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Investigation of the Key Factors Influencing on Successful Offer of Internet Banking Services in Iran: Presenting a Predictive Model Using Decision Tree

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Abstract: With respect to increasing spread of internet network in Iran and preparation of the grounds for employing this achievement by financial-service institutions and in particular by banks to provide services to customers, study of key factors which lead to providing more favorable electronic services seems necessary. Thus, purpose of the present study is to present a predictive model for bank success by identifying the most important features influencing encouragement and motivation of people for using internet banking. Since using internet banking requires computer literacy of users, statistical population of present study consists of students; totally, 300 questionnaires were distributed to university students, that 267 questionnaires were used for the final analysis. Instrument for collecting data was a researcher-developed questionnaire which studied eight independent factors influencing customers' intent to use internet banking and then identified correlation of these variables with customers' intent to use internet banking. The results from analysis of them based on simple linear regression show that variables of membership relation, customization, criticality, price, human power importance, professional knowledge and interaction degree had respectively significant relationships with study independent variables. Thus it is recommended to organizations which provide or intend to provide services through internet to determine correct and appropriate conditions for adoption of electronic commerce and factors which facilitate their shifting from traditional physical channels toward internet channels and then they are recommended to use decision tree prediction model in order to predict their success or failure because this model is of less error compared to common methods.

Key words: Customers' purchase intent · Decision tree · Electronic commerce · Electronic services · Internet banking · Iran

INTRODUCTION

Electronic commerce consists of every type of business and\or economic activity being conducted through electronic communications. Business means all activities which lead to value creation in relationship with customers and suppliers [1]. Emergence of information technology (IT) has influenced many industries e.g. banking one. Electronic services are provided to customers via electronic channels such as ATMs, telephones, PCs, internet and recently mobile phones. Today IT provides many services online and many customers have access to online services [2]. Internet banking also means to provide banking services through internet and facilities of this network [3]. Internet offers many advantages both for banks and its customers. Using this technology, customers not only can perform their banking jobs in any time and place, but also it has the advantage of cost reduction and increased productivity for banks [3]. Despite of this, not all organizations and institutions are equally successful in employing electronic commerce. Thus it is necessary to conduct required studies so that we can create a favorable policy in relation to implementation and employment of electronic commerce and identify factors which facilitate its growth [4].

Given the increasing expansion of internet networks in Iran and the ground prepared for organizations in order to use this achievement in providing services to customers, thus it is necessary to examine key factors

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leading to supply of more favorable electronic services. Such studies are especially more necessary and effective for financial-service institutions e.g. banks which have exerted great efforts in providing electronic and internet services in recent years. On this basis, Purpose of the present study is to present a predictive model for bank success by identifying the most important features influencing encouragement and motivation of people for using internet banking; Which in this respect, effects of such variables as price, professional knowledge, criticality, human power capability, intractability, geographical accessibility, membership relationship and degree of customization on customers purchase intention will be addressed.

Theoretical Framework for Research

Electronic Services: Electronic services emerged along with internet growth. Initially, providing online services led to cost reduction and development of active institutions in this area. Though firms gained some profit by on line selling, but because of weaknesses in providing these type of services and meeting customers' needs, some challenges were emerged. Thus it became necessary to refocus on customer requirements and demands and quality of online services in order to enhance relationship with customers and service providers. During recent years, online service providers gained significant profits through increased relationship with their customers. Thus researchers realized that providing superior electronic services is possible through increased relationship between customers and firm and product development. Despite of electronic service growth, little research has been conducted on critical factors in providing desired services and research on quality of electronic services is also in its empirical phase. Thus study of the quality of electronic services and judgment about priority and quality of provided electronic services from customer viewpoint should be considered more than before [5].

In general, electronic service is an interactional and customer-oriented process based on internet being led by customer, is integrated with organizational customer-related processes and supports ICT with the aim of enhancing service provider-customer relationship [6].

Internet Banking: Internet banking is a channel for distribution of banking services remotely and at a virtual level [7] and customers can access to their banks and accounts information and conduct their bank transactions. At basic level, internet banking means to create a web page by a bank in order to provide information about product and services being offered by it and at enhanced level, it consists of access to accounts, cash transfer and online purchase of products or financial services [8].

Internet banking service is offered through internet at three levels consisting of [9]:

Basic Level of Services: Basic level of services including establishment of relationship with customers via email and spread of information on services and products being offered to customers.

Simple Transactional Websites: Simple transactional websites which allow customers to receive guidelines and applications for obtaining various services.

