Effective Factors on Adoption of Customer in the Internet Banking Services, case Study: Iran

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Abstract—**In recent years, the Internet banking has become one of the most challengeable and risky fields of electronic banking. In fact, the advent of the Internet has revolutionized the way banking is being done. In addition, Consumers' adoption in online banking is a critical challenge facing bank industry; while, the knowledge of the adoption is still limited and there is an essential need to investigate that. In this research, we examine the factors that influence the adoption of the Internet banking also try to discover the relationship between personal features and adoption of the Internet banking. A questionnaire is applied to certain statistical society of Iranian customers in order to analyze some attributes such as usage, security, availability, and so on. Our conceptual decision tree leads to successfully determine the factors which affect adoption in the Internet banking in Iran.**

Keywords: adoption, e-banking, Internet banking

I. INTRODUCTION

Electronic innovations in banking can be traced back to the 1970s, when the computerization of financial institutions gained momentum.[1]Electronic banking is the automated delivery of new and traditional banking products and services directly to customers through, the interactive communication channels Electronic banking includes the systems that enable financial institution customers, individuals or businesses, to access accounts, transact business, or obtain information on financial products and services through a public or private network, including the Internet [2]. Electronic banking services have provided numerous benefits for both banks and customers. The first benefit for the banks offering electronic banking services is better branding and better responsiveness to the market. Those banks that would offer some services such as the Internet banking perceived as leaders in technology implementation. Meanwhile, by the Internet banking customers achieve to the bank without their physical attendance, so they could have contact with their bank in the best way and fastest. Internet banking is the service, which materializes the customer access the bank accounts by only logging on the web from everywhere and in every time. This study examined the factors affecting the adoption of Internet banking services in Iran. In our survey, four factors identified, which namely are usage, security, speed and accessibility. Moreover, implicitly finds the barriers of entry to better observe the level of acceptance of the Internet banking in Iran. Moreover, this paper assesses whether the usage of Internet banking consumers in Iran is constrained by the technology, particularly based on different demographic characteristics, such as different age groups, educational level, Internet usage, monthly income, attention to advertisement and etc. (more details are shown on Table 1). Findings of this study are useful for the banking sector in formulating appropriate strategies to build customer loyalty and retain users. This paper divided in to five sections including the introduction. In the second section, literature of the Internet banking will be reviewed. While the methodology used to carry out the study will be elaborated in section 3 the finding and conclusion of the study are detailed in section 4 and finally suggestions for future research will be drawn in section 5.

II. REVIEW OF LITERATURE

Marketing literature has studied the phenomenon of Internet banking from different perspectives. Some research, have analyzed the adoption and growth of the Internet banking, while others, describe the benefits to be gained from the Internet, as far as the organization is concerned.

A survey worth mentioning is the one by Thorton Consulting (1996), which concludes that perceived lack of security is one of the main Obstacles of growth in the number of Internet-banking users [3]. In addition Sathye (1999) considers the effects of security, ease of use, perceived benefits from the service, resistance to change, price, and infrastructure availability on Internet banking adoption.[4] In a similar research, we could mention the work of Liao et al. (1999). It studies Internet-banking adoption through variables such as ease of use, image, comparative advantage, compatibility, willingness, and the opportunity to try it [5].Furthermore ,for How croft et al. (2002), the principal factors that inhibit online banking adoption are perceived security and errors that might be inherent to the telecommunication system[6]. Also, we should mention the work of Rexha et al. (2003), which concludes that trust and satisfaction have an influence on electronic banking adoption, although satisfaction moderated, by the level of consumer trust [7]. Moreover, Carlos Flavia´n and Miguel Guinalı´u (2006) had same research which Trust was mentioned as influence factor in adoption of online banking in Spain.[8]Finally in our understudy society we could introduce Yosefe Namazdost whom considered the adoption of various electronic banking (2009) [9]

Although many studies have made on the Internet banking field, to our best knowledge, automatic analyzing of user personal characteristics focus on adoption of Internet banking services have been rarely investigated. Therefore, in this paper we concentrate on this narrow field. We present data mining as a powerful tool to achieve our results. The scope of this research includes adoption of all Iranian banks' services.

- *Customer Resistance and Adoption of Innovations*

It is very important for bank managers firstly to identify what the customers most likely to purchase, adopt electronic banking services, and understand the factors, which influence adoption or rejection of the electronic banking services. Customers are invariably the best source of ideas[10]. Innovations have commercial value only if they meet the needs of customers better than current products. Innovative customers -those individuals who are at the forefront in buying new products or applying new ideas- are the most valuable sources. Such customers see problems and opportunities well ahead of typical buyers. Hence our research has focused on the success of innovations and reasons to adopt, the theory of innovation resistance aims to analyze why customers resist innovations. We introduce adoption in four parameters, which include accessibility, security, usage and speed. The definition of mentioned factors follows in the next paragraph.

