzed and only those who were present in both studies were selected as influence factors for e-banking adoption.

Based on the theories reviewed and the common results of the empirical studies, were proposed factors that should be included in the main model designed for predicting the adoption of Internet in banking services. The selected factors are as shown in Figure 1. The final model takes into consideration all the above identified factors.

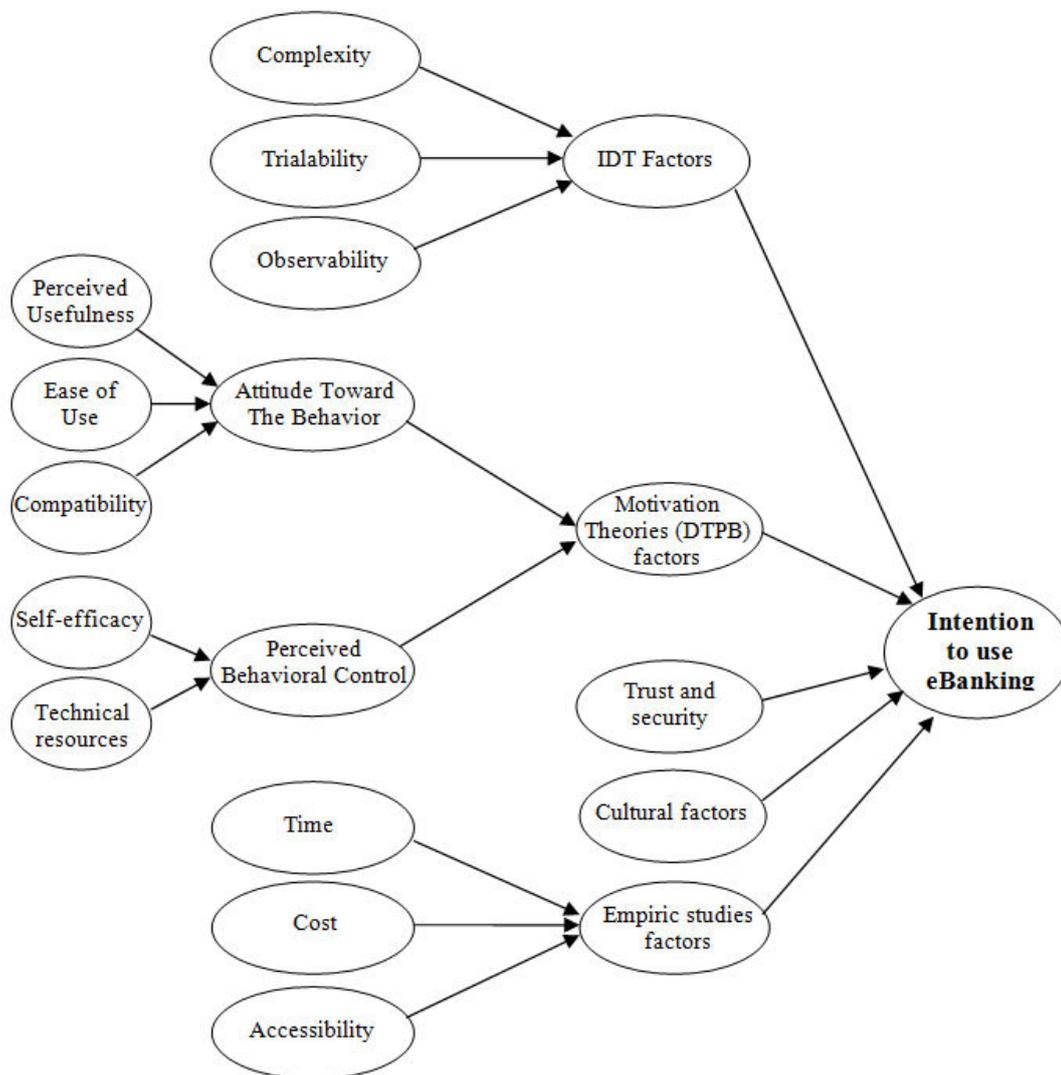


FIG. 1: CATEGORIES OF FACTORS

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