

The Analysis of the Relationship between Organizational Structure and Information Technology (IT): And the Barriers to Its Establishment at the University of Isfahan from the Faculty Member's Viewpoints

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Abstract

The purpose of the present study is to investigate the relationship between organizational structure between IT and the barriers to its establishment in University of Isfahan from faculty member's viewpoints in 2007-2008. The questionnaires were prepared and examined based on the organization dimensions of organizational structures (formality, complexity, centralization) and IT. The research is descriptive-correlative type. Statistical population of the research consisted of 466 faculty member's of university of Isfahan which 80 individuals were selected as statistical samples through simple randomized sampling method. To gather the data for organizational dimensions and IT a questionnaire consisted of 37 items based on 5-point Likert-scale. The reliability of questionnaire obtained 0.93 using Cronbach's alpha. The content and face validity of the questionnaire was determined through the viewpoints of experts in management & educational sciences. The data were analyzed at descriptive (Frequency, Percentage, Mean) and inferential levels (correlation coefficient, variance analysis, independent T- test) by the SPSS software version 15.00. The findings showed that there was a significant and positive correlation between all organizational dimensions of structure and information technology.

Keywords: Information technology, Organizational structure, Faculty members

1. Introduction

If we consider Adam Smith's work as turning point for enhancing the efficiency of organizations in 19th century, there is no doubt that emerging of the computer in the middle of 20th century has not only had less influence on the organizations, but also its multidimensional effects prepared grounds to, and increase the effectiveness and efficiency of the organizations, so that IT has got an undeniable role in new organizations. According to many experts, it is impossible to imagine organizations without IT in present conditions. Kestlz believes that a new phase of industrial revolution has been created by expanding and developing the internet and other communication devices in 1990s (Burke, 2002). The era in which we live is called Information Age. In today's world, information is viewed as the main factor and the cornerstone of economical and social development in the countries, playing pivotal role in all human activities. Entering the new era, information age, the human life and the relationship between them have substantially changed and vast developments have emerged in the field of information technology. IT consists of tools, instruments equipment, knowledge, and skills which are used for collecting, storing, restoring, and transferring the information (Behan, 1999).

Applying IT in organizations results in changes which have influence on various aspects of organization including organizational structure. In accordance with Business Dictionary (2009) definition, Organizational Structure is, formal and informal framework of policies and rules, within which an organization arranges its lines of authority and communications, and allocates rights and duties. Organizational structure determines the manner and extent to which roles, power, and responsibilities are delegated, controlled, and coordinated, and shows how information flows between the levels of management. This structure depends entirely on the organization's objectives and the chosen strategy for to achieving them. In a centralized structure, the decision making power concentrates on the top layer of management and a tight control is exercised over departments and divisions. In a decentralized structure, the decision making power is distributed and the departments and divisions have variable degrees of autonomy. An organizational chart illustrates the organizational structure.

As we can see, organizations develop, modify and change their structures so that they align them selves with their strategies (Ramienski, 2008). A special form of boundary less organization is virtual. It works in a network of external alliances, using IT and Internet. This means that while the core of the organization can be small, the company still can operate globally and be a market leader in its niche (Anderson, 2007).

In order to apply IT in organization we need an appropriate organizational structure to make use of IT efficiently. Also, the huge flow of information makes the mangers learn IT completely and apply it properly (MehriNedjad, 2004). On each day, a lot of information is produced in any organization. A lot of data is produced by various activities such as accepting customers' orders, processing payments, and so on. It is necessary that we create structures which are able to process such information rapidly and correctly, and provide useful information for achieving the organizations' goals (Behan, 1999). Applying IT results in changes in organizational structures so that they change from hierarchical and vertical into horizontal and the organizational borders pale. All tasks of organization are designed according to information networks and technologies, and the employees perform their duties at home and there is no need for their physical presence (Ghafoorian, 2003). The organizational employees are people who learn and train continuously, then their creativity and innovation are their most important concerns. All organization affairs will be done online and the managers will be immediately in contact with customers and clients. The decisions will be made unfocusedly with more quality (McClure, 2001). Organizational structure is one of the key variables which are influenced by the way the organization's strategies are preformed, so the proper organizational structure is very important for achieving the performance. Further more, the organizational structure and permanent programs are a sort of organizational memory. Therefore, the structure is a critical factor not only in what the organizations learn, but also in the way this information and knowledge is retained (Robbins, 2007). Since the ability of a company to compete is based on its ability of learning, the issue of proper organizational structure will gain increasing importance in terms of how it is influenced by IT the organization compositions are empowered.

