

A Study on Factors Affecting Operational Electronic Banking Risks in Iran Banking Industry (Case Study: Kermanshah Melli Bank)

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ABSTRACT: Nowadays, advances in information and communication technologies, has provided an opportunity for banks to provide their electronic services to their customers in remote areas. This technological innovation by E-banking systems has brought about many benefits to customers while it has been accompanied by a number of risks including the operational ones. This risks need to be identified and managed by the Banks. The present research identifies, compares, and ranks factors affecting operational E-banking risks in viewpoints of customers and employees of Kermanshah Melli bank. To this end, a questionnaire was distributed to 300 employees and 384 customers of Kermanshah Melli bank by applying random cluster data collection method. The method of this study is descriptive- survey research. The study period covered the second half of the year of 2012. One-Sample T-Test, Friedman ranking Test and Independent Samples Test were employed to test hypotheses, to rank factors affecting operational risks and to compare the amount of effective factors on the operational risks of electronic banking among employees and customers Melli Bank respectively. The results indicate that hypotheses (1-5) support effects the factors (data accuracy, internal controls, technological infrastructure, access to systems, and security) have on Melli bank operational E-banking risks; hypothesis (6) ranks each of the 5-fold factors. In the security factors employees' opinion is more effective than customers, but in factors (Data accuracy, Technological infrastructures) the trend is reversed. The study also includes recommendations in order to manage and lower operational E-banking risks.

Keywords: *Data accuracy, Internal controls, Technological infrastructure, Access to systems, Security, Operational risks, E-banking*

INTRODUCTION

Advances in technology and the growing influence of information and communication technology and computer systems in financial institutions is one of the achievements of the twenty first century to the extent that in today's world, information technology and communications provides underpinning the relationship between different groups of societies in different geographic regions and

levels without any limitations of time and space.

In fact everyone through the networks can obtain necessary awareness in various fields through surfing t. Because today through the seventh continent (World Wide Web), the money or otherwise contained information on money, economic data, trade and commerce are available to all users (Abasinrzhad, 2011). The application of E-banking¹ seems to be an

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essential task given the recent world transformations and societies turning to E-business¹ and using internet and electronic facilities instead of using traditional methods. Nowadays, banking industry is changing quickly as banks have been influenced by international economy development and market competition; and development of information and communication technology and increasing growth of electronic transaction and business across the world and business need for presence of banks to transfer financial resources all have made E-banking on integral part of E-business, which plays a crucial role in its implementation. It can be said that E-business is not realized without E-banking. Recent business transformations have raised new concepts in E-banking, including fund electronic transfer, bank cards, electronic money electronic payment of bills automated clearinghouse, etc. (MBRC, 2005). Furthermore, innovations such as telecommunication networks, cell phones, internet automated teller machines (ATM), automatic branches, electronic money, and so on have changed ways of service providing by banks and financial institutions and have provided banks with such advantages as focusing on new distribution channels; while having access to provided services by banks with no spatial –time limitations, more geographically covered areas, possibility of E-shopping², and possibility of having access to and monitor personal accounts have increased banks competition power within the modern complex markets. New risks caused by this phenomenon are employees and customers unfamiliarity with new technology, lack of infrastructures necessary to provide E-services³. Not taking an appropriate strategic approach by bank managers and by governmental top managers; these are challenges facing banks and financial institutions. One of the most important responsibilities of management of banks and financial institutions is to understand all kinds of risk and to take the proper management strategy. So it can be claimed that movement from manual to entirely computer processing accompanied by increased processing volume,

