The adoption of e-banking: An application of theories and models for technologies acceptance

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Abstract **—** e-banking services have gained the attention of a major part of the traditional banking customer services because of the great importance of the financial activities within the daily life. This should be a plus for the bank, but this hypothesis is not confirmed by the real life. The paper identifies the factors that influence the customers' intention to use the electronic version for banking services. 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. This paper presents the main theories employed in assessing the technology acceptance (theory of reasoned action, theory of planned behavior) as well as the technology acceptance models that have been developed on the basis of these theories. The focus of the paper is on the model development and, implicitly, on the hypotheses that have to be tested in order to validate a model for the Internet acceptance in traditional banking services, based both on the content of the main theories employed in assessing the technology acceptance as Information Diffusion Theory, Decomposed Theory of Planned Behavior, trust and security and on other factors revealed by empirical studies.

Keywords **—** e-banking, incentive factors, consecrated theories, previous 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. 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, we are witnessing significant changes regarding the conduct of economic transactions. 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 distribution channels.

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In Olteanu's opinion the mobile phone, PC and the Internet are regarded as an option that was taken into consideration [1]. 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 three categories mentioned above [2].

Regarding the Romanian banking system, we 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 is based.

Analyzing the information provided in Table I 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, we can say that despite the drastic diminishing of traded value, the number of users is increasing. We can say that banks have achieved at least one of their purposes thus making e-banking large scale service among clients.

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TABLE I
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 [3]

II. PROBLEM FORMULATION

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 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 are 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 Behavior. 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 explores 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 theories. First of all a review had been conducted concerning all classical theories and we stopped on 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, the first version of the model is taken into account and 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 (1983) [4]. The critical factors that determine the adoption of an innovation at the general level are the following: relative advantage, compatibility, complexity, trialability and observability Rogers (1995) [5]. Researchers as and Tan and Teo (2000), Gerrard and Cunningham (2003) and Md Nor and Pearson (2008) had tested the theory on the e-banking adoption [6], [7], [8]. The nominalized factors are complexity, triability and observability.

2. The Decomposed Theory of Planned Behavior: The second reviewed theory is the Decomposed Theory of Planned Behavior (DTPB). The theory was developed by Taylor and Todd (1995) [9]. The theory postulates that the intention to use a certain technology is influenced by attitude, subjective norm and perceived behavioral control. Starting from the research conducted by Md Nor and Pearson (2008), Karahanna, Straub, and Chervany (1999), certain influencing factors were

selected: the attitude toward behavior and the Perceived Behavioral Control [6], [10].

B. Incentive factors in Empirical studies

1. Trust and security: Trust is defined as a willingness to be vulnerable to the actions of others (Mayer, Davis, and Schoorman, 1995) [11]. On the other hand, security is connected with the techniques employed to maintain security within a computer system (Onieva, Sauveron, Chaumette, Gollmann, and Markantonakis, 2008) [12]. We may say 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 (Siau and Long, 2006) [13]. 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 (Teoh and Md Nor, 2008) [6].

Analyzing the data provided in Table II we can notice that the Romanian banks which are active on e-banking market have implemented at least one measure for securing services. We may also notice 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, we believe that the role of security is recognized as an important factor in the increasing number of online banking users.

TABLE II
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**

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 & Jong (2006) suggest that culture influences the level of information technology adoption [14]. The same opinion is hold by Dinev, T. (2005), who confirmed the hypothesis by testing the trust perception due to an empirical study conducted simultaneously in SUA and in Italia [15]. 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 BNR statistics the Romanians withdrew 78.8 milliard RON from ATMs in 2008 whereas the card payments worked out at only 12.8 milliard RON, 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 employing e-banking services [16].

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 [17]. 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 subscription system and payment charged per transaction. 50% of the Romanian banks that provide Internet banking service do not charge any bank charges and regarding the banks that perceive bank charges they work out at 0.3 euro to 9 euro.

TABLE III
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**

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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. Accessibility is another factor which is considered important in taking the decision of online transaction. 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 effort to increase accessibility are synthesized in Table III.

IV. Conclusions

This paper has provided an overview of the classical theories that previous researchers have used to examine individuals' acceptance of e-banking. The summaries of some empirical studies conducted in Romania by the author and the team of the acknowledged research project were also provided. The theories reviewed in this paper are not considered to be exhaustive as there are many other models and theories. Nevertheless they were selected out of the most-frequently used ones in ITC acceptance determination in banking activities.