IT changes the nature of the tasks, and the tasks are more abstract than concrete. They are done in group rather than individually. Organizations expand and get more decentralized and corporations turn into various networks of organizations rather than independent institutes. IT breaks through the barriers between individuals, organizations, and institutes. IT reduces the differences between old organizations and new ones (Edward J, 1999).

According to Pinsonneault, IT has eliminated nearly one third of middle management opportunities. In other words, it has made about two million managers idle in the United States. For the next decade, we will have more than 60%

of work force reduction among the middle managers. The prediction is the discharge of employees about 11000 in Nat West, 6000 in Lloyd's, 5000 in British Telecom, 4500 in Philips, 4300 in Barclays, 1000 in British Petroleum have been attributed to IT. A vast temporary discharge of employees in companies such as IBM, Apple Computer, and others reported in Unites States. The theoreticians who believe in the influence of IT on reducing the middle management opportunities that in today's competitive world, suggest that the organizations go towards the middle and narrow structure, and the IT is absolutely a facilitating factor, rather than the reason for changes (Lucas, 1992).

The studies show that the computerized IT has resulted in reducing white-collar opportunities and increasing management forces by 17 % and 5 %, respectively (Bidgoli, 1999).

IT can be an appropriate substitute for some managers and management duties. Moreover, since the electronic communications can prove effective in particular affairs, especially in relation to administrative issues, compared to communication by phone or in person, the domain of control for managers will increase. Technology has made it possible to enhance the domain of control and to eliminate the layers in organization (Henry, 1997). As mentioned previously, the IT greatly affects the structure and the design of the organizations and it is necessary for the organizations to make more & more use of IT in order to survive. So, studying the relationship between IT, considering the vast of its role and its increasing use in the organizations, especially upon the organizational structure about dimensions of formality, complexity, centralization is an inevitable requirement at the moment.

2. Interaction between IT and Organization

Information systems and organizations have effects on each other. Information systems have to accompany the organization in order to provide the information needed by special organization's members. On the other hand, the organizations must be aware of the information effects and open their doors to benefit from the innovative technical knowledge. Organizations affect the information systems through decisions made by managers and employees. Perhaps, organizations apply IT to have greater efficiency to, save valuable resources, and to reduce expenses. But, it is not the only reason for applying the information systems. Innovation is the purpose of some organizations and they recognize it as a competitive advantage and they don't even think of direct returns of the expenses in information systems. In some cases, the changes in social and governmental disciplines, rivals' functions, and the functional expenses increase are nice justifications for applying information systems. On the other hand, since the organizations are different, it can be concluded that the IT affects the organizations differently. For instance, computer can't make all organizations flat and the other conditions are needed (Lauden, 2000).

Saadatmandi (2005) conducted a research titled the relationship between IT and organizational structure and the barriers to its establishment it in the Iran Steel national company. The results showed that with increasing application of IT and the other aspects of IT; we witness the new terms, new ideas, and new forms of organization and organizational structures at international level. Nowadays, IT is recognized as the major change factor to fulfill the goals of organizations. We can edit the strategic policies of organizations according to appropriate data and information obtained by IT, in order to meet the organizations' goals. Following the same taken, the results show that there meaningful relationship between IT and all dimensions of organizational structure. Also, there are some recommendations asserting statistical tests, research literatures which highlight the route for the managers.

There are various insights about the relationship between IT and organizational structure, which are summarized as followed:

- i. IT leads to organizational centralization.
- ii. IT doesn't lead to organizational centralization.
- iii. IT has no even effect on organizational control; instead, the other factors determine this relation.
- iv. IT interacts with the organizations in an unpredictable way.
- v. IT makes a new organizational combination possible such as network organizations (Michel, 1998).

There are two approaches about the relationship between IT and centralization. In the first approach, IT makes decision making and organizational control to be centralized. Reif (1968), suggested that IT results in centralizing the control and decision making in organizations, because it facilitates the appropriate transfer of information to higher organization management. In addition, the recent work by Lewit & Whichler extended these agreements in the insurance companies considering the theoretical activities and case studies, where IT resulted in re-centralizing the decentralized authorities of decision making. In another recent work by Reif (1968) findings in three case studies demonstrated the normalizing IT resulted in centralization. However, Reif (1968) suggested that changing the related orientation towards IT centralization, is under the influence of:

- i. Type of processed information
- ii. Reporting the process to managers in hierarchical order during the application of IT.
- iii. Organizational performance in which IT is represented (Reif suggests that the centralization in productive operations more than in marketing ones).