whether in number or its source, is a major concern in the current era because it has raised risk likelihood and reduced control over such transactions (Sheykhan, 1999). Therefore, it is necessary for financial institutions to be flexible in order to face future world's challenges and changes successfully. Professional risk management is one of the most important domains requiring adaptation of financial institutions to new conditions in order for it to understand increasing complexity caused by regulations, customers, and technology and to act efficiently. Without such adaptation, undoubtedly, an institution is most likely to encounter conditions threatening its continuous activity and survival (El-Kharouf and Magdalena, 1999). These factors led a committee called Basel to begin preliminary studies on risk management principles in E-banking and E-money⁴ areas in 1998, which specified necessity of more work in risk management domain the result of which was establishment of a working group, named E-banking group, consisting of the heads of banks and central banks in Nov. of 1999. A report prepared by this group on risk management and E-banking supervision was approved by basal committee in Oct of 2000. According to this report, main E-banking risks include strategic, credit, operational, liquidity, and market risks (Basel Committee, 2003). Given that people have already turned to, or are now turning to, the use of E-banking services, to identify risks associated with this type of banking is considered an essentially important task so that banks and financial institutions be able to encourage people to use such banking more and more by identifying and reducing related risks. As mentioned earlier, operational risks are one of major risks known in E-banking services. (MollaZade, 2010). It should be said, Operational risk is defined as the risk of losses due to inadequacy or failure of internal controls, human errors, systems and external events. In other words there is the risk of failure and lack of efficiency in personnel and individual, technology and working process (Abolhassani and Hassani Moghaddam, 2008). The other risk areas are the following: internal and external fraud, which is done by the staff of banks and

1- Electronic Business
2- Electronic Shopping
3- Electronic Services

4- Electronic Money

non-banks; inadvertent factors or negligence arising out of employees or lack of safety at work; which will cause loss of physical assets; Factors concerning of recipients of facility performance; external factors, such as legal restrictions, political, and natural factors (Niazi, 2005).

This type of risk is not a new phenomenon, but its importance has been highlighted recently with spread of information technology application (so that Basel committee has issued numerous instructions and reports to facilitate operational risk management, although technology has facilitated performing of many organizational tasks and more importantly, resulted in productivity growth, it has brought about new problems for organizations the most important of which is operational risks) (MBRC, 1999).

The reasons for the increasing importance of operational risk in recent years can be the following factors:

- ✓ Globalization of financial markets has added to the complexity of the institutions providing financial services, this also leads to increased need to the disclosure operational risk.
- ✓ Integration in the financial services industry has created larger and more complex organizations which consequently have also increased the risk of non-compliance systems.
- ✓ Increasing dependence on computers and electronic communications in transaction banking and trading operations has increased the possibility of system failure.
- ✓ Investing in stocks of banks and interbank loans, potentially increasing the transmission of operational loss between banks and financial institutions.
- ✓ Growth of e-banking and e-commerce has caused financial institutions are faced with unknown risks.
- ✓ The occurrence of events such as Enron and World Com and similar events, due to illegal accounting operations, investors and legal authorities are focusing on transparency in financial reporting (Embrechts, 2006).

The banks need to be highly attendant in this regard since in the case operational risks are not managed well, they will lead to not only economic losses but also banks bankruptcy (MBRC, 1999). The purpose of operational risk management decision making about this type of risks in organization, acceptance that and, controlling is based on the risk strategy of organization (King, 2001). The first step is to identify the factors affecting this type of risk and controlling them. In a report released in October 2000 by the Basel Committee on the 5 factors are used (technological infrastructure, security, data integrity, internal controls access to the system) as the main factors influencing on the operational risk of electronic banking. Therefore, it must be said that Melli Bank of Kermanshah Province, as well as a financial institution that provides banking services need to consider these factors in order to manage their operational risk.

Literature Review

MollaZade (2010) studied the factors affecting on operational risk of electronic banking, in the Maskan Bank of East Azarbaijan, Kermanshah and Hamadan in Iran. The researcher found that all factors (data authentication, internal controls, technical infrastructure, access to system and security from the perspective of employees and customers) has an effect on the operational risk of Maskan Bank and the influence of these factors from employees perspective was more than the customer perspective. And the safety of staff and customers perspective has the greatest effect. Sokolov (2008) examined operational E-banking risks in Estonian banks. Results indicated that security controls, periodic check of individuals with key positions, and limited unauthorized access to E-banking data are the most important factors affecting operational E-banking risks. Chang and Twang (2006) investigated factors influencing internet security in Taiwanese banks. They found that security is one of the most important reasons for adoption and application of internet banking. Shakeri (2007) studied vital factors of success of Iranian E-banking in the form of external (managerial, socio-cultural, technological, economic ones) and internal (telephone banking, internet