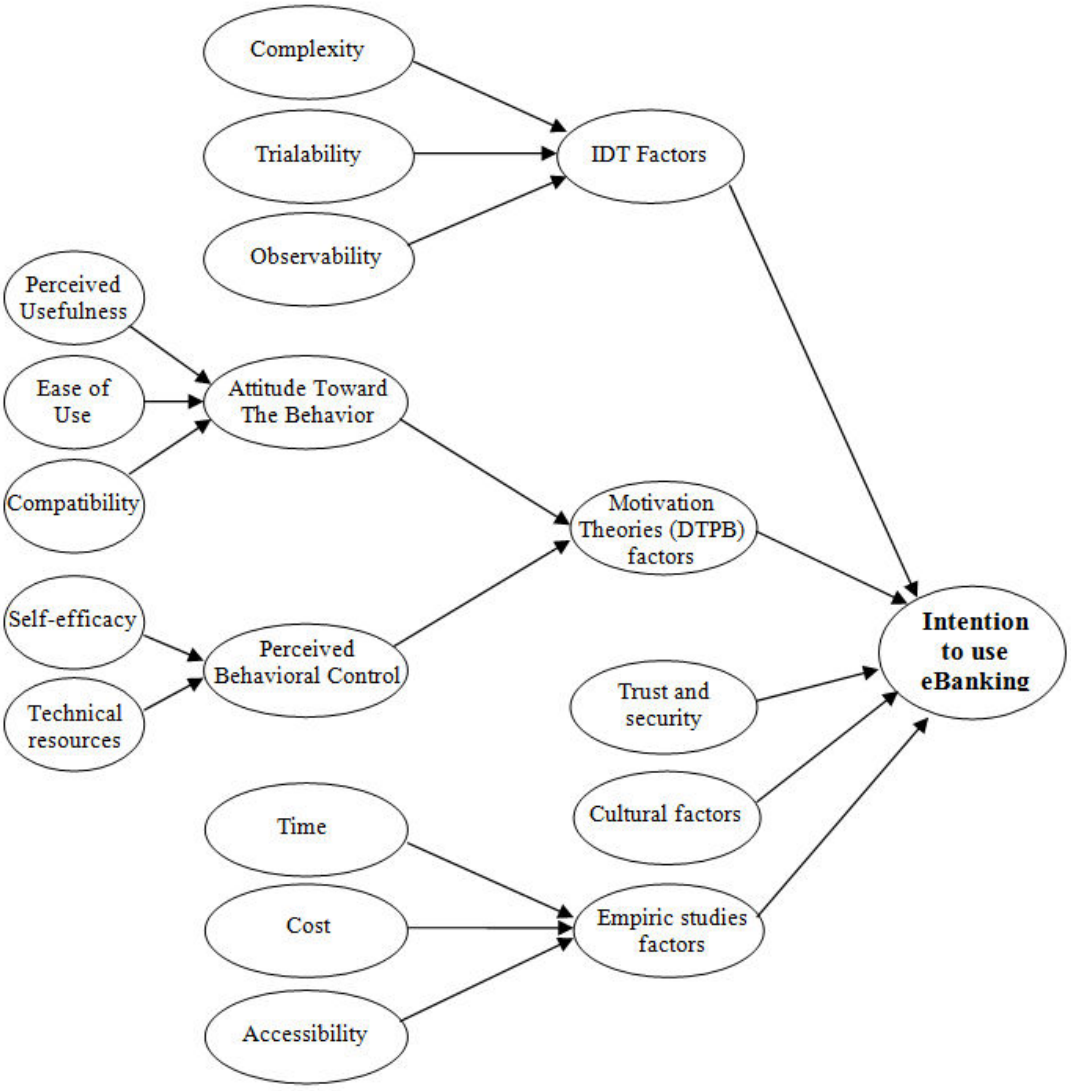

Fig. 1 categories of factors

Based on the theories reviewed and the results of the empirical study, we proposed factors that should be included in the main model in predicting the adoption of IT in particular e-banking. The factors are as shown in Figure 1. Reviewing this proposed model we can observe that four distinct components are represented: classical theory focused on technology acceptance, security and trust, empirical factors and national attributes. Therefore the final proposed model should be developed by taking into consideration these factors.

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