Finally, the study which particularly dealt with the effect of IT on work groups showed that work groups who make use of IT extensively in manufacturing organizations and insurance companies are much more centralized than those which are not using IT. A little while after Lewit & Whichler's theories, several papers were published rejecting the recent ideas about IT resulting in centralization. They stated that IT results in decentralization, because IT performs the repeated decision making process at middle and lower levels of organizational hierarchy. Therefore, the individuals in these levels focus on unrepeated and new issues. The results from studying the employment organizations in the US by Kolinsky revealed a strong relationship between IT and decentralization in decisions related to employment. Belau et al (1976) found that the place of computers in factories was related to decentralization, whilst the place of computers outside the manufacturing factories was related to centralization. So far the place of computers was a proper indicator for accessing the processors and information systems, so the general conclusion was that the presence of computers in factories resulted in decentralizing the authority of decision making company centers to factories managers. These findings were highlighted by another manufacturing industry study. Faghr & Lebis (1977) studied 38 manufacturing companies and controlled the size and environmental properties. The results showed that IT makes the organizations to accept a decentralized structure of decision making (Humer, 1998).

3. Hypothesize

Major Hypothesis:

How much is the relative share of IT in triple dimensions of organization structure (formality, complexity, centralization)?

Minor Hypothesis:

- i. How much is the relative share of IT in the "formality" dimension of organizational structure?
- ii. How much is the relative share of IT in the "complexity" dimension of organizational structure?
- iii. How much is the relative share of IT in the "centralization" dimension of organizational structure?

4. Method

The method of the present study was descriptive-correlative. The statistical population consisted of 466 faculty members, and 80 individuals were selected by random sampling. The tool used for collecting the data was a scholar-made questionnaire about IT and the dimensions of organization structure with 37 items based on 5-point Likert scale, with reliability coefficient of 0.93. The nominal and content validity of questionnaire were determined by the opinions of experts at school of management and educational sciences faculty members in university of Isfahan. The data was analyzed at descriptive level (frequency, percentage, and mean) and deductive level (correlation coefficient, variance analysis, and independent t- test), using the SPSS software version 15.00.

5. Findings

Analyzing the questions revealed the following results:

According to table 1, the correlation coefficient between IT application in University of Isfahan and formality reduction was significant at $p \leq 0.01$. Also, the determination coefficient showed that IT application in University of Isfahan and formality reduction share 0.13 of scores variance. Therefore, there is a relationship between IT application in university of Isfahan and in formality reduction by a correlation coefficient of 0.36.

The correlation coefficient between IT application in Isfahan University and in complexity reduction meaningful was at $p \leq 0.01$. Also, the determination coefficient showed that IT application university of Isfahan and complexity reduction share 0.094 of scores variance. Therefore, there is a relationship between IT application in university of Isfahan and complexity reduction by a correlation coefficient of 0.30.

The correlation coefficient between IT application in university of Isfahan and centralization reduction in decision making was meaningful at $p \leq 0.01$. Also, the determination coefficient showed that IT application in university of Isfahan and centralization reduction in decision making share 0.12 of scores variance. Therefore, there is a relation

between IT application in university of Isfahan and centralization reduction in decision making by a correlation coefficient of 0.35.

According to table 2, the triple dimensions of organizational structure are under the influence of IT application in university of Isfahan. In other words, according to faculty member's viewpoints of in university of Isfahan. IT can influence the triple dimensions of organizational structure of decision making (i.e. complexity, formality, and centralization) in university of Isfahan. The determination coefficient shows that 25% of the changes in scores of triple dimensions of organization structure were under the influence of IT.

6. Conclusion

The purpose of this paper is to show how IT application influences the need for the organizational information processing and organization dimensions in university of Isfahan. This paper deals with the issue of how IT can enable organizations to respond to the demands of information processing, and how IT allows the managers to design organizations with more flexibility and processed data. To access the above results, the obtained data is given as followed:

According to the first question, the correlation coefficient between IT and formality was meaningful at $p \leq 0.01$ level. The relationship rate between two variables $r = 0.363$ indicate the mean and direct correlation between two variables. The results from the first question's answer are compatible with the results of Saadatmandi (2005) and Michel (1998). The more flexible the systems and IT are used in organization, the more the formality will reduce. Flexibility is the ability to cope with the new conditions and terms, the flexible organizations defend themselves against threats from outside and rapidly make use of the created opportunities. In general, technology accelerates information in organizations processing. Technology provides the ability to change the work method and increases the capacity of information processing in the organization. These benefits technology are considered as organization flexibility. Moreover, by distributing the information at organization level, each of the employees has the right to manage his duties. In fact, instead of controlling the employees from the high level managers, the control is extended at organization level. Being given a free hand is necessary for new organizations. The individuals can make decisions about their time and how to work in the accepted framework of organization considering the goals of efficiency and quality indices (Humer, 1999).