Perfect Transactional Websites: Perfect transactional websites which prepares required facilities for customers in order to access their account for cash transfer, payment of different invoices and bills, subscription to other bank products, securities trading transactions, etc.

Internet prepares the ground for banks so that they can provide their customers with such banking services as invoice payment and money management 24\7 at home. For instance, customers can receive information on their loans and saving accounts, cash transfer between accounts and relationship with other banks via email [10]. Even it is possible to trade shares and debts, receive facilities schemes, provide electronic invoices, do international payments and offer electronic salary and compensation via internet [11]. Internet banking is an instrument which makes it possible to reduce costs, improve bank productivity and create added-value for customers [12]. Though many common activities of businesses can be substituted by online ones, but still there are certain limitations for providing these type of services because customers do not like to use services through online channels [4]. Research has shown that in order to accept online banking risks it is necessary to study banking services characteristics [13] and customers are deeply subject to risk level of purchase while purchasing via intern and to the great extent, they purchase services based on their perceived ease of use [4].

Intent of Customers for Using Internet Banking: According to Ajzen [14], customers choose to employ internet banking because they are interested in using

the systems provided for bank transactions. Many researchers have tried to identify behavioral factors influencing people decision on online purchase. Also various theories exist in this respect consisting of rational action theory, planned behavior theory and technology acceptation model which intend to predict a desirable behavior [15] and also based on decomposed planned behavior theory, attitude, subjective norms and perceived behavior control are among main factors influencing customers' intent to use internet banking services and some of electronic commerce studies show that intent of customers to employ online interactions is a strong predictor of real expectations of customers in electronic commerce [16].

In reviewing literature on marketing and trade, it is found that degree of customization is considered as a factor influencing customers purchase intent. Customization, as one of the dimensions of service characteristics, means the extent to which customer specific demands is met in production and supply of goods and services. On the other hand, degree of customization means to adapt and match service process faced with customer personal need [4]. In electronic commerce, face to face contacts and human interactions have been minimized via using such technologies as email, chat and multi-media conversations. Overall, it is observed that interactions and customization are semantically different. In electronic commerce, necessity of online interactions and customization with the aim of facilitation of online transactions play similar roles in some areas [17].

Degree of customers' concerns on awareness of and knowledge about selection of service provider, expected service quality and trust in services being provided, summed together under the title of professional knowledge, had found to be effective in customer' intent to use internet services (Cho and Park, 2002).

Interactions among bank staff and customers are of significant importance in financial transactions. During last twenty years, banking sector has been under great revolution along with understanding of customer needs associated with technology and software and also technology progress and change in structure of financial services. In response to these revolutions, banks reduced number of physical branches and expanded electronic channels in order to increase effectiveness and reduce transaction costs [5].

Degree of transactions shows the frequency of transactions between service providers and customer in the whole transaction process. The important factor in repeated interactions with customer is that customers are allowed to present their recommendations and critiques on received services and obtain feedback from service providers [4].

Despite of the fact that IT and internet applications have gradually reduced customers' need to geographical accessibility, but many experts [17] believe that this need is still an important variable affecting electronic commerce operations and strategies. Degree of customers' need to geographical accessibility is fundamentally dependent upon product and service characteristics too.

In addition to the above, urgency extent of the intended service (criticality for customer), price charged for internet services compared to prices of those provided via other methods, human resource capability in production and supply of services and also necessity of membership relation are considered as another factors influencing customers' intent to use internet banking [4].

Decision Tree: Decision tree is a hierarchical tree-like structured flowchart consisting of three main elements. Decision nodes correspond to variables, edges or branches are correspondent to different probabilities for variable values and leaves consists of objects which belong to one class or are very similar and can be put in one class [18]. Analysis of decision tree is a systematic and organized approach which facilitates obtaining knowledge and information for decision making. Decision tree helps to analyze a sophisticated problem and turn it into a smaller one and analyzers use it in achieving optimal decisions.