banking ATM, and sale-point machines) factors. Results indicated that technological and socio-cultural factors are the most important external factors, and management of ATM bank operations POS security systems, organizational structures of telephone and internet banking are the most important internal ones. Kesheh Farahani (2007) studied and evaluated approaches to transition from traditional to E-banking in Persian bank. Results showed that basic infrastructures are the most important obstacles to Iranian E-banking followed by legal, social, and cultural factors, obstacles related to technological knowledge, economic factors, and internal bank factors. Sherbat Oghli and Erfanian (2006) have done a comparative study on the implementation of the operational risk measurement models approved by Basel Committee in the Bank of Industry and Mines. Researchers in this study were determined the amount of capital required to meet the all kind of operational risks in the Bank of Industry and Mine based on two methods basic and standard indicators. Hamidzadeh et al. (2006) identified and ranked challenges and hardships of environments external to Iranian E-banking system. They found that low speed of communicational networks, internet infrastructures, low level of customers knowledge and awareness management problems, sites maintenance, incompatibility of traditional banking with electronic one, and insecure communication systems and networks are among main challenges to development of E-banking. Wahlstrom (2006) investigated the question of whether the requirements of performance and behavioral of operational risk should be performed as result of the adoption of new guidelines for Basel Committee? Paid to done a field research in the Swedish banks and after the survey of 22 senior executives of the country's banking system and investigated the opportunities and is discussed threats using the Basel to provide practical strategies for implementing these guidelines. Karimi (2006) identified and studied factors affecting the risks of Sepah bank information security. This researcher identified 4 elements as factors affecting the risks of Sepah bank information security: (1) data classification (confidentiality authenticity, access ability), (2) management controls (risk management, revision of security

controls, life cycle running, business continuation planning, and error correction), (3) operational controls (personnel security, environmental / physical security, documentation, awareness of and training security), and (4) technical controls (identification and certification of identity and non-denial, logical access control, audit of registration and monitoring). Ayady (2006) divided factors influencing establishment of E-banking in Tunisia into 2 technological and organizational ones. He considers such factors as central architecture, multiple information systems, organizational inflexibility, and ignoring users wants as being effective in failed E-banking establishment. Aghaunor and Fothoh (2006) examined factors effective in applying E-business to Nigerian commercial banks. Results showed that top management support; organizational capabilities; technological infrastructures; perceived interests, compatibility, and complexity; supporting industries; and government support are factors effective in establishment of E-banking within Nigerian commercial banks. Watangase (2005) addressed management roles within Thailand banks it environment. He identified security, data confidentiality, data accuracy. System integration, internal controls, and Outsourcing as factors influencing operational E-banking risks. Venus and Salehi (2004) identified factors influencing customer's tendency to use bank automatic payment systems. Results showed that spatial desirability, customer awareness, system integration, service diversity, easy use, availability and reliability are 6 factors influencing customer tendency to use bank automatic payment systems. Pilawski (2003) examined obstacles to establishment and implementation of E-banking within polish banks. He introduced security data confidentiality, technological infrastructures, data accuracy, internal controls, and Outsourcing as factors influencing operational E-banking risks.

Research Hypotheses

Hypotheses1: Data accuracy influences operational E-banking risks in Melli bank of Kermanshah.

Hypotheses2: Internal controls influence operational E-banking risks in Melli bank of Kermanshah.

Hypotheses3: Technological infrastructures influence operational E-banking risks in Melli bank of Kermanshah.

Hypotheses4: Access to systems influence operational E-banking risks in Melli bank of Kermanshah.

