

Investigating the Effect of Information Technology on the performance of the Banking Industry in Iran

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ABSTRACT

The inventive and subtle use of information and information systems can increase the value, speed, quality, cost and organizational communication improvement. IT enables the organizational performance to improve the quality of information; therefore, the organizations use IT to meet the challenges in the changing environment and be supported against the changes and improving their performance. This can be considered as a necessary matter for promoting and growing the IT field: Which aspect of IT in an organization can improve the performance of its IT section? The goal of this study is examining the role of effective factors on IT performance improvement in Iranian banking industry, because this industry is one of the most important and updated users of IT services. This is an applied research and the method is survey-descriptive. The statistical population consists of 260 people of IT sector experts in the field of Iranian banking that 156 people from which have been selected by Krejcie and Morgan method to answer to the designed questionnaire. After the data were analyzed through Confirmatory Factor Analysis and the statistic tests, the results were shown that the effects of or ware and human ware aspects were identified as the most affective factors in the Iranian banking compared to technoware and info ware.

KEYWORDS: Information Technology, Performance improvement, Banking industry, Orgware, Humanware, Infoware, Technoware.

1. INTRODUCTION

Information technology is a set of tools include: technology-ware, information-ware, human-ware, organization and network-ware, which facilitate the dynamic process of information [1]. Organizations use IT systems to deal with challenges of the turbulent environment, thereby through increasing efficiency caused by them, they can supported against the changes. But the successful usage of these systems requires their compliance with various social, technical and economic factors [2]. Also in the field of banking services, the quality of service, customer's belief or attitude concerning the rate of service superiority determines the advantage of the banking service [3]. So, banking industry due to the increasing use of information systems and information technology to reduce the time and costs, has more interaction with IT and Perhaps we can say that it is one of the most important users of this technology. Therefore investigating the effect of information technology on banking services and prioritizing its components has a special role in Iran's banking system. In this paper we attempt through identifying and investigating the importance of effect of each dimension of information technology on banking industry achieve to maximum efficiency of the facilities, human resources and capital, because the additional cost reduction when there is no possibility of increasing resources, is the best possible solution. The aim of this study is investigating the effects of factors affecting the performance of information technology in Iran's banking system. This requires identifying the dimensions of each organization and providing unique solutions more than before. So IT by reducing costs and reducing the loss of facilities, can help these areas to improve productivity and increase competitive power. The research methodology of this paper in terms of objective is an applied research. This study is also a descriptive- analytical research, and the questionnaire was used for data collection, so it is a survey research. In the next section of this paper the overview of studies done in this area in order to investigate the previous research and the status of this paper. The methodology of the study, methods of data analysis and finally the conclusions obtained from the analysis are presented below.

2. THE LITERATURE REVIEW

The era of new communication and technologies is such that within it we can not classified persons into two information producers and its consumers. In this era the distance of information producers and its consumers is too short that sometime the information producer is considered as its consumer [4]. Technology is the regular application of scientific knowledge in practical cases that the elements of knowledge, skills and expertise are featured on it and its benefits are the rapid communication between employees, increase creativity and efficiency of staff, domination of office space (due to the changing concept of this space), allowing the vast distribution of information with less cost and choice of useful information. Also, a set of processes, methods, techniques, tools, equipment, machinery and skills which are

used in making goods or offering the services are also named technology [1]. Information technology is a set of technology-ware, information-ware, human-ware, organization and network-ware, that in order to achieve the organizational goals requires some prerequisites such as software technology, human-system interface technology and telecommunications infrastructure [5].

Information technology before that is a hardware system and a set of patterns is thought and cultural system and can be called the culture of information production. Without creating a culture of information production, information technology systems can not be sustained. What is important in Information technology is the information oriented thinking. Information technology is formed from the connection and combination of generated useful thoughts and is not as computers and supercomputers, wires, cables and such tools. In information technology, information is produced from intelligent people think [6]. This is a wrong perception that we think that information technology has information itself, just when the business owners themselves are responsible for the quality of the data to determine what information is necessary for business stability and their development. Reliability and timeliness are more important than accuracy. When Information technology is involved in a process of recovery from its beginning, significantly improves the team's overall understanding of the situation and even can improve the affectability of developments that are obtained through that [7].