Decision trees, as analytical tools and based on certain rules, help decision makers in making decisions in which various variables are involved. Also in every specific problem, decision trees not only provide solutions for it based on its class, but also articulate the reasons for reaching those solutions in a clear way. Using this technique, a large amount of data can be managed. Structure of decision making tree is similar to a real tree with root representing decision making problem and each of branches representing one of the classes. The so-called chance nodes and decision nodes represent class values. Hierarchically organizing data in decision tree form is so favorable and successful in practice. Many applications in various fields conduct decision tree analysis which some of them are as follows: in banks for making decisions on credits, in industry for inspecting mechanical equipment, in production for quality control, in health care for diagnosis of some diseases, in molecular biology for analyzing amino acids and in astronomy for

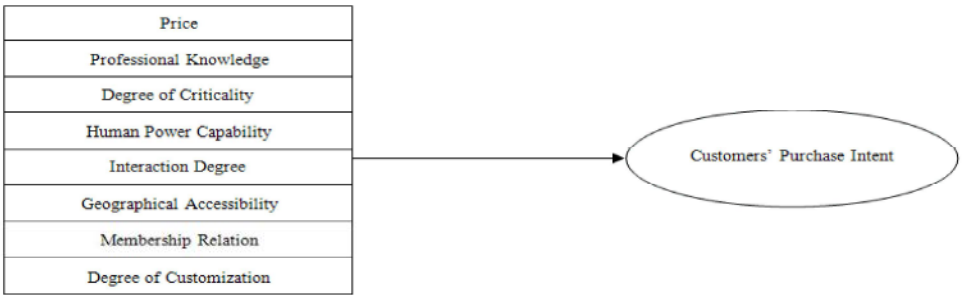

Fig. 1: The conceptual model for research

automatically sorting of space masses. Those are some applied fields of that technique in real world and many potential applications for it are not introduced yet [19].

Research Hypothesis: According to the fact that aim of present research is to identify factors influencing successful offer of internet banking services and provide a model for successful prediction of offering bank services via internet, thus after reviewing theoretical bases of this subject, variables influencing customers' purchase intent are identified, the following hypotheses were formulated:

H1: In internet purchase, price has a positive and significant effect on customers' purchase intent.

H2: In internet purchase, professional knowledge has a positive and significant effect on customers' purchase intent.

H3: In internet purchase, degree of criticality has a positive and significant effect on customers' purchase intent.

H4: In internet purchase, human power capability has a positive and significant effect on customers' purchase intent.

H5: In internet purchase, degree of interaction has a positive and significant effect on customers' purchase intent.

H6: In internet purchase, degree of geographical accessibility has a positive and significant effect on customers' purchase intent.

H7: In internet purchase, membership relation has a positive and significant effect on customers' purchase intent.

H8: In internet purchase, degree of customization has a positive and significant effect on customers' purchase intent.

H9: Using a decision tree, success of an organization in providing internet services can be predicted.

Therefore, based on the hypothesis, Figure 1 is a conceptual model to this study.

MATERIALS AND METHODS

Data Collection and Analysis

Procedure and Questionnaire Design: Present research is of correlation type and is a survey one from implementation viewpoint. In present research both field and library method were used for data collection. In order to complete theoretical bases, library method was employed and in order to collect required data on potential customers of internet banking a questionnaire developed by researchers was used which consisted of 45 questions. Some of the questions were extracted from other similar questionnaires developed in other countries and the other ones were designed and put into questionnaire by the researchers according to specific conditions of Iran. Responses were organized based on Likert 5-point scale (very much, much, moderate, little, too little). In order to confirm validity of questionnaire, some experts were asked to review it and declare their correctional ideas. After required modifications, in pilot study, 50 copies of questionnaire were distributed to study population, Cronbach alpha was calculated as shown in Table 1 and after ensuring reliability of research instrument, final questionnaire administered to selected sample of statistical population.

Sampling Target: In this study, information was collected in August 2012, from 267 college students in University of Tehran. According to Shouli [20], in every society college students and consumers belong to the middle and high

Table 1: Cronbach alpha for pilot study

	Sample number (N)	%	Cronbach α	Questionnaire number
Acceptable sample	48	96	.956	45
Non-acceptable sample	2	4		
Total	50	100		

class and their education, revenue, social status and social interactions make them more involved. Therefore, college students who are in different age ranges with varying income levels were selected as the sample of this research.

Sampling Method and Sample Size: Since using internet banking implies computer literacy of users, all students of University of Tehran (about 14000 ones) at their associate's, bachelor's, master's and PhD program of studies were considered as research statistical population. In order to enhance similarity between sample and population and increase sampling accuracy, it was tried to employ students of all program of studies. For calculation of sample volume, according to the fact that number of university students was more than 10000 ones, infinite population sampling method was used which based on error percent of 0.05, sample volume should be equal to 267. In order to maximize sample size, p and q were set at 0.05 and confidence level (1-á) and intended accuracy (e) were respectively considered as 95% and 0.06. Thus sample volume was determined using the following formulae as follows:

$$n = \frac{Z_{\frac{\alpha}{2}}^2 .p.q}{e^2} \quad \text{Sample size} = \frac{1/96^2 \times 0/5 \times 0/5}{0/06^2} = \frac{0/9604}{0/0036} \approx 267$$

Data Analysis: Questionnaires were collected and analyzed using statistical software SPSS and Clementines client 11.1. Pearson correlation test was used for determining correlation between independent variables and dependent variable. Also decision tree technique was employed for designing a model for predicting success of providing internet banking services.