- Usage

   In our research to analyze this factor also to get the best results, we explain all of the services, which are present by bank managers for easy usage of customer.

- Accessibility
  In this survey we analyze this factor in both two points. In one hand we considered accessibility of time and location and on the other hand we survey the failures rate and disconnecting of network.
- Speed
  For studying of this parameter we asked the responders to mention their sight about the speed that this factor includes the speed of website's upload and the also the speed of the opening of the menu.
- Security
  We study the probability to which customers estimate unauthorized access to their personal information during the service usage as a security metric. Also influence of system failures and the problem such as system disconnecting and saving the information on the computer on privacy from the user viewpoint would be considered.

III. METHODOLOGY

In this section firstly, we explain the executed access to collect the data used for research and describe features of it. Then methods applied for analyzing the data will be present.

A. Data Collection

The data for this research collected between June and May 2010. Anonymous questionnaires are randomly administered to 130 respondents from different states within Iran country by both ways handy and online. The detailed information about responders depicted in Table I.

TABLE1.DEMOGRAPHIC PROFILE

Profile	category	frequency	%
Gender	Male Female	92 38	70.76 29.24
Age	20_30 years old 30_40 years old 40_50 years old Above 50 years	51 24 35 20	39.23 18.46 26.92 15.38
Education Level	Under diploma Above diploma Above up diploma Above master	5 38 18 69	3.84 29.23 13.84 53.07
Income	Less than 200000 TM 200000_500000 TM 500000_1000000 TM Above 1000000 TM	41 28 21 40	31.53 21.53 16.15 30.76
Job related to Internet	Very Midway Little Seldom	22 40 22 46	16.92 30.76 16.92 35.38
Internet usage(daily)	Less than 1 hour Less than 2 hour Between 2 and 4 Above 5 hour	19 25 52 34	14.61 19.23 40 26.15
Attention to Advertisement	Very much Very Midway Little seldom	7 24 37 30 32	5.38 18.46 28.46 23.07 24.61
Risk taking	Less than1.5 Between 1.5_3 Between 3_4.5 Between 4.5_6	26 57 30 17	20 43.86 23.07 13.07

The whole number of responders is 130.Among these %70.8 are males and %29.2 are females. A majority of the respondent is in the range of 20-30 years old, while %53.07 has higher education level.(BA or above). The survey shows that a majority %66.15 of the respondents is able to access the Internet at home or at workplace. Moreover, about %52.3 of responders in their job need to use the Internet more than 2 hours a day. Finally, about %36.14 of responders have risk taking factor more than 3 degree, which is a high degree in the risk tests. 3.1. Methods

In this paper, we focused on application of data mining for discovering the relationship between personal characteristic and the mentioned factor. For Data modeling via classification models, we use Decision Tree to achieve best result.

Data mining is as being of the process of extracting or detecting hidden patterns or information from large databases. With comprehensive customer data, data mining technology can provide business intelligence to generate new opportunities.[11,12]There are many techniques used for classification in statistical analysis and data mining which includes Random forest and boosted trees, Bayesian learning, neural networks and decision tree algorithms, which have recently become quite popular. Among this the decision tree algorithms Not only is an efficient classification method, but also has an extra advantages over other data mining algorithms. There are many forms of decision tree algorithms included in data mining tool packages, the most common of which are CHAID and Classification and Regression Trees(C&RT) which In our experiments, the decision trees are generated using CHAID algorithm.

• Decision Tree A decision tree is a hierarchical group of relationships organized into a tree-like structure, starting with one variable (like the trunk of an oak tree) called the root node. This root node is split into, too many branches, representing separate classes of the root node (if it is categorical) or specific ranges along the scale of the node (if it is continuous). At each split, a question is "asked," which has an answer in terms of the classes or range of the variable being split. In addition, a decision tree can be viewed as a hierarchical Step-wise decision procedure [13].In our Experiments, the decision trees are generated using CHAID. We have selected it because in comparison to other algorithms, CHAID does not restrict the number of branches from each node to a predetermined number.

• CHAID Algorithm

CHAID algorithm is a method of database segmentation that has been used for a number of years in addition the acronym CHAID stands for Chi-square Automatic Interaction Detector. Kass (1980) proposed it [14]. Unlike C&RT, CHAID uses multi way splits instead of binary splits, where more than two splits can occur from a single parent node. While a categorical response variable has many categories (like car, truck, classic, motorcycle, etc.). CHAID relies on the Chi-square test to determine the best next split at each step in a classification problem. In F-regression-type problems, the algorithm uses the F-test in place of the Chi-square test. [15].Also it is important to make a point that in this research to achieve best result we used SPSS Clementine as data mining software.