Processes that cause waste in an organization are divided into three main categories: MURI, MURA, MUDA. MUDA is attributed to the elements that do not add value to the work or components. MURA is the failure to limit costs while maintaining quality, Producing the information in irregular volume and inappropriate planning are the cause of its creation, means an imbalance in capacity and amount of work. MURI means expanding the limits of power and capacity, whether for employees or machinery and equipment. For example, excessive use of workforce ability results to stress and tension which in turn results to loss of quality and inappropriate productivity [8]. Organizations to deal with challenges of the changing environment use the information technology systems, thereby through increasing efficiency caused by them they can supported against changes. But successful application of this system requires its compatibility with various social, technical and economic factors. Sometimes the lack of appropriate infrastructure for the implementation of information technology leads to the failure of information systems. The most important problematic factors in organization's information technology can be described in four parts: Design (failure to meet the demands of the organization, due to the lack of coordination between system design with structure, culture and goals of the organization), Data (discontinuity or lack of transparency, which the necessary data for real business can not be achieved from them), cost (system's cost mismatch with its produced value), and function (lack of timely preparation of information and the failure of the devices) [9].

The most important and useful study of problems related to the implementation of information technology is conducted by Hicks who examined the issue raised in developing countries and provided them in 7 categories that includes: Information, Technology, Processes, Objectives Values, Management and structures, Staffing and skills and Other resources (ITPOMSO) [10].

As Paul David said every new technology, can start to effect on productivity only when it has penetrated up to the 50% in the economics of the country [11]. Information technology needs some infrastructures such as technical, economic and administrative, staff, social and cultural factors [1]. Considering the fact that more than 58 percent of investments in the information technology sector are related to its infrastructures, we should pay more attention to the impact of information technology infrastructure flexibility on the competitive advantage and the performance of the organization [12]. It is known that environmental factors, technical, technological and human factors are effective on the customer satisfaction [13]. Each of these infrastructures plays a key role in finding a special place for technology in organization and a deficiency in one of these components could have an irreplaceable impact on other elements.

Information technology has created great revolution in banking industry so without the use of this technology, banking is impossible and this matter is correct for technology such as communication, process and electronic sales channels. Information processing includes various tasks, such as: obtaining and studying information, displaying information in the best form, information processing to obtain new information, data storage and data transmission to individuals [5].

The importance of information is known as an important tactical and strategic source and also as a major source for value added and increasing economic growth. In the business environment, information has always introduced as a competitive advantage but the important point is that the use of information technology increases the potential value of information and the ability of organizations. Companies and industries are dependent on the use of this new technology and additional investments will increase the positive impact on the stability of the information technology [11]. So, the investment with decentralization of decision-making process and improving business processes, resulting in increased productivity in the organization [14].

All individuals in the society in each location and time will have an equal access to necessary information and this access to information is not only the right of people, but it also is considered as tools and development index and even such societies can classified based on the information value and access to it. Implementation of electronic banking in every country requires different infrastructure, so identification of these infrastructures and knowledge of the effects and challenges of the banks during the implementation of electronic banking, will be an appropriate guide for bank managers to achieve to success. Factors affecting the implementation and development of banking in Iran are: financial, managerial, technical and cultural [3].

According to studies conducted, variables such as employee empowerment, the extent of the use of technology, understanding the ease of use and understanding of the usefulness had the highest impact on adoption of information

technology in Iranian organizations, respectively [15]. Increasing accuracy, update, availability, integration and transparency, as well as reducing production costs, are also the reasons for the use of information technology tools in manufacturing and service centers in a country [16]. In another study, the measures of appropriate information include effectiveness, efficiency, confidentiality, accuracy, availability, observing principles and reliability.

It means that the information obtained through information technology must comply with these conditions in order to be useful for companies and failure to achieve these criteria could cause the failure in the organization [17].

Despite all these benefits, sometimes information technology development speed is so high which surpass from the human capacity to understand the applications and the desired results, it also may destroy person's private life privacy, create the power by focusing on information and its transfer costs and capital is high. In addition IT need to awareness and ability of human resources which is some disadvantages of this technology [18].

From conducted studies we can conclude that although the information technology has created many benefits for organizations, in the case of non-compliance with organization goal's orientation and information technology, we can not benefited from its all advantages and sometimes cause to the imposition of high costs to the organization. While IT dimensions can well recognized in organization we can enhance the percentage of increasing productivity from it. The rapid development of information and communication technology, is also effective in the banking industry and also lead to structural changes in this sector. The banking industry is also affected by changes in technology. In fact recent banking industry has become the information processing services industry, in a way that this industry has now become the main focus of governments, the media, consumers and businesses [19].