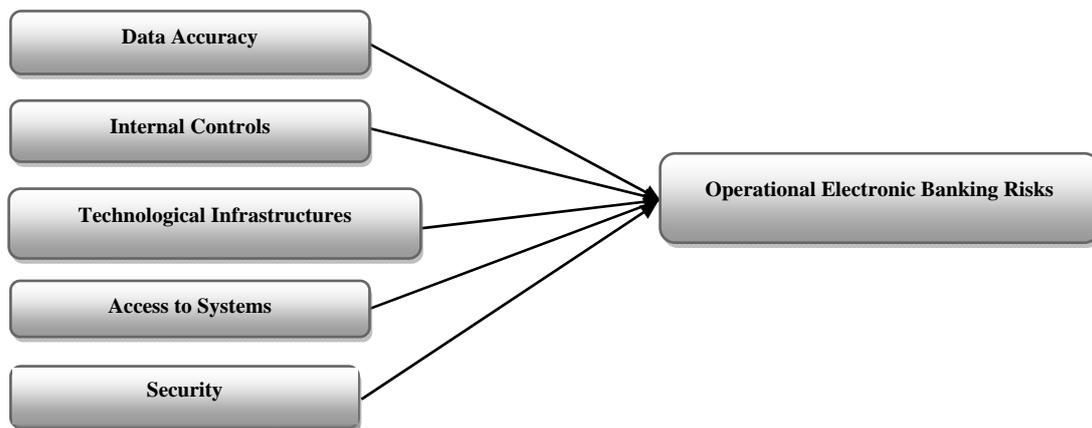
Hypotheses5: Security influences operational E-banking risks in Kermanshah Melli bank.

Hypotheses6: Amount the effect of each of these factors on the operational risk of electronic banking at the Melli Bank of Kermanshah Province is alike from employees and customers view?

RESEARCH METHOD

The present study is descriptive- surveys research which is one of applied research. Required information of research literature sector has been gathered from books, specialized journals articles on Persian (ISC) and Latin derived (library methods). For data collection, questionnaire was used in this study (questionnaire: Mollazadeh (2010) consists of 24 questions). Mollazadeh designed this questionnaire with Likerts spectrum Grading Mode questions from a questionnaire, is calculated of 1 grade to 5 grades. Also, you can

look for further review to conceptual model in figure 1, and conceptual and operational definition of research variables in tables 1, and also, research hypotheses results in tables 2 , 3 and 4. Validity of the questionnaire was confirmed by a group of university professors. And for determined reliability of the questionnaire was used Cronbach's alpha 0.730 for employees and 0.770 for customers. Finally, the collect information to calculate variables research was stored in a database such as Excel (field method). One-Sample T-test was used to analyze data for testing research hypotheses. Also, Friedman's ranking test was used to rank factors influencing operational risks in viewpoints of employees and customers and Finally, Independent T-test to compare the degree of each of 5 factors influence in points of view of employees and customers. In the 0.095 confidence level, and P-value<0.05, Hypothesis (H_1) is confirm, and hypothesis (H_0) is rejected. In addition to set the statistical tables, statistical data analysis, was used SPSS software. The statistical population is 300 employees and 384 Customers of Melli Bank of Kermanshah; for a period of 6 months of second half of 2012, were selected randomly cluster.



Figur1: Research conceptual model (Basel Committee, 2000)

Table 1: Theoretical and operational definition of research variables (Basel Committee, 2003 & 1998)

Spectrum items	Scale items	Variable scale	Operational Definition	Theoretical Definition	Name of variable
The value of high levels	The rating scale	Interval scale	Logical coherence of e-banking processes.	Data accuracy: collection appropriate measures to protect the coherence and accuracy of data in information of records and transactions in electronic banking.	Data accuracy
			Restrictions on data manipulation and disruption of electronic banking by hackers.		
			Existence restrictions on unauthorized changes in data of e-banking by users		
			Existence of software correction of incorrect data.		
The value of high levels	The rating scale	Interval scale	Tracking e-banking transactions	Internal control: a set of independent control mechanisms for finding defects and reduce the risk to providing services of e-banking.	Internal Controls
			Control opening, changing and closing an accounts by the customer.		
			Control over licensing of entering customers into e-banking system (confirm the validity of customers).		
			Control over employee changes of access to the system.		
			Physical control of databases, servers and systems.		
The value of high levels	The rating scale	Interval e	Development of telecommunications networks.	Technological infrastructure: it is including hardware, software, databases, and communication that used for do duty in the form of providing services through the Internet, to support the electronic transfer of data and other forms of putting the message, and getting the message by the Internet or other network.	Technological Infrastructures
			The level of development of ATM machines.		
			Development of the acceleration grid.		
			Level of technology used in credit cards.		
			Performance of computer networking.		
			Existence backed the appropriate electric.		

