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Study on the Impact of IMs Components on the Efficiency of Smart Schools (Case Study: provinces of Tehran, Isfahan and Alborz)

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Abstract: *The recent advances in information and communication technology have led to a huge transformation in educational system and the emergence of smart schools. The components of information management systems [IMS] may play an effective role in the efficiency of smart schools. This paper aims to determine the impact of IMS components on the efficiency of smart schools in the provinces of Tehran, Isfahan and Alborz. This research was conducted by descriptive-correlational method. The statistical population consists of all personnel of smart schools in the provinces of Tehran, Isfahan and Alborz. 755 people were selected by random stratified sampling method. The required data was collected by Nonaka and Takeuchi IMS Questionnaire, Jahed Organizational Efficiency Questionnaire, Robbins Organizational Culture Questionnaire, and Data Technology and Organizational Management Assessment Questionnaire. The data was analyzed by SPSS 21 and LISREL software package using structural equations and path analysis methods. The results indicated that IMS components were associated with technical and managerial factors, the component of organizational culture was associated with organizational efficiency, and technical and managerial factors were associated with organizational efficiency. The data had a good fitness with factor construct and theoretical underpinnings of the study, which confirmed that the questions were in line with theoretical constructs.*

Keywords: *IMS, Efficiency, Organizational Culture, Technical and Managerial Factors, Smart Schools.*

INTRODUCTION

With the ever-increasing educational needs of the society and the insufficient educational space and physical equipment, the social system is seeking an alternative method for providing educational services to people. Higher education system, as a subdivision of social system, always attempts to provide alternative educational services, transform teaching-learning process, and transfer knowledge and skills to students.

The recent advances in information and communication technology have led to the emergence of a new educational method, which is called smart school. In this modern method, teaching - learning process is organized and educational performance is evaluated by an institute with high flexibility so that all people are provided with equal educational opportunities, accessibility problems [geographical distance in particular] are eliminated, all people access to independent learning in all levels, and suitable solutions are provided for using educational technologies, multimedia systems, and information and communication technology (Botha et al., 2014). Today, the majority of higher education specialists believe that schools, as the main educational

centers in any society, have to transform their teaching-learning process, develop the culture of sharing knowledge, and utilize IMS solutions in order to face the challenges of the modern age. The biggest challenge faced by IMS lies in cultural problems, not technical issues.

Organizational culture plays a significant role in the development and sharing of knowledge and facilitation of IMS execution process in schools. IMS means the process of creative and efficient use of all knowledge and data accessed by an organization for the benefit of client and, consequently, for the benefit of the organization itself, or, in other words, the process of changing tacit knowledge to applied knowledge.

In order to develop knowledge into competitive advantages, organizations have to develop a cultural environment in which the knowledge and data can be shared, managed and used.

Knowledge plays an effective role in the achievement of competitive advantages and collective resources. The recent years have seen the emergence of numerous approaches in the field of IMS.

Knowledge is a valuable asset which enables to preserve cultural heritage, learn new subjects, solve issues and problems, develop competition cores, and find new opportunities for individuals and organizations (Noruzy et al., 2013). In organizations, knowledge manifests not only in the form of papers and documents but also in the form of processes, functions, and organizational norms (Noruzy et al., 2013).

Smart schools organize teaching-learning process through suitable solutions for utilizing educational technologies, multimedia systems, and information and communication technologies, with a view to providing independent learning facilities and educational evaluation services and establishing a reciprocal relationship between teachers and learners who are distant from each other in terms of time and location (Noruzy et al., 2013).

All smart schools share the feature of removing the time and geographical distance between teachers and learners and meeting the educational needs of various groups with different ages, without any need to attend in a physical class or location. In order to satisfy the educational needs of people in a modern society, therefore, a fundamental transformation in educational system is inevitable. In Iran, smart schools officially began their activity (Aggestam, 2015).