In this paper, we identify the aspect of each of the four dimensions of IT and examined the importance of them in Iranian banking industry.

3. RESEARCH METHODOLOGY

For the purpose of research this paper is in the category of applied research, in addition, since in this study we try to explore the assumptions and describing results and consequences of the phenomena this research is descriptive-analytic study, and because the questionnaires has been used for data collection this study in terms of data collection, is a survey study.

3.1. Data collection method

The most important data collection methods in this research include library studies and field research. To collect information on the theoretical bases and research literature, library resources, including domestic and foreign papers, thesis and books related to the topic, and available documents were used, and to gather senior managers opinion to approve or reject the research hypothesis the field method by using a questionnaire was used.

3.2. Statistical and sample population

Statistical population of this research includes 260 persons who are expert in the information technology in the banks of all over the country. The members of the sample were reached to 156 persons by using krejcie and Morgan methods.

3.3. Data analysis method

The questionnaire was designed to examine the main components of information technology in the Iranian banking industry. The descriptive statistical methods were used to analyze the data obtained from the responses of the questionnaires. In this study, descriptive analysis using SPSS software version 22 and confirmatory factor analysis with LISREL software version 8.8 are used for analysis. The questionnaire validity has been evaluated using the opinions of experts of bank's information technology. Cronbach's alpha was also used for testing the reliability of the questionnaire. The Cronbach's alpha for the questionnaire of the main components of information technology was 0.926 which is a good value.

4. Research's statistical data analysis

4.1. Statistical description of factors affecting information technology in the Iranian banking industry

The responses obtained from the questionnaires related to the studied variables in a 5 scale Likert-style were classified in very low, low, medium, high and very high levels that provides a qualitative description of each factor. This analysis indicates that the 44.9% of responses related to technology-ware in IT shows very high, so this dimension is placed in the first rank of importance, also 35.9% of responses related to the human-ware show very high, 33.4% of The responses related to the information-ware show the medium level and the importance rate of organization-ware in information technology with 37.9% in the high level represents the importance of these factors in information technology in the Iranian banking industry. The frequency results are given in the tables 1.

Table1. Frequency related to the importance rate of IT dimensions in the banking industry

The importance rate of IT dimensions in the banking industry	The importance of	Very low	Low	Middle	High	Very High	Total
Technology ware	Frequency	2	8	34	42	70	156
	Percent	1.3	5.2	21.8	26.8	44.9	100
Information ware	Frequency	2	14	52	38	50	156
	Percent	1.3	5.9	33.4	24.3	32.1	100
Human ware	Frequency	2	18	36	44	56	156
	Percent	1.3	11.5	23.1	28.2	35.9	100
Organization ware	Frequency	2	14	48	56	33	156
	percent	1.3	8.9	30.7	37.9	21.2	100

In the following table the descriptive indicators of factors affecting the productivity of IT such as mean, median, mode and variance are given.

Table2. The values of descriptive indicators of factors affecting the productivity of IT

factors affecting The productivity of IT	Model variables	Mean	median	mode	variance
	Technology ware	3.88	4	4.3	0.6
	Information ware	3.69	3.7	4.3	0.72
	Human ware	3.73	3.7	3.3	0.58
	Organization ware	3.66	3.8	3.4	0.49

4.2. Confirmatory factor analysis of factors affecting the improvement of information technology dimensions

Data analysis has been started according to following questions:

Which of the IT components are more effective in the banking system? How much is the effect of the quality of information technology on the performance optimization in the Iranian banking system and can reduce the losses in this area? And which of the components of the information technology in the Iranian banking industry should be considered more than the others? To assess the impact of information technology in this area we need to identify the main components, so with this sufficient knowledge, we are able to take effective action. In this area, based on the raised theoretical principles on research literature, 4 factors were investigated as hidden variables: technology-ware, information-ware, human-ware, and organization-ware. Then 14 questions are provided in the *five-point Likert* scale. In this part of research, responses analysis gets started using collecting needed data. Confirmatory factor analysis is used to realize whether obvious variables can well describe the hidden variables or not. Factor loading determines the power of relationship between obvious and hidden variable. Some statistical researchers defined factor loading as a value between 0 and 1 and expressed that if the factor loading was less than 0.2 the relationship is poor and can be ignored. The factor loading between 0.2 and 0.6 is acceptable and if it is higher than 0.6, the relationship between the factors is very desirable. But the main criterion for judging about factor loading is the t test, if the amount of T is higher than critical T value, then the observed factor loading will be significant and this means that the null hypothesis is rejected, then the observed factor loading is significant and this means that the null hypothesis is rejected [20].