Operational Electronic Banking Risks

Access to Systems	Access to the system: it is a set procedures that for control reliability and availability to access of systems, applications programs and databases of electronic banking.	Limit employee access to e-banking database.	Interval scale	The rating scale	The value of high levels
		Restrict unauthorized access of users to e-banking database.			
		Lack of availability of change password by users.			
		Limiting the possibility of collusion of Bank staff.			
Security	Security: it is a combination of systems, applications, and internal controls, that it used in order to protect the authenticity of validity, and confidentiality of data and operational processes	Conducting periodic reviews of security from people at key positions.	Interval scale	The rating scale	The value of high levels
		Existing, the protective software from unauthorized intrusion to systems.			
		Periodic testing of network intrusion.			
		Existence anti-virus software.			
		Classification of sensitive data.			
		Management software and system security upgrades.			

Results of Testing Hypothesize

Table 2: One-sample test

Hypothesis	One-Sample Test									Hypothesis Verification	
	One-Sample Statistics				Test Value = 3						
	N	Mean	Std. Deviation	Std. Error Mean	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference		
								Lower	Upper		
1	300	13.2467	3.61794	0.20888	49.055	299	0.000	10.24667	9.8356	10.6577	H ₁
	384	16.8906	3.47592	0.17738	78.310	383	0.000	13.89063	13.5419	14.2394	
2	300	17.7500	3.41952	0.19743	74.711	299	0.000	14.75000	14.3615	15.1385	H ₁
	384	17.8047	3.93762	0.20094	73.677	383	0.000	14.80469	14.4096	15.1998	
3	300	19.5700	4.27700	0.24693	67.103	299	0.000	16.57000	16.0841	17.0559	H ₁
	384	24.5859	5.03231	0.25680	84.056	383	0.000	21.58594	21.0810	22.0909	
4	300	13.6267	3.63842	0.21006	50.588	299	0.000	10.62667	10.2133	11.0401	H ₁
	384	16.5938	3.99367	0.20380	66.701	383	0.000	13.59375	13.1930	13.9945	
5	300	26.6367	4.71012	0.27194	86.919	299	0.000	23.63667	23.1015	24.1718	H ₁
	384	24.8203	5.46830	0.27905	78.194	383	0.000	21.82031	21.2716	22.3690	

Table 3: Friedman -test

Sig	df	Chi-Square	Mean Rank	Mean	N	NO	Variable	hypothesis
0.000	4	882.982	1.64	13.25	300	1	Data accuracy	employees
			1.80	13.63	300	2	Access to systems	
			3.13	17.75	300	3	Internal controls	
			3.60	19.57	300	4	Technological infrastructures	
			4.84	26.64	300	5	Security	
0.000	4	994.715	1.92	16.59	384	1	Access to systems	Customers
			1.97	16.89	384	2	Data accuracy	
			2.45	17.80	384	3	Internal controls	
			4.32	24.59	384	4	Technological infrastructures	
			4.36	24.82	384	5	Security	

According to table 2, the results of One-Sample Test of each of hypotheses are as following:

Hypothesis 1: Data accuracy influences operational E-banking risks in Melli bank of Kermanshah.

Given that sig level is smaller than 0.05 error one it can be said that H_1 is accepted. Therefore, with 0.095 confidences, factor of data accuracy has Influence on operational E-banking risks in Melli bank of Kermanshah in viewpoints of employees and customers. Also, results show that, with 0.095 confidences interval, mean of the effect of importance of data accuracy on operational E-banking risks among employees and customers of Kermanshah Melli bank Lies between (9.8356 and 10.6577) and (13.5419 and 14.2394).

Hypothesis 2: Internal controls influences operational E-banking risks in Melli bank of Kermanshah.

Given that sig level is smaller than 0.05 error one it can be said that H_1 is accepted. Therefore, with 0.095 confidences, factor of internal controls has Influence on operational E-banking risks in Melli bank of Kermanshah in viewpoints of employees and customers. Also, results show that, with 0.095 confidences interval, mean of the effect of importance of internal controls on operational E-banking risks among employees and customers of Kermanshah Melli bank Lies between (14.3615 and 15.1385) and (14.4096 and 15.1998).