The second question analysis showed that the correlation coefficient between complexity and IT is meaningful at $p \leq 0.01$ level. The correlation rate between the two variables was $r = 0.308$, which showed a linear correlation between the two variables. The results from the to the first question answer are compatible with Saadatmandi (2005) and Michel (1998). If the managers want a healthy and balanced organization, they must consider the rate of complexity. What does complexity mean for organization managers? Organization consists of various subsystems, and there are communications and relations, effective coordination, and controlling methods for subsystems to be effective. In other words, increasing the complexity results in more responsibilities for the mangers to make sure that the disperse activities in organizations are performed coordinately and along the goals of the organization. By reducing the complexity of organizations, the need for tools such as committees, computer information systems, and formal annual instructions is reduced. But when a lot of employees in the organization do a piece of organizational work, the administrative hierarchy increases and the above tools are necessary.

The information systems change the future of organizations. The revolution of information reduces the need for middle managers and executive units to gather, analyze, and comment data. The executive units are initially designed for resolving the issues and problems resulted from increasing the size of the organization, complexity of problems, and the need for professional knowledge. But in many organizations, the computers are able to gather and analyze data more rapidly, exactly and more appropriate than what the executive units are able to. It is obvious that all the executive units are not resolved, but the survived units are going to have less power than their predecessors, they serve trade units instead of governing them. Information in itself is not considered as power. In order for it to be used as power, it must be rare. IT is fair as a new form of the power structures by making the information available for higher mangers (Robins, 2000). Applying the advanced IT makes many organizations reduce their various levels of middle management. In other words, IT has created a shortcut in the routes of bureaucracy and hierarchy. Due to easy access and low costs of IT tools, the authorities have been able to access their experts in different organizations. In other words, IT has made the exchange of information between the managers and experts more flexible and non-bureaucratic, so this has been very effective in eliminating the middle management (Ghafurian, 2003).

Analyzing the third question revealed that there was a meaningful relationship between the centralization and IT at $p \leq 0.01$. According to the output from Pierson correlation coefficient of which the meaningful level is 0.001 and r is equal to .0351, it can say that these two variables have a direct and average correlation. The results from the third question's answer are compatible with House (1960), Mann & Williams (1998), and Reif (1968) who believed that IT leads to centralization in the decision making and organizational control and also to centralization of control and decision making in organizations for its ease in transferring the information to the higher management. On the contrary, they were incompatible with the ones from Anshen (1960), Burlingame (1961), Belau (1976), and Faghr & Faghr & Lebisi (1977) who suggested that IT results in decentralization, by taking the responsibility for repeated decision making at middle and lower levels of organizational hierarchy. Therefore, individuals in these levels focus on the unrepeated issues.

According to the investigations, the structure of the organizations which apply IT extensively is much more centralized than the work groups that do not using IT frequently. Considering the management's viewpoint, application of advanced IT can result in centralization or decentralization of their management systems in organizations. The mangers who wish to centralize their systems of decision making can use this technology in order to collect more information and make more decisions. On the other hand, the mangers who wish to decentralize their management systems in organizations can give more information to their employees and the other members of organization and enhance their contribution in decision making process by applying this technology. The philosophy of management and the organization's culture play a major role in determining the consequences resulted from applying this technology (in centralization or decentralization of management structure) (Mehri Nejhad, 2003).

Regarding the studies and results, the problems against developing IT in Iranian organizations can be divided into two categories:

First group: the problem is directly related to the organizations, programs, and the departments involved in IT.

The problems of the first group are:

- i. Misunderstanding of the concepts and the importance of IT
- ii. Lack of an exclusive system to develop IT in the country
- iii. Some missing links in the chain of IT management in the country
- iv. Insufficiency credits for research and development
- v. Insufficiency of educational training in the country

Second group: the problem behind the departments in IT domain such as structural problems existing in the economy

IT development is achieved when the performance of economy sector of the country is in a way that activates the various levels of technology. If the structure of economy is formed so that their function and performance can not encourage creativity and innovation in manufactures, then any activities and policy makers to developing the IT will be void and ineffective.

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Table 1. Correlation coefficient between IT and dimensions organization of structure

	Formality	Complexity	Centralization
Information Technology	r = 0.363 r ² = 0.13 p = 0.001	r = 0.308 r ² = 0.094 p = 0.005	r = 0.351 r ² = 0.12 p = 0.001

Table 2. The results from regression of pure and impure

Source	Standard deviation	Regression coefficient	T value	Determination coefficient	Significant level
Complexity	0.008	0.75	2.24	0.25	0.001
Formality	0.008	0.89	2.33	0.25	0.001
Centralization	0.002	0.55	1.70	0.25	0.001