Table3. The factor loadings and T-test statistics related to the IT items in Iranian banking industry

The main variable	Item	standardized solution	T-values	The sign in the model
Technology ware	The existence of professional and technical infrastructure with good quality	0.87	12.3	v1
	The security structure with high reliability	0.79	9.68	v2
	An appropriate hardware technology	0.72	9.16	v3
Information ware	The use of innovative and creative opinions and ideas	0.75	9.36	v4
	The people organizational maturity to accept and use of information technology	0.89	11.32	v5
	The professional staff compatible with organizational culture	0.81	11.74	v6
Human ware	The necessity of data with high quality and providing a detailed and proper analysis	0.7	8.28	v7
	The choice of the appropriate method in carry out the process	0.81	11.74	v8
	The existence of an adequate standard for information systems processes	0.68	8.13	v9
Organization ware	The training and support during the process in order to deal with unexpected problems	0.7	9.19	v10
	The manager's knowledge and support of the system	0.7	8.71	v11
	The regular planning and setting appropriate goals	0.82	11.71	v12
	The existence of appropriate structures and information systems	0.8	11.46	v13
	The systems to update tools processes and employees	0.74	10.61	v14

The results of the confirmatory factor analysis reveals that "the existence of professional and technical infrastructure with good quality" with factor loading 0.87 in technology-ware is the most important factor. After that "the security structure with high reliability" with factor loading 0.79 is in the second level of importance, and the "use of appropriate hardware technology" with factor loading 0.72 in this collection has the least importance. All of the T-values related to these variables illustrate the high significance of these relationships. Also, "the use of innovative and creative opinions and ideas" with factor loading 0.75 has the lowest importance of human ware, "the people organizational maturity to accept and use of information technology" with factor loading 0.89 and "the professional staff compatible with organizational culture" has the factor loading 0.81. As well as T-statistics of all the components of the structure are higher than the critical value and revealed the high significance of the relationship between the components and the structures. "the necessity of data with high quality and providing a detailed and proper analysis" has factor loading 0.70, "the choice of the appropriate method in carry out the process" with 0.81 factor loading" and "the existence of an adequate standard for information systems processes" has factor loading 0.68, which indicates that "the choice of the appropriate method to carry out the process" has the most importance between the sub factors of information-ware. Also

all amounts related to the T- test which are higher than critical level ensure the significance of this relationships and this suggest that the hidden variables are correlated well with the structure and describe it, and this relationship is significant. "the training and support during the process in order to deal with unexpected problems" with 0.70 factor loading, "the manager's knowledge and support of the system" with 0.70 factor loading, "regular planning and setting appropriate goals" with 0.82 factor loading, "the existence of appropriate structures and information systems" with 0.80 factor loading, and "the systems to update tools processes and employees" has factor loading 0.72, and in between "regular planning and setting appropriate goals" has the high significance in organization-ware factor. All the structure factor loading are in highly desirable level, that is, more than 0.6, and this means that the hidden variables describe the obvious variables very well and because all the T-values are all higher than critical value, means all the relationship have high significance. The following figure shows the standard factor loading and T test statistic value of each variable.