Hypothesis 3: Technological infrastructures influences operational E-banking risks in Melli bank of Kermanshah.

Given that sig level is smaller than 0.05 error one it can be said that H_1 is accepted. Therefore, with 0.095 confidences, factor of Technological infrastructures has Influence on operational E-banking risks in Melli bank of Kermanshah in viewpoints of employees and customers. Also, results show that, with 0.095 confidences interval, mean of the effect of importance of Technological infrastructures on operational E-banking risks among employees and customers of Kermanshah Melli bank Lies between (16.0841 and 17.0559) and (21.0810 and 22.0909).

Hypothesis 4: Access to systems influences operational E-banking risks in Melli bank of Kermanshah.

Given that sig level is smaller than 0.05 error one it can be said that H_1 is accepted. Therefore, with 0.095 confidences, factor of Access to systems has Influence on operational E-banking risks in Melli bank of Kermanshah in viewpoints of employees and customers. Also, results show that, with 0.095 confidences interval, mean of the effect of importance of Access to systems on operational E-banking risks among employees and customers of Kermanshah Melli bank Lies between (10.2133 and 11.0401) and (13.1930 and 13.9945).

Table 4: Independent samples test

Hypothesis	Group Statistics				Independent Samples Test									
	N	Mean	Std. Deviation	Std. Error Mean	Levene's Test for Equality of Variances		T-Test for Equality of Means							
					F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
1	Employees 300	13.2457	3.61794	0.20888	5.220	0.023	-13.363	682	0.000	-3.64396	0.27269	-4.17937	-3.10855	
	Customers 384	16.8906	3.47592	0.17738			-13.297	629.969	0.000	-3.64396	0.27403	-4.18209	-3.10583	
2	Employees 300	17.7500	3.41952	0.19743	6.757	0.010	-0.191	682	0.849	-0.05465	0.28660	-0.61741	0.50803	
	Customers 384	17.8047	3.93762	0.20094			-0.194	674.375	0.846	-0.05465	0.28170	-0.60780	0.49843	
3	Employees 300	19.5700	4.27700	0.24693	1.840	0.175	-13.803	682	0.000	-5.01594	0.26340	-5.72945	-4.30242	
	Customers 384	24.3859	5.03231	0.25680			-14.079	677.150	0.000	-5.01594	0.35626	-5.71545	-4.31642	
4	Employees 300	13.6257	3.63842	0.21006	4.447	0.035	-10.022	682	0.000	-2.96708	0.29664	-3.54835	-2.38582	
	Customers 384	16.5938	3.99367	0.20380			-10.138	666.079	0.000	-2.96708	0.29268	-3.54177	-2.39240	
5	Employees 300	26.6357	4.71012	0.27194	3.023	0.083	4.577	682	0.000	1.81635	1.03724	1.03724	2.59547	
	Customers 384	24.8203	2.46830	0.27905			4.662	675.500	0.000	1.81635	1.05130	1.05130	2.58141	

Hypothesis 5: Security influences operational E-banking risks in Melli bank of Kermanshah.

Given that sig level is smaller than 0.05 error one it can be said that H_1 is accepted. Therefore, with 0.095 confidences, factor of Security has Influence on operational E-banking risks in Melli bank of Kermanshah in viewpoints of employees and customers. Also, results show that, with 0.095 confidences interval, mean of the effect of importance of Security on operational E-banking risks among employees and customers of Kermanshah Melli bank Lies between (23.1015 and 24.1718) and (21.2716 and 22.3690).

According to table 3, the result of Friedman - Test is as following:

Hypothesis 6: Amount the effect of each of these factors on the operational risk of electronic banking at the Melli Bank of Kermanshah Province is alike from employees and customers view?

The effects of all factors are the same.

$H_0: P_1 = P_2 = \dots P_5$

The effects of all factors are not the same?

$H_1: P_1 \neq P_2 \neq \dots P_5$

Given means and ranking means of each calculated factor, variable which has the least influence gains the lowest ranking. According to table 2, for both employees and customers freedom degree is 4 and significance level is. 0.000, but χ^2 is 882.982 for the employees and 994.715 for the customers. Since significance level is < 0.05 both employees and customers H_1 is Accepted, therefore, there is a significant difference among means of factors. Thus, factors influencing operational E-banking risks in Melli bank are, in viewpoints of employees and customers, in low-to-high influence order as follows:

In viewpoints of employees: data accuracy, access to systems, internal controls, technological infrastructures, and security.

