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The relationship between organizational structure, organizational agility and information and communication technology

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Abstract

The purpose of this study was to examine the mediatory role of ICT¹ in the relationship between organizational structure and organizational agility. The method was descriptive with correlational design. The population was all workers of the Methanol Company of Deir. Since the population was limited, sampling was redundant and the whole population selected as a sample by census. The results of the study showed that organizational structure has a direct and significant relationship with ICT. Organizational structure and ICT have a direct relationship with organizational agility.

Keywords: role, agility, structure, organizational, organizational.

¹ Information and communication technology

La relación entre la estructura organizacional, la agilidad organizacional y la tecnología de información y comunicación

Resumen

El propósito de este estudio fue examinar el papel mediador de las TIC en la relación entre la estructura organizacional y la agilidad organizacional. El método fue descriptivo con diseño correlacional. La población era todos los trabajadores de la Methanol Company de Deir. Dado que la población era limitada, el muestreo fue redundante y toda la población seleccionada como muestra por censo. Los resultados del estudio mostraron que la estructura organizacional tiene una relación directa y significativa con las TIC. La estructura organizacional y las TIC tienen una relación directa con la agilidad organizacional.

Palabras clave: rol, agilidad, estructura, organizacional, organizacional.

1. INTRODUCTION

Nowadays, agility can quickly respond to changes and can be an effective factor in the success and survival of large factories and companies. ICT is one of the most powerful tools for empowering to achieve agility and communication between organizational structures. Interpretative structural development aimed at reaching agility using ICT capabilities. Identification of the indices of reaching agility through ICT, the managers' willingness and commitment, organizational atmosphere and the alignment of strategic planning with ICT plans is an effective factor in achieving agility and communication

between organizational structure through ICT. Khosravipour and Amirnejad (2014) conducted a study entitled “The effect of ICT on organizational agility in public universities of Khuzestan (Case Study: Shahid Chamran University of Ahwaz)”. The results showed no significant differences between the opinions of faculty members with an academic degree, age, and service history regarding organizational agility. There was a relationship between internal and external factors affecting information technology with organizational agility, and external factors had more effect on organizational agility.

Bistoun (2013) conducted a study entitled “Studying the relationship between information technology and organizational structure in the Ministry of Sports and Youth of the Islamic Republic of Iran. The results showed a significant relationship between information technology and organizational structure in the Ministry of Sports and Youth. There is a positive and significant relationship between information technology complexity, formalization, and concentration in the Ministry of Sports and Youth.

Bloom et al. (2010) examined the effects of ICT on organizational structure showing that these technologies have different effects on each level of the organization. Better access to information leads to guidance of decisions towards lower levels of the organization and thus to decentralization and reduction of hierarchy.

Chang (2007) conducted a study entitled “The use of information technology and organizational structure.” The results

showed that the use of information technology directly relates to the interaction between team performances; and when the organizational structure is decentralized and the formality is low, the interaction between team performances is highly desirable.

Over the past two decades, the industrial environment in Iran has faced unprecedented and unpredictable fast changes in technology, market conditions and customer needs. This has made manufacturing organizations face issues such as rapid and unpredictable changes: increasing competition due to technological innovation and turbulent environments. To face these changes, as an inevitable necessity of activity and competition in the global economy, agility is a matter that has entangled the minds of the managers of manufacturing organizations in Iran. Thus, Iranian organizations must be aware of the enablers of agility and learn the path through which agility can be achieved. Giving the necessity of simultaneous achievement of productivity and flexibility in manufacturing organizations to face the customer's changes and enrichment as well as effective role of information technology in this regard, with the aim of helping manufacturing companies, this research intends to present an interpretive structural model of the factors affecting the achievement of agility through information technology. Interpretative structural modeling is an interactive learning process that examines the relationship between the concepts of a problem and creates a comprehensive structure of a complex set of concepts. Besides, determining the priority of the effects of elements on one another, determines the direction and intensity of the relationship between the

elements of a complex set in the hierarchical structure by interpreting the views of a group of experts.