While organizations possess a large amount of data and knowledge and utilize modern information and communication technologies, they do not provide the applicants with a sufficient amount of data. IMS is an efficient solution for enhancing the efficiency of organizations. If different sectors collaborate on innovation processes, effective steps can be taken for the proper and timely transfer of knowledge to researchers and managers.

Schools and educational and research centers have the biggest share in the development and dissemination of knowledge given their educational missions. In other words, schools have the biggest role in the institutionalization of IMS in the society. Development of educational system in general and promotion of educational services through smart schools in particular are extremely important as this would pave the way for economic and social development.

The qualitative and quantitative development of smart schools and the formation of modern approaches in the management of smart schools would call for a particular attention to IMS as a necessary element in the achievement of goals defined by schools, particularly smart ones.

Considering the modern approaches developed in the central administration of smart schools, IMS should be paid a particular attention as it can help to achieve the goals set by smart schools.

In line with this objective, the present study attempts to develop an insight into smart schools in scientific terms and explore the impact of IMS components on the efficiency of smart schools in Tehran province and their branches in other cities. Moreover, the findings of this study may provide the concerned managers with an insight into the conditions of IMS components in smart schools, which can be useful for future planning in such schools. The main goal of this study is to determine the impact of IMS components on the efficiency of smart schools.

Main Hypothesis of Research:

IMS affects the efficiency of smart schools.

Sub-Hypotheses:

1. IMS component is associated with the components of organizational culture.
2. IMS component is associated with technical and managerial factors.
3. The component of organizational culture is associated with organizational efficiency.
4. Technical and managerial factors are associated with organizational efficiency.

Research Method

This research was conducted by descriptive-correlational method. The statistical population consists of all personnel of smart schools in the provinces of Tehran, Isfahan and Alborz during a specified time period from January to March 2017. We selected 755 people [248 people in Tehran, 242 people in Alborz, and 265 people in Isfahan] from among the personnel of smart schools in the provinces of Tehran, Isfahan and Alborz using random stratified sampling method. The required data was collected by the following questionnaires:

A. Nonaka and Takeuchi IMS Questionnaire: This questionnaire has six components of knowledge identification, knowledge acquisition, knowledge development, knowledge use, knowledge sharing, and knowledge maintenance, with symbols I1 to I6, making a total of 36 questions. This questionnaire has been normalized by Allameh (2007) in Iran and its reliability has been confirmed with a Cronbach's Alpha of 0.85.

B. Jahed Organization Efficiency Questionnaire: This questionnaire has nine components of ability, recognition, support, motivation, performance feedback, decision validity, compatibility with natural factors, participation and education, with symbols E1 to E9, making a total of 41 questions. The validity and reliability of this questionnaire has been confirmed by Jahed (2006) with a Cronbach's Alpha of 0.87.

C. Robbins Organizational Culture Inventory: This questionnaire has 56 questions divided into nine components with symbols C1 to C9, using a 5-point Likert spectrum [very high, high, average, low and very low]. The questionnaire has a good theoretical framework and its content validity has been confirmed by Noori (2007). The reliability of the questionnaire has been confirmed by Noori with a Cronbach's Alpha of 0.82 for the entire questionnaire.

D. Data Technology and Organizational Management Assessment Questionnaire: This questionnaire is a researcher-made questionnaire consisting of 13 questions based on hypotheses. The questions relating to technical factor have symbol T1 [questions 1-7] and the questions relating to managerial factor have symbol M1 [questions 8-13]. The validity and reliability of this questionnaire have been established by the researcher. The validity has been confirmed by guiding and advising professors and the reliability has been confirmed with a Cronbach's Alpha of 0.80.

We carried out the inferential analysis using confirmatory factor analysis tests, structural equations, and one-sample t test in order to confirm or reject the research hypotheses and find the special relationships between the variables.

Results

We analyzed the questionnaire structure and identified the constituents of each structure using confirmatory factor analysis. The results of confirmatory factors analysis have been summarized in the following tables. The loading factor relating to model structures were tested in an error level of 5%. All loading factors were significant in the confidence level of 95% and had a significant share in the measurement of structure.