In viewpoints of customers: access to systems, data accuracy, internal controls, technological infrastructures and security.

According to table 4, the result of Independent Samples Test is as following:

Comparison the amount of effective factors on the operational risks of electronic banking at Melli Bank of Kermanshah among employees and customers:

H_0 : mean of factors affecting operational electronic banking risks between staff and customers is equal.

$H_0: \mu_1 = \mu_2 = \dots \mu_5$

H_1 : mean of factors affecting operational electronic banking risks between staff and customers is not equal.

$H_1: \mu_1 \neq \mu_2 \neq \dots \mu_5$

Given that sig levels is smaller than 0.05 error one it can be said that H_1 is accepted. Only In Internal controls factor is reject because the test significance level (equal to 0. 849) is more than 0.05.

In the end: in factors (Security), mean of employees group is higher than customers group. So we conclude that the amount of factors affecting on operational risks of electronic banking according to employees opinion is significantly more than customers.

In factors (Data accuracy, Technological infrastructures, Access to systems), mean of customers group is higher than employees group. So we conclude that the amount of factors affecting on operational risks of electronic banking according to customers opinion is significantly more than employees.

CONCLUSION

It is not an easy task to draw conclusions on a subject as expansive as measurement of opinions of bank customers and employees performed within one realm. Although present research has tried to observe all scientific rules of doing a research in order to reach reliable findings, secure conclusion on such a subject requires a nation – wide and / or a lot regional research. However, results obtained from this research are very interesting and can be used as a guide by subsequent research.

1. On the basis of hypotheses (1-5) and of research tests, it is concluded that all 5 factors influence operational E-banking risks in Kermanshah Melli bank.

2. Based on hypothesis (6) and on research tests, it is concluded that in viewpoint of employees and customers factor of security is of the highest effect on operational E-banking risks in Melli bank of Kermanshah. Also, On the one hand, There are in viewpoints employees: technological infrastructures, internal controls, access to systems, data accuracy. On the other hand, There are in viewpoints customers:

technological infrastructures, internal controls, data accuracy, and access to systems. Given the importance employees and customers of Melli bank place on these factors, thus, it is expected that this bank to have more careful and stronger strategies and approaches to these factors.

Findings of this research show that these 5 factors influence operational E-banking risks in Melli bank of Kermanshah. Results of this research are in line with previous ones findings.

MollaZade (2010), Sokolov (2008), Chang et al. (2006), Wataganase (2005), Pilawski (2003), and Karimi (2006) considered security as an effective factor in E-banking. Sokolov (2008), Pilawski (2003), and Venus and Salehi (2004) identified access to systems as a factor influencing operational E-banking risks. Shakeri (2007), Farahani (2007), Hamidzadeh et al. (2006), Ayady (2006), Aghaunor and Fothoh (2006), and Pilawski (2003) introduced technological infrastructures as an important factor to E-banking. Karimi (2006), Watanagase (2005), and Pilawski (2003) identified factors of data accuracy and internal controls as those influencing E-banking.

RECOMMENDATIONS

Research recommendations are presented in 2 parts. First, includes applied suggestions related to management of operational risks in Melli bank E-banking system and second, includes suggestions for future research.

Applied Suggestions

1. For data accuracy, it is recommended that Melli bank plan & program office document all its E-banking processes and examine them technically managerially while revising and redefining them optimally in order to organize Melli bank E-banking processes logically properly. By doing so, bank needs related to the process of data management are identified based on which software correcting incorrect data is designed and developed.

2. For internal controls, it is suggested that this bank define sufficient logs for all steps if E-banking transaction process, intercepting and controlling whole transactions. Also, it is recommended that multiple methods be used simultaneously to identify users while being connected to servers and databases. To control employees, it is suggested that whole bank

personnel be classified based on their organizational positions and information requirements commensurate with those positions; and informational level of and access level to Melli bank E-banking systems be defined commensurate with each class and users be allowed to have access only to specified levels, for servers, systems, and databases, it is suggested that an efficient contingency program be defined, duties of each employee be determined clearly while training them in order to prevent any disruption in providing services caused by natural disasters (flood, earthquake, storm, etc.) and intentionally mistakenly human – made unpredicted incidents. One important point in this field is to prepare supporting systems and data banks being updated and to place them in locations geographically different from those of main servers and databases.