Today, competition for organizational agility and service quality improvement is known as a strategic issue for organizations operating in the service sector. Organizations that achieve a higher level of service quality provide higher levels of customer satisfaction as an introduction to achieve competitive advantage. ICT is as a commodity that can be bought, sold and transmitted, and has a certain life cycle.

The agility of companies along besides other management theories is critical to the success of companies in the turbulent market environment. Rapid technological developments, increasing risks, globalization and privatization expectations are of the environmental features that current business organizations are facing. To succeed in this environment, agility creates a competitive edge that can be preserved with innovation and quality. The agility approach put forward, developed in less than a decade, and is a conscious and comprehensive response to the changing needs of competitive markets and gain success from opportunities.

Thus, the purpose of the present study is to identify the intermediary role of ICT in the relationship between interfaces in the relationship between organizational structure and agility through information technology in manufacturing factories and their relationship in an integrated model.

1.1 Research hypotheses

1.1.1 The main hypothesis

ICT plays an intermediary role between organizational structure and organizational agility.

1.1.2 Sub-hypotheses

1. The organizational structure can predict ICT.
2. The organizational structure can predict organizational agility.
3. ICT can predict organizational agility.

2. METHODOLOGY

The present research was applied in terms of purpose, and correlational regarding methodology. The population of this study was all employees with a Bachelor's degree and higher working in Kaveh Methanol Factory in Deir in 2017. The sample size was 130 subjects (23 women and 107 men) from among the employees and workers of Kaveh Methanol Factory. The present study used census-sampling method due to the limited population and the whole population was selected as the sample. The study used three questionnaires: (A) ICT by Azadmehr with 20 items that measure three aspects of familiarity

with the computer, the Internet, and computer software with Cronbach Alpha of 0.95. (B) Robins' organizational structure questionnaire 2008 with 24 items: question one is related to complexity of organizational structure, questions 8 to 14 are related to formality, and questions 15 to 24 are related to structural centralization. The overall Robins' organizational structure score is obtained from Robins' three-factor aggregate scores and its Cronbach alpha was 70%. (C) Sharifi-Zhang's Agility Questionnaire has 28 items and 5 components, with Cronbach's alpha of 0.92, which measures the organizational agility scale.

2.1 Inferential results

Hypothesis 1: Organizational structure of employees can significantly predict (the uses of) information technology and their relationship

Simple regression analysis was used to test this hypothesis, whose results are shown in [Table 1].

Table 1: Results of regression analysis of ICT according to organizational structure

Criterion variable	Predicting variable	Beta	t	p	R²	R	F	df	p
ICT	Organizational structure	0.194	20.23	0.28	0.038	0.194	4.97	1.127	0.28

Hypothesis 2: Organizational structure of employees can significantly predict their organizational agility

Simple regression analysis was used to test this hypothesis, whose results are shown in [Table 2].

Table 2: Organizational agility regression analysis according to organizational structure

Criterion variable	Predicting variable	Beta	t	p	R ²	R	F	df	p
Organizational agility	Organizational structure	0.306	3.63	0.000	0.094	0.306	13.15	1.127	0.000

Hypothesis 3: (the rate of use) of ICT by the staff can significantly predict their organizational agility

Simple regression analysis was used to test this hypothesis, whose results are shown in [Table 3].

Table 3: Organizational agility regression analysis according to ICT

Criterion variable	Predicting variable	Beta	t	p	R ²	R	F	df	p
Organizational agility	ICT	0.353	4.25	0.000	0.125	0.353	18.08	1.127	0.000

The main hypothesis: (the rate of use) of ICT can play an intermediary role between organizational structure and organizational agility.

Path analysis using hierarchical regression method was used through Baron and Kenny method to test the intermediary role of ICT between organizational structure and organizational agility. [Table 4 and 5] indicate the results of multiple regressions in a hierarchical way to test the intermediary role of ICT in the relationship between organizational structure and organizational agility [Figure 1].