The index with higher loading factor has a biggest share in the measurement of relevant structure. The research model was validated using confirmatory factor analysis and structural equations. To answer this question, 2 statistic and other criteria for the goodness of fitness should be investigated.

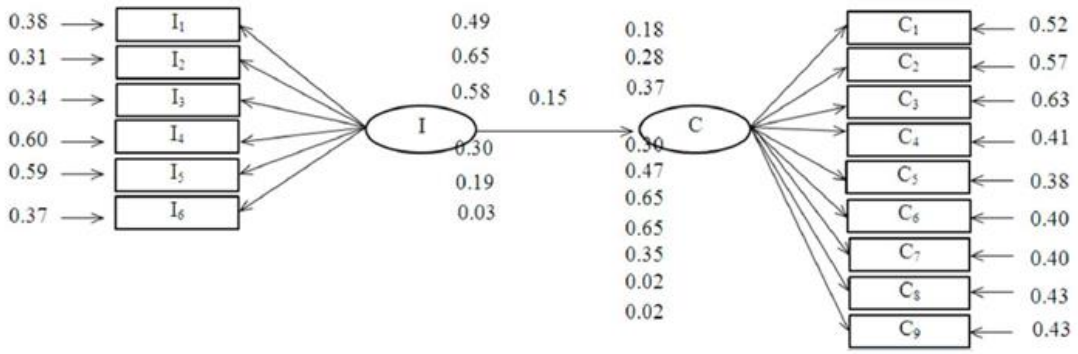

Figure 1: The main model of research for the estimation of standard coefficients of subhypothesis 1

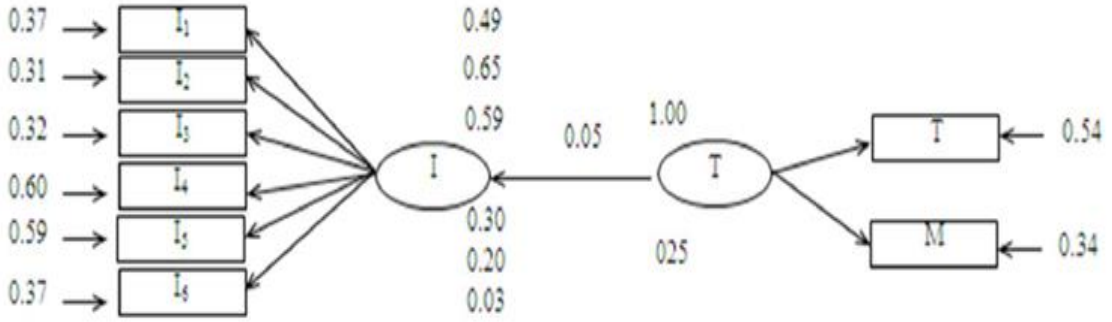

Figure 2: The main model of research for the estimation of standard coefficients of subhypothesis 2