RESULTS AND DISCUSSION

Hypothesis Testing: As can be observed in Table 2, given the fact that significance coefficients obtained for all independent variables except for geographical accessibility were less than 0.05, thus all hypotheses except for H6, suggesting positive and significant relationships between degree of criticality, membership relation, customization, price, human power importance, professional knowledge and degree of interaction and intent to use internet banking are supported. But according to obtained significance coefficients for geographical accessibility, hypothesis 6 was not confirmed.

Results of Decision Tree: After identification of variables influencing internet purchase intent of customers and confirming related hypotheses, a model was designed using decision tree technique based on which some predictions can be made on success of internet banking compared to traditional one (Figure 2).

Figure 2 shows that the most important variable is "price". Indeed two variables including price and professional knowledge have the most effect on preference for using internet banking over statistical traditional one and also decision tree shows that variable of professional knowledge has the most effect on variable of price. In decision tree, word OK shows preference of internet banking over traditional one and word NO means that traditional banking is preferred over internet one. Essentially, if relative frequency of OK is more than 50%, it means that implementation of internet banking can be favorable.

Using decision tree, other important results can be obtained which the most important ones are as follows:

- Given node 6, it can be concluded that if price is at a low level, implementation of internet bank is recommended for providing service (81.416%).
- Given node 14, it can be concluded that if price and professional knowledge requirement are at low levels, implementation of internet banking is essentially recommended (86.735%).
- Given node 7, it can be concluded that if price is at a low level and professional knowledge requirement is at a medium level, implementation of internet banking can be recommended (77.344%).
- Given node 13, it can be concluded that if price is at a low level and professional knowledge requirement is at a medium level and also degree of interaction between bank and customers is at a very high level, implementation of internet banking is highly recommended (100%).

Table 2: Correlation coefficient between independent variables and dependent variable

Dependent	Intent to use internet banking		
	Pearson		
Independent variables in the descending order of correlation with dependent variable	Coefficient	Significance	H1
1 Membership relation	0/368	0/000	Supported
2 Degree of customization	0/336	0/000	Supported
3 Degree of criticality	0/332	0/000	Supported
4 Price	0/329	0/000	Supported
5 Human power importance	0/269	0/000	Supported
6 Professional knowledge	0/239	0/000	Supported
7 Degree of interaction	0/221	0/000	Supported
8 Geographical accessibility	0/019	0/762	Rejected