Table 4: Multiple hierarchical regression results for testing the intermediary role of ICT

Step	Variables	Beta	t	p	R ²	R	F	df	p
First	Organizational Structure	0.306	3.627	0.000	0.094	0.306	13.15	1.127	0.000
Second	Organizational Structure	0.247	3.012	0.003	0.183	0.428	14.15	2.126	0.000
	ICT	0.305	3.717	0.000					

Table 5: The direct and indirect effects of ICT in the relationship between organizational structure and organizational agility

Variables	Direct effect	Indirect effect	Total effect
ICT	0.305	-----	0.305
Organizational Structure	0.247	0.059	0.306

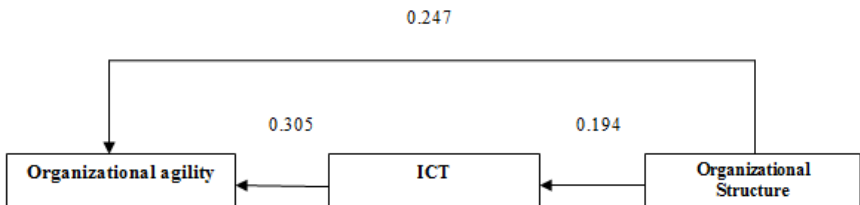


Figure 1: The assumed intermediation model of mediation of ICT in the relationship between organizational structure and organizational agility

3. DISCUSSION AND CONCLUSION OF RESEARCH HYPOTHESES

Hypothesis 1: Organizational structure of employees can significantly predict (the uses of) information technology and their relationship

Simple regression analysis was used to test this hypothesis. The results of the variance analysis test show a significant linear relationship between predictive variable (organizational structure) and criterion variable (ICT), and organizational structure can significantly and directly predict (the use of) ICT.

This finding is consistent with the findings of Bistoun (2013), Damanpour (1987), Bezweek and Egbu (2010) and Bloom et al. (2010) denoting that the effects of ICT on the organizational structure are significant and technologies have different effects on each level of the organization.

In explaining this finding, one can state that information technology is the key to the use of knowledge in the 21st century. The use of ICT today is a guarantor of the survival and continuity of the activities of manufacturing companies and without the use of them, not only it is not possible to use new methods, but also the ability to compete with other companies is not possible. Thus, the organization must be planned to provide sufficient information to the managers of the industrial workshops. In this study, the effect of ICT relationships

and organizational structure not only include a high degree of respect between manufacturing companies and stakeholders such as customers, suppliers of raw materials, and raw materials and employees, but also the excellence of communication and coordination and negotiation by the two sides of the relationship, along with the exchange of knowledge, are about the capabilities of ICT and business needs. Thus, according to the results of the organizational structure of the employees that they can significantly predict the (the use of) their ICT is confirmed.

Hypothesis 2: Organizational structure of employees can significantly predict their organizational agility

Simple regression analysis was used to test this hypothesis. The results of variance analysis showed a significant linear relationship between predictive variable (organizational structure) and the criterion variable (organizational agility) and organizational structure can significantly and directly predict organizational agility.

The results of this hypothesis show that the square of the coefficient of the organizational structure between the predictive variable and the organizational agility variable was 0.094, which means that about 9% of the variance of employees' organizational agility is predicted by their organizational structure. This finding is consistent with the results of Babaian and Rezaei (2014) and Farzaneh et al. (2011) stating that the important factor influencing the organizational structure is organizational structure. In explaining this,

it is said that the design of an appropriate organizational structure can lead to the benefits of agility by focusing on employees and innovation and creativity resulting from their effective collaboration with each other. Thus, enable industrial companies to develop features such as flexibility, high response speeds in the face of environmental changes and responsiveness and appropriate response to predictable and unpredictable changes.

Hypothesis 3: the rate of use of ICT by the staff can significantly predict their organizational agility

Simple regression analysis was used to test this hypothesis. The results of variance analysis showed a significant linear relationship between predictive variable (ICT) and criterion variable (organizational agility), and (the use of) ICT can significantly and directly predict organizational agility. This finding is consistent with the findings of Khosravipour and Amirnejad (2014) and Ghanbari et al. (2014) stating the direct effects of the knowledge management process on organizational agility. The results of Bashuh and Shekastehband showed that architectural, infrastructure, human resources and communication resources aspects are the dimensions of the capability of ICT, and senses, responsiveness and learning dimensions of organizational agility constituents that have a significant relationship between the capabilities of information technology agility is organized by the organization.