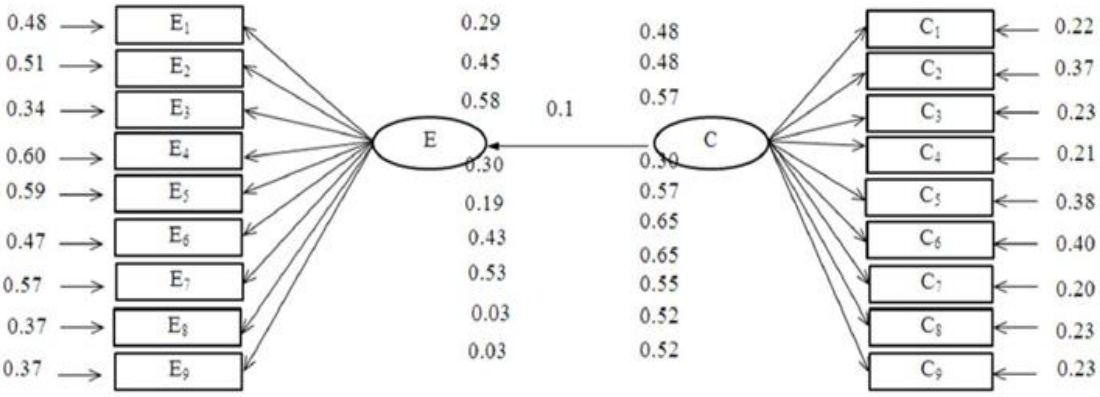

Figure 3: The main model of research for the estimation of standard coefficients of subhypothesis 3

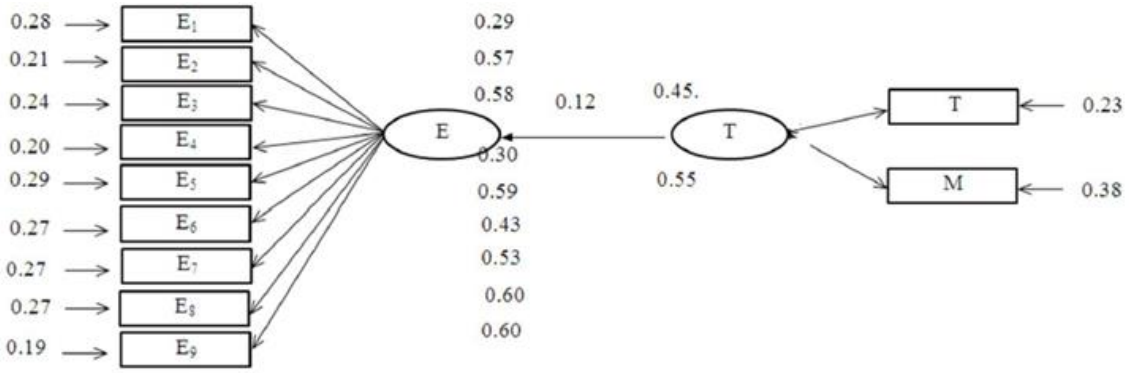

Figure 4: The main model of research for the estimation of standard coefficients of subhypothesis 4

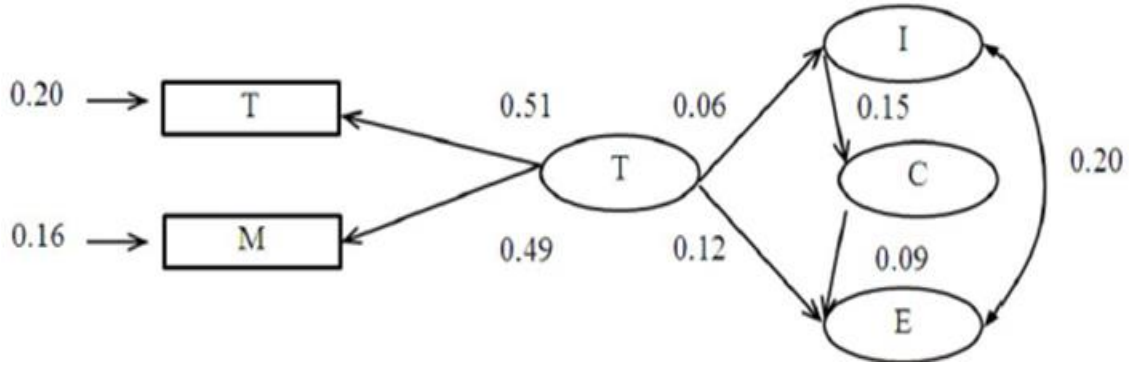

Figure 5: The main model of research for the estimation of standard coefficients of main hypothesis

Figures 1-4 illustrate the model of structural equations of the research for the main hypothesis and four sub-hypotheses in the mode of estimation of standard coefficients. All variables of this model are divided into two categories: manifest variables and latent variables. Manifest or observable variables [rectangle] are directly measured by researcher, while latent or nonobservable variables [oval] are not directly measured but are inferred by the relationships or correlations between the measured variables.