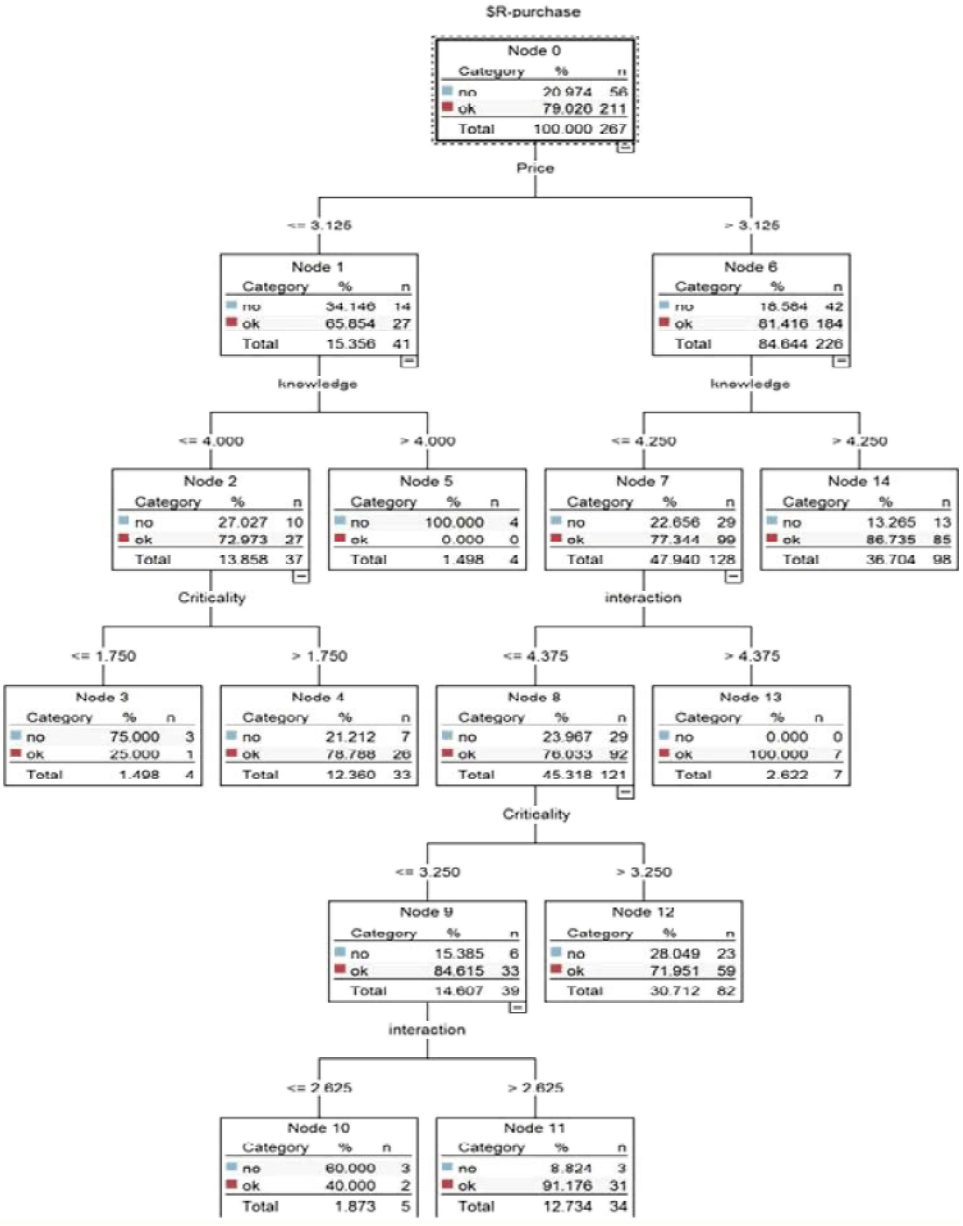

Fig. 2: Decision tree based on research variables

Table 3: Acceptation of internet banking by customers

Service	Mean for independent variables and dependent one	Observed value	Predicted value
Internet banking	Human power importance (3.951)	76.620	86.735
	Professional knowledge (3.902)		
	Price (3.853)		
	Customization (3.765)		
	Membership relation (3.595)		
	Criticality degree (3.511)		
	Interaction degree (3.501)		
	Intent to use internet banking (3.831)		

- Given node 1, it can be concluded that if price is at a moderately high level, implementation of internet banking may be favorable (65.854%).
- Given node5, it can be concluded that if price and professional knowledge requirement are at very high levels, implementation of internet banking is not favorable at all (0.000%).

As previously said, in present study intent to use internet banking was the most important target for measuring internet banking success. Thus observed value for internet banking success (76.620) in Table 3, was the same customer intent to use internet banking and predicted value for internet banking success was the same predicted value at final node (node 14) in decision tree i.e. 86.735. According to observed and predicted values for internet banking success, since these two ones are relatively close, it is concluded that decision tree is one of the most powerful instruments for prediction of success or failure of an organization in providing electronic services. Compared to other data analysis techniques, this one has a wide-range application in various fields. Thus decision tree is very powerful for distribution and evaluation of data. According to results, H9 is supported, i.e. using a decision tree model, success of an organization in providing electronic services can be predicted.

DISCUSSION

In present research it was tried to help identifying some characteristics and features of internet banking services encouraging customers to use internet banking. According to provided research literature, researchers e.g. Cho and Park [17], Lee *et al*. [4] and Loonam and O'Loughlin [5] concluded that variables degree of customization, professional knowledge, degree of interactions, geographical accessibility, degree of criticality for customer, degree of human power importance, necessity of membership relation and price are influential in acceptation of internet bank by customers.