In explaining this hypothesis, one can state that as managers and staff experts are more positive about using ICT and communication, they are more determined to use this ICT, and as they are more determined in their decision to use this technology, they will use ICT more. It encourages employees of the organization to use this technology and ultimately increases the organization's agility and performance. Creating communication is another valuable source of ICT communication. Promoting understanding of the elements and factors of ICT in the manufacturing industry chain, increasing and reinforcing mutual trust among members, coordinating common goals, paying attention to sustainable development in manufacturing companies, successful communication among stakeholders are of the corporate technical and business programs.

Agility can also lead to an increase in the quantity and quality of services, reduction in the cost of adverse reactions to change preventing waste of resources, increase in the competitiveness of producers, and increase efficiency and effectiveness. ICT reduces production costs, increases staff revenues, and reduces the various skills needed to communicate with the market. According to this study, ICT leads to power to anticipate the agility of manufacturing companies for expanding response options when unpredictable events occur. Thus, as the results obtained, the use of ICT by the staff can significantly predict their organizational agility.

The main hypothesis: the use of ICT can play an intermediary role between organizational structure and organizational agility

Path analysis using hierarchical regression method was used through Baron and Kenny method to test the intermediary role of ICT between organizational structure and organizational agility. The results of multiple regression analysis using the hierarchical method to test the intermediary role in the relationship between organizational structure and organizational agility were statistically significant at the one percent level. The results of hierarchical regression analysis show that ICT plays an intermediary role between organizational structure and organizational agility.

As the results show, one of the most important reasons for the differentiation of companies is the use of ICT by them in the agility of an organization and organizational structure. According to the results, the use of ICT can play an intermediary role between organizational structure and organizational agility.

In explaining this, one can say that the use of ICT with learning and computer use training, Internet familiarity and familiarity with computer software affects the agility and organizational structure and ensures success and effectiveness of industrial workshops. Agility can implement the structure of change technology, which leads to making important and timely decisions in manufacturing companies that

increase the tolerance of errors in the production process, which is considered a merit.

Organizational agility enhances predicting environmental risk and flexibility in manufacturing companies, which ensures future stability and security. In fact, one can claim that agility in manufacturing industrial companies can quickly respond to market opportunities and threats. Thus, agility can quickly make great changes fast and solve problems more effectively. Thus, it can be said that the use of ICT has a mediating role on agility and can implement multilateral education that is in fact an optimal efficiency. ICT is a significant predictor of the organizational structure of Kaveh Methanol Company. Accordingly, one can claim that the higher the prevalence of ICT in industrial workshops is, the more organizational structure with better control and better performance of employees is done to the highest degree. Thus, the need to pay attention to organizational structure is due to the effect that organizational structure has on all dimensions of the manufacturing companies (Sedaghatpour, 2011).

By creating knowledge-based diagnosis, complexity, formalization and concentration, organizational structure can drive manufacturing companies forward or stop them. Thus, considering the above-mentioned factors, studying organizational structure is necessary for the causes of the success and failure. Private companies and organizations, as open systems, look for high-efficiency economic development. In this case, survival in the environment and desirable efficiency require a kind of coordination within the organization.

Accordingly, for having desirable efficiency, organizations need organizational structure and agility. The last and most important finding shows that ICT plays an intermediary role between organizational structure and organizational agility.

4. PRACTICAL SUGGESTIONS

1- As the results of the first hypothesis approve of the relationship between organizational structure and ICT, the managers of Kaveh Methanol Company are suggested provide the necessary facilities for strengthening ICT and thus make favorable changes in the organizational structure.

2- As in the results of the second hypothesis, a relationship was found between agility and organizational structure, it is suggested that the managers of various organizations, especially Kaveh Methanol Company, follow organizational agility through changes in the organizational structure by holding scientific meetings experts by inviting experts of management as well as the formation of special in-service workshops.

3. As the results of the third hypothesis showed a clear relationship between ICT and agility, it is suggested using appropriate techniques for communication technology transfer equip the methanol production technology with the excellent technology and training the people appropriately.

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