Clementine is a data-mining workbench that enables us to quickly develop predictive models using business expertise and deploy them into business operations to improve decision-making. [16]

The statistic results of questionnaires can demonstrate the degree of customer adoption in each of parameters generally, as it is shows in Table2.in this table, since accessibility average has the most degree amount, it seems that it is highly valued in online banking by all users. Also it is related to the higher education level that most of the customers have. Furthermore, regarding the standard deviation the usage has the highest degree in compared to the others. By a more detailed study, it can be mentioned that most of responders use this system for bill paying, check their last three transactions and send money some were.

TABLE2. DESCRIPTIVE STATISTICS OF THE DATA

Factor	Mean	STD DEVIATION
Usage	2.795	1.289
Availability	3.232	0.901
Speed	3.068	1.202
Security	3.116	1.221

The decision tree learning was presented on the collected data for each functional parameter namely usage, security, speed, and accessibility. One decision tree was gained for each factor separately which classifies users to five classes representing the degree of user agreement to the corresponding parameter. It is important to clear that our decision trees have also the capability to predict the degree of customer agreement in the case of new or unseen users. Furthermore, to achieve generalized decision trees, as it is popular in data mining tasks, we partitioned data to 2 sets, 70% for train set and 30% for the test set. The train set used for constructing decision trees, and the test set used for validating it. The achieved average accuracy of decision trees on test set was around85%, which is satisfactory result for a classifier. Figure one display the constructed decision tree for the first parameter, usage.
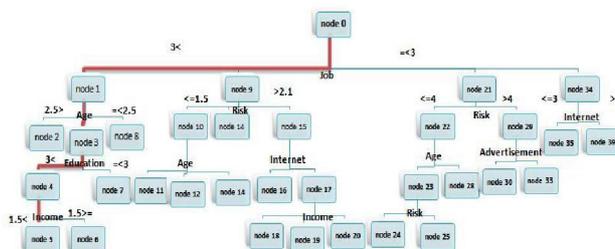

Fig. 1.Decision tree of usage

- Usage

As it clear in figure 2 the customer who is young and have high level of education that they job needs to use the Internet used this services more than other customer actually we could mentioned that we have straight relationship between uses of this services and their job related to the Internet.

- Accessibility

According to our results it can be mentioned that the young men who has high level education and has more attention to the advertisement has more accessibility to this services more than others.

- Speed

In speed decision tree seems that, men with high level education also has high level risk taking in comparison with the women who has low level education and low risk taking has more satisfaction from this services and this difference can be from the deference point of view of men and women.

- Security

Generally, we could mentioned that the customer who has high level education and also has low age (in the range of 20-30 years of age) in comparison with other customer who has high range of age and also has low risk taking were more satisfy from this parameter.

According to decision tree algorithm, the more effectual and distinctive features faces in higher levels of the tree. As a result, form the four decision tree that produced by our research, the most important features are job related to the Internet, levels of education and gender orderly, which you could see in figure2 for the usage factor. Since these features have the highest effect on user adoption which mentioned in factors of speed, security, usage and finally accessibility. In contrast, some factors such as income, which was on lower ranks of trees, are not very important and effective on customer adoption.

IV. CONCLUSION

The aim of this study was to explore consumer value in services, which is present by Internet banking, and investigate if and how individual's characteristics differ in their Internet banking valuations and adoption. It can be mention that this survey was began by distributing some questionnaire between June and May 2010 which asked responders to measure of their satisfaction from four parameters, which we considered for adoption(i.e. usage, security, availability and speed).The implication of the questionnaire was based on the previous research in the

Literature. To find out of relations and dominant patterns in collected data, we applied data mining techniques and specifically decision tree learning algorithms (i.e.CHAID). Rather than the statistic approaches, this technique have more reliability, truth, and capability of automatic analysis of data. The experimental results demonstrate that customer adoption of Internet banking services is dependent on some individual characteristics followed by job related to the Internet, education level, and finally their age. In other words, the young people who their job forced them to use the Internet also has higher level of education use the new and innovative Internet banking services more than others. In this research, it also found that the old people with low level of education resistance to these services more than others do.

V. RESEARCH LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Our survey exposed to some limitations. There are some limitations regarding to its exploratory stage. In spite of our attempts to achieve a reliable statistic community, which include different layers of the society the majority of our research responders, are college students. Future research should pay more attention to the society under study. Again, we recommend bank managers to pay attention to potential customers of their innovative services, characterized in this experiment, and customize the services for better adoption of this group of customer. For example if banks could persuade the usage of Internet, they could have more customers who are preferred to use Internet banking services. For future experiment, we plan to concentrate on customers' individual characteristics more near to the effective factors gained in the research such as customer's job and their age rather than some irrelevant features like monthly income and so on.

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