Results from present study confirm ones of above mentioned research works to a great extent except for geographical accessibility which was not confirmed in the case of our intended population. Thus this demonstrates high validity of present study. Then, data gathered in this study were used for developing a predictive model via decision tree and the results showed extraordinary accuracy and correctness of prediction and thus results of present research would help in predicting online success based on customers acceptation and obtaining more insight about how to facilitate future adoption of internet banking services. Also the results confirm those of Lee *et al*. [4] from Korea. Thus it is recommended to organizations which provide or intend to provide services through internet to determine correct and appropriate conditions for adoption of electronic commerce and factors which facilitate their shifting from traditional physical channels toward internet channels and then they are recommended to use decision tree prediction model in order to predict their success or failure because this model is of less error compared to common methods.

Finally results of similar research in the field of internet banking are reviewed briefly in Table 4. Results obtained from present study and comparison of them with results of similar research on internet banking (Table 4) can assist organization and bank managers who want to provide electronic services in attracting and retaining customers by identifying preferences and factors influencing acceptance of electronic services by customers.

Table 4: Research on e-banking

No.	Author	Title	Findings
1	Sohail and Shaikh [21]	Internet banking and quality of service: Perspectives from a developing nation in the Middle East	Results based on a factor analysis identify three factors that influence users' evaluation of service quality of internet banking services. These factors are labelled as "efficiency and security", "fulfilment" and "responsiveness".
2	Divya and Padh [22]	A study on customer perception towards Internet banking: Identifying major contributing factors	Major factors responsible for internet banking were 'utility request', 'security', 'utility transaction', 'ticket booking' and 'fund transfer'. More than 50 per cent of total respondents agreed that internet banking is convenient and flexible ways of banking and it also have various transaction related benefits.
3	Srivastava [23]	Customer's perception on usage of Internet Banking	Education, gender, income and training play an important role in usage of internet banking. Inhibitory factors like trust, gender, education, culture, religion, security and price can have minimal effect on consumer mind set towards internet banking.
4	Yiu *et al*. [24]	Factors affecting the adoption of Internet Banking in Hong kong implication for the banking sector"	Certain factors did have a positive relationship with the adoption of Internet Banking and as such strategy in the banking services sector can be refined to better meet the demands and profile of the Hong Kong market.
5	Alain *et al*. [25]	Online banking adoption: an empirical analysis	The results showed that perceived usefulness, trust and government support all positively associated with the intention to use online banking in Vietnam. Contrary to the technology acceptance model, perceived ease of use was found to be not significant in this study.
6	Pooja and Balwinder [26]	Determinants of Internet banking adoption by banks in India	The results show that the larger banks, banks with younger age, private ownership, higher expenses for fixed assets, higher deposits and lower branch intensity evidence a higher probability of adoption of this new technology. Banks with lower market share also see the Internet banking technology as a means to increase the market share by attracting more and more customers through this new channel of delivery. Further, the adoption of Internet banking by other banks increases the probability that a decision to adopt will be made.
7	Luis *et al*. [27]	The role of security, privacy, usability and reputation in the development of online banking	The data showed that web site security and privacy, usability and reputation have a direct and significant effect on consumer trust in a financial services web site. Besides this, consumer trust is positively related to relationship commitment. Finally, it is observed that trust is a key mediating factor in the development of relationship commitment in the online banking context.
8	Petrus and Ndubisi [28]	Borneo online banking: evaluating customer perceptions and behavioural intention	The results indicate that perceived usefulness and perceived ease of use are strong determinants of behavioural intention to adopt online banking. There is also an indirect effect of computer self-efficacy and prior general computing experience on behavioural intention through perceived usefulness and perceived ease of use.

CONCLUSION

Today people increasingly need banking services. People expect more and faster services with higher quality; so attracting new customers and retaining current ones requires an efficient and effective management at all aspects of banks with emphasis on marketing management. It seems that similar advertisements of banks in mass media, prize draws and other promotional methods do not create required motivation in customers. Therefore it is necessary to consider innovative plans and projects and new strategies.

In today complex societies, customers seek to reduce costs, save time and achieve convenience in doing their everyday banking jobs. During previous decade various technologies in the form of such services as telephone services, mobile phone services, sms services, ATM services, fax services and internet services have been provided by leading banks and a major part of customers have welcomed these services. But in this context it seems necessary to identify factors drive customers to prefer e-banking services over traditional ones.

Bank managers should realize that their banks cannot survive without paying attention to demands and preferences of customers because by recognizing customers preferences they would be able to predict customer behaviors and react in an optimal way based on those behaviors in order to attract customers and make them loyal. Thus present study tried to provide a predictive model for bank success by identifying and prioritizing factors having effects on encouraging people to use internet banking.

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