Invisible variables denote a series of theoretical structures such as abstract concepts which are not directly visible but are produced and observed through non-observed variables. Latent variables in turn are divided into two groups: endogenous or downstream variables and exogenous or upstream variables. Each variable in structural equations model may be considered both endogenous and exogenous. Endogenous variable is a variable which is affected by other existing variables in the model. By contrast, exogenous variable is a variable which is not affected by other variables present in the model but affects other variables. In this model, the variables of language, value and attitudes, religion, social organizations, material culture, education and technology are exogenous variables [independent] and the variable of mixed marketing strategy is endogenous variable [dependent].

In this figure, numbers or coefficients are divided into two groups: The first group is measurement equations which indicate the relationships between the latent variables [oval] and manifest variables [rectangle]. These equations are called loading factor. The second group is structural equations which indicate the relationships between manifest and latent variables and are used for testing the hypotheses. These coefficients are called path coefficient. Based on the loading factors, the index with the biggest loading factor has a bigger share in the measurement of the related variable and the index with smaller coefficients has a smaller share in the measurement of related structure.

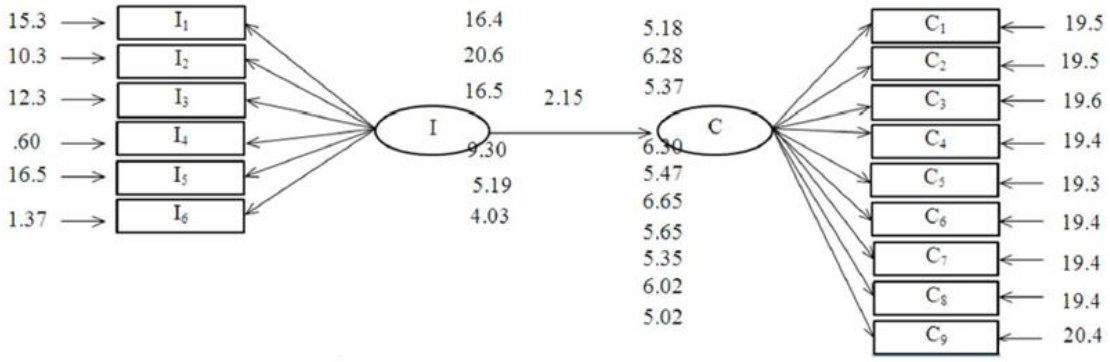

Figure 6: Structural equations model for hypothesis 1 in significance mode [t-value]

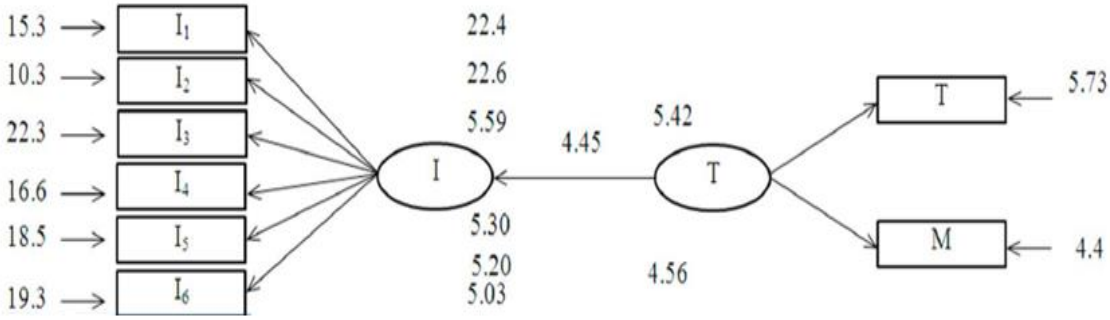

Figure 7: Structural equations model for hypothesis 2 in significance mode [t-value]