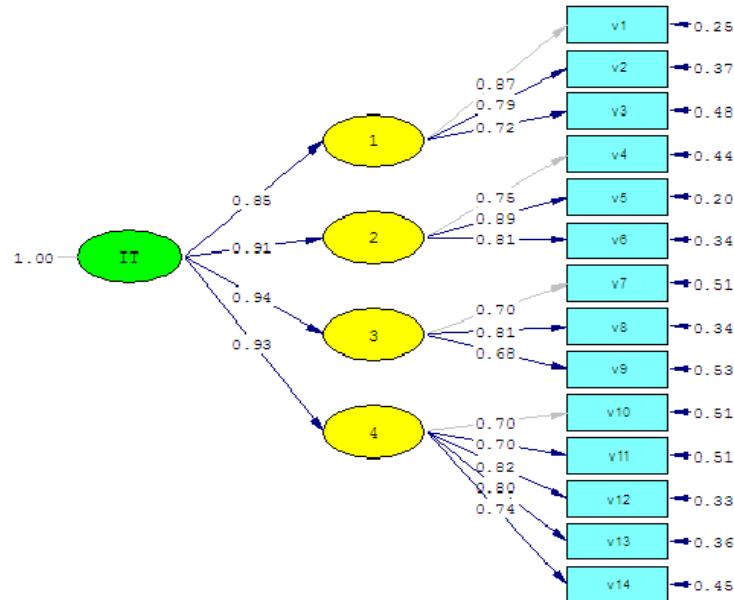


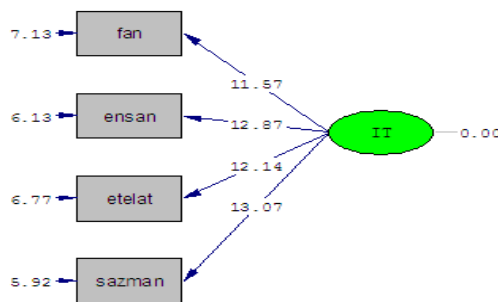
Fig.1. The model between the dimensions and the hidden factors of IT in the Iranian banking industry

4.3. The confirmatory factor analysis of the main dimensions of IT

After reviewing the confirmatory factor analysis on the information technology sub-components now, we examine the main components of IT. In table 5 the factor loadings and t-statistic value related to relationships are evaluated. And finally the structural equation model that using LISREL software was used for this study has been presented in figure2.

Table 4. The standard factor loading and t-statistics related to the main variables

	The main variable	standardized solution	T-values	The sign in the model
IT	Technology ware	0.8	11.57	Fan
	Information ware	0.86	12.87	Ensan
	Human ware	0.82	12.44	Etelat
	Organization ware	0.86	13.07	Sazman



Chi-Square=2.89, df=2, P-value=0.23586, RMSEA=0.054

Fig.2. T-values related to impact of information technology in the Iranian banking industry

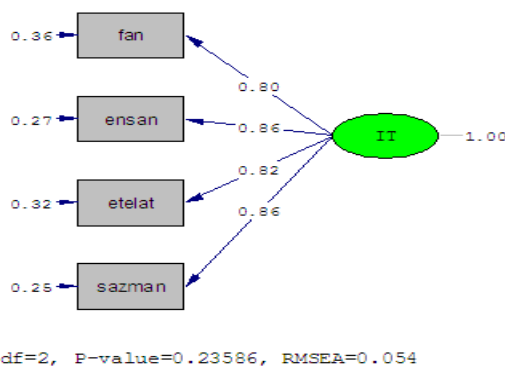


Fig.3. the standardized solution loadings values related to impact of information technology in the Iranian banking industry

To test the results obtained from in the confirmatory factor analysis and structural equations modeling, RSMEA index is the main fitting index of a model, the lower index *score*, the better, because this index shows the measure of the average difference between the observed data and model data. If this index is less than 0.50, will be desirable. In some of resource this value is also acceptable up to 0.08 [20]. In our model, RMSEA index was obtained equal to 0.054 that indicate the model good fitness.

5. Conclusion

The results obtained from the statistical and confirmatory factor analysis done on the data gathered from the questionnaires which tested the importance of the effect of IT dimensions on the organizational performance in Iranian banking industry shows that the technology-ware, human-ware, information-ware and organization-ware with factor loadings, 0.80, 0.86, 0.82 and 0.86 reveal the importance of IT dimensions in Iranian banking industry. Among these dimensions, organization-ware and human-ware have the most importance. In organization-ware structure, "the regular planning and setting appropriate goals" and "the existence of appropriate structures and information systems" and in human-ware "the organizational maturity of people to accept and use information technology" and "the professional staff compatible with organizational culture" have played more roles. This indicates the importance of human resources and systemic vision in establishing IT of banking industry more than the hardware and information ware. Identifying and prioritizing the dimensions of IT in an organization can improve the performance of IT sector in that organization. So the investment and considering to the important sectors will lead to greater success in this area. In the future research we can examine the effect of IT dimensions for other service sectors and specify the importance of each dimension in those areas, so that the direction of future investment in these areas could be more clearly.

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