3. For technological infrastructures, it is recommended that the bank choose technologies and systems in such a manner that they not only comply with common standards of banking industry but also be capable of achieving bank strategic outlooks in direction of providing services to customers effectively flexibly. An effective solution to reduce risks related to this area is to hold negotiations among central bank, banks representatives, and organizations concerned (communications & technology, telecommunications, power, etc.) in order to examine weaknesses of these organizations and to appoint groups to improve status quo. It is suggested that Melli bank use Linux operating system, developed form of UNIX operating system, so that it can be made indigenous easily. It should be noted that many countries which are not willing to establish commercial relationships with the U.S. and / or are under sanction turn to this operating system. This operating system is advantageous because it is no organizations monopoly, that is, it has not been produced by a particular manufacturer, but evolved by different specialists. Also it should be pointed out that according to experts, inappropriate infrastructures of telecommunication and a communicational network is among factors problematic in the field of E-banking. Positive steps can be taken to reduce E-banking risks by improving these infrastructures and by increasing seed and precision of communicational networks.

4. For access to systems, it is suggested that tasks related to E-banking processes be divided carefully with a preventive logic; all changes in access limits be registered and recorded, requiring approval by bank top management, and controlling, monitoring, and inspecting units. Also, employees activities need to be controlled both regularly tangibly and accidentally intangibly job rotation and employee exchange is another control policy being effective in reducing operational losses caused by employees. This problem can be resolved by providing employees with continuous education and by occupational planning although financial institutions are reluctant to hold posts related to E-banking activities due to necessity of high specialty. Also, it is suggested that similar policies be applied to bank external users (customers) in order that merely authorized users be able to do allowed operations and transactions within specified and defined limits. Among procedures proposed to control users access to banks E-banking systems is to change passwords periodically and to control and intercept transactions of E-banking irregularly accidentally.

5. For security, it is suggested that Melli bank design and implement a careful and strong security policy for bank employees, which is active in units related to E-banking. Also, it is recommended that this bank management outsource required software system by concluding valid and appropriate contracts with valid foreign companies given the lack of antivirus software and software protecting against unauthorized penetration to network inside country, of course, it needs to gain necessary implementation guarantee for updating and supporting related tasks by those companies.

finally, given opinions and suggestions expressed by it assistants and employees working for this sector in Kermanshah during interviews performed, it needs to be pointed out that banks and financial institutions need to offer more comprehensive education to customers using E-banking services in order to minimize risks in such banking by training and creating a proper culture among general public. And also at the end, it is suggested that Melli bank management embark on creating a database to get precise information on studied factors in

order to manage operational risks better within its own E-banking system for defining its E-banking processes, transactions, and functional areas in short term. It is evident that at the end of this period bank management will be able to formulate efficient policies and strategies for risk management considering available data and specified priorities.

Suggestions for Future Research

The second part gives some recommendations to interested researchers for future research:

1. To examine other factors like outsourcing as one influencing operational E-banking risks. Thus, interested individuals could examine each of factors studied in present research separately for Melli and / or any other national banks by defining standards more precise than and beyond minimal specified here.

2. To study approaches to calculation of capital sufficiency comparatively for operational risks in Melli bank E-banking systems.

3. To identify, study and provide the most efficient standards of monitoring and supervision based on the second element of instructions of Basel committee for Iranian E-banking system.

4. To examine factors influencing credit and market risks in Melli bank and to design measurement model for liquidity risks for Melli bank banking system and, finally; to suggest an efficient and effective risk management regime for Melli bank.

5. To examine factors influencing credit and market risks in in Banking Industry of Iran and to design measurement model for liquidity risks for Iranian banks banking system and, finally; to suggest an efficient and effective risk management regime for in Banking Industry of Iran. And compare the results of these researches with this study in Melli bank.

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