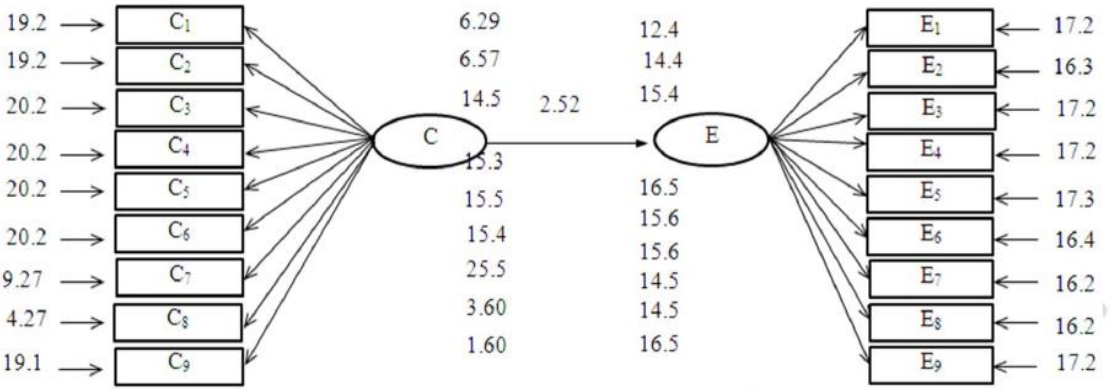

Figure 8: Structural equations model for hypothesis 3 in significance mode [t-value]

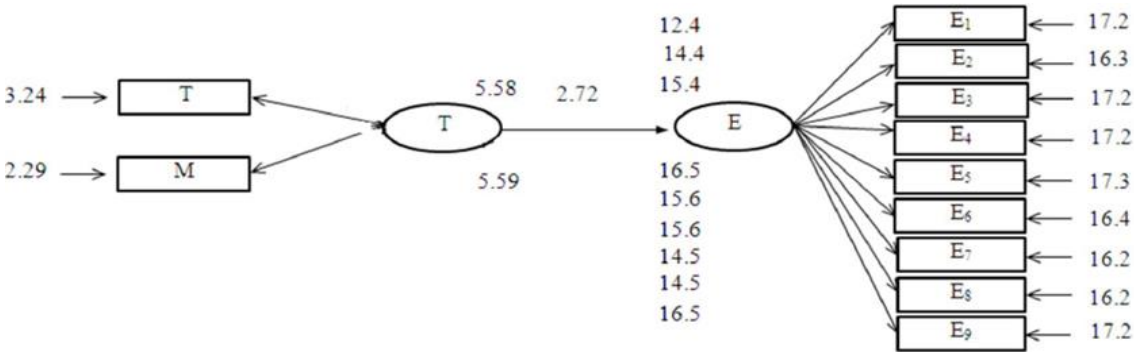

Figure 9: Structural equations model for hypothesis 4 in significance mode [t-value]

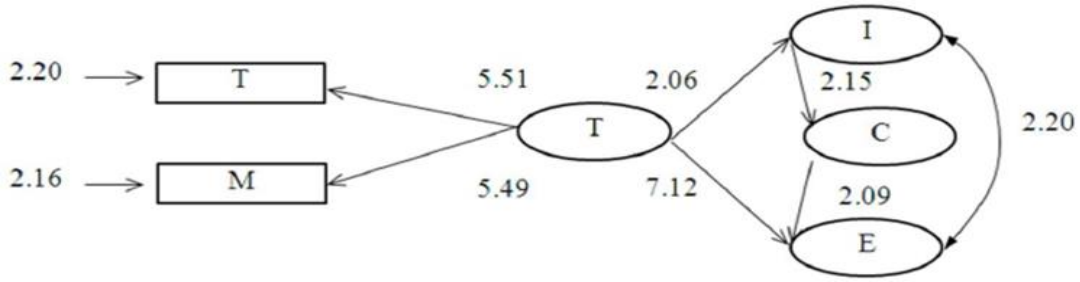

Figure 10: Structural equations model for the main hypothesis in significance mode [t-value]

Figures 6-10 illustrate the structural equations model for the main hypothesis and four subhypotheses in significance mode of the coefficients [t-value]. This model tests all measurement equations [loading factors] and structural equations using t statistic. Based on this model, path coefficient and loading factor are significant in the confidence level of 95% if the value of statistic t is not within the range of 1.96 to -1.96. The model indicates that all loading factors are significant in the confidence level of 95%.

T value of each loading factor for each index with latent variable is bigger than 1.96, which confirms the validity of the questions for the measurement of concepts. In other words, the results contained in the above table indicate that the questionnaire has properly assessed the items intended by researcher. Therefore, the relationships between structures or latent variables are reliable. In order to determine how much the obtained values conform to the existing realities in the model, fitness indices need to be studied. Figure 11 illustrates model fitness indices of the sub-hypotheses. The red line shows the permissible limit, upward sign means "higher than" and downward sign means "lower than".

[a] [b]

[c] [d]

[e]

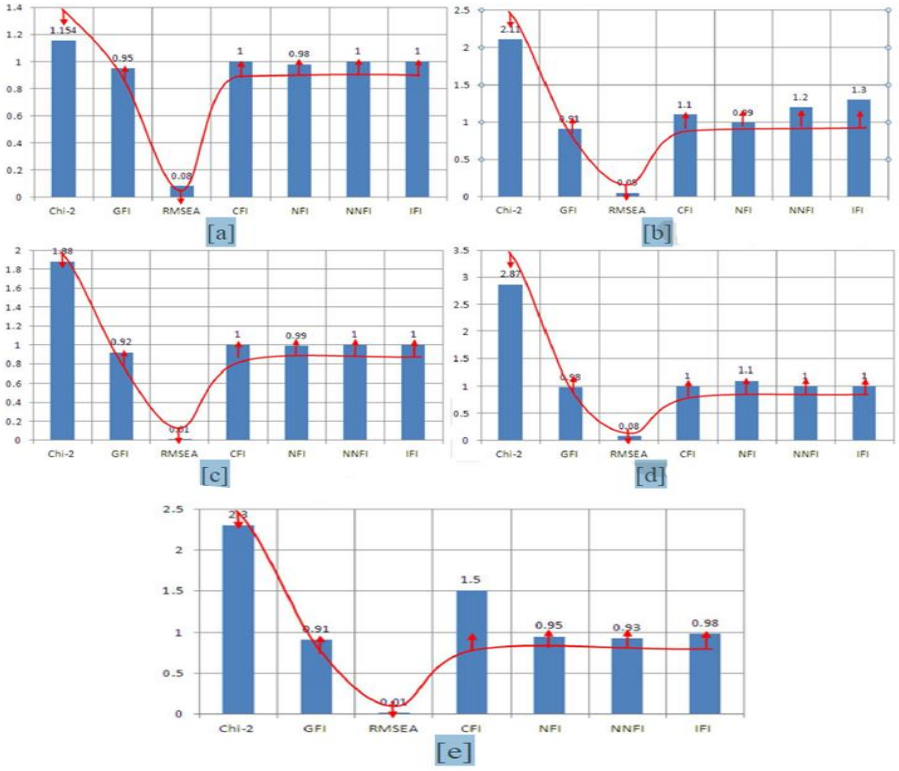

Figure 11: Model fitness indices of the sub-hypothesis 4; the first figure illustrates the subhypothesis model and the last figure illustrates the main hypothesis model

T values of each loading factor for each index with latent variable are bigger than 1.96, which confirms the validity of the questions for the measurement of concepts in this step [Table 1].

Table 1: Path coefficients and t statistic

Sub-Hypotheses	Path Coefficient [β]	T Statistic
IMS component is associated with the components of organizational culture.	0.15	3.25
IMS component is associated with technical and managerial factors.	0.05	4.41
The component of Organizational culture is associated with organizational efficiency.	0.10	2.51
Technical and managerial factors are associated with organizationl efficiency.	0.13	2.79

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0.10 2.51 Technical and managerial factors are associated with organizational efficiency.
0.13 2.79
The path coefficients and t statistics contained in Table 1 are significant, which means that IMS component is associated with the components of organizational culture.

Discussion and Conclusion

The results indicated that IMS promotes the efficiency of smart schools, which is in line with the findings of (Tseng et al., 2014; Meihami and Meihami, 2014; Donate et al., 2015; Galliers and Dorothy, 2014; Cassidy, 2016).
IMS means the process of creative and efficient use of all knowledge and data accessed by an organization for the benefit of client and, consequently, for the benefit of the organization itself, or, in other words, the process of changing tacit knowledge to applied knowledge. Based on this definition, IMS is able to promote the organizational efficiency in various ways.
Culture means the values shared by all individuals of a group. This group may be a family, an organization, or a country. The important role of culture in the society has long been recognized, but organizational culture is a new topic in management literature.
We have to bear in mind that good culture or bad culture is meaningless. Organizational culture should be aligned with organizational mission and strategies. The evaluation of organizational culture should be based on how much it is aligned with organizational duties and tasks.
Organizational culture is a double-edged sword. On the one hand, it provides a context which facilitates the achievement of organizational goals. One the other hand, it may act as a barrier to changes and reforms. The modification of organizational culture [if needed] depends to a great extent on the education of changer team. The use of modern technologies, therefore, plays an important role in the promotion of organizational culture (Hu et al., 2015).
The results of this study indicated that IMS component was associated with technical and managerial factors. Paper (Magelssen et al., 2015) studied the role of IMS in the environments equipped with electronic systems. They reported that despite the considerable advances in information and communication technologies, some organizations have completely forgot to use such technologies or are very slow in making decisions about the use of modern technologies, but some managers are always seeking to use the most recent technologies in the

world of business. Nevertheless, it seems that many organizations tend to overlook the human and organizational impacts of such technologies (Filatotchev and Chizu, 2014). The potential capabilities of modern technologies may be considered a potential source of weakness for organizations, because some managers are unable to utilize these technologies or to use the opportunities created by them. In order to solve this problem, managers need to understand the capabilities of these technologies in business areas and the possibility of using their advantages and should attempt to change their mentality with respect to the management.

Given the high level of security offered by modern technologies, it is extremely important to understand the accurate relationship between modern technologies and information systems and how to guarantee the survival of a business. The specialization of activities may lead to the loss of organizational knowledge due to transfer or dismissal of personnel (Noori, 2007). In the beginning, IMS used to be considered only a technology and treated only from a technological point of view, but organizations gradually realized that mere data management was not sufficient for optimal use of personnel's skills. Man plays a central role in the development, execution and success of IMS and this human factor distinguishes IMS from similar concepts such as data management.

The results of this study confirm that technical and managerial factors are associated with organizational efficiency. The same has been reported by (Bajdor et al., 2014) who studied a model for IMS implementation process based on organizational learning in Iran Khodro Company. Paper (Kirigia et al., 2015) conducted an empirical study and reported that socialization had an obvious impact on knowledge development process if a company would give importance to human strategy. They reported that a company would produce far better results if it gives equal importance to both strategies.

Strategies with human and system origin are efficient strategies which may affect IMS activities.

In developing countries like Iran, administrative system plays a special role due to the constraints caused by the lack of skilled workforce. Perhaps the existing physical resources can be properly used by selecting and using the efficient technical and technological methods, but it is not easy to make optimal use of human resources, enhance personnel motivation, and develop teamwork spirit.

The performance of public management system depends on the structure, role and function of human resources and the amount of its adaptability to the needs and demands of the society.

Therefore, the improvement of human resources should be one of the major goals in any country, organization or institution and entails an accurate and proper planning (Hwang et al., 2015). We should bear in mind, however, that there exists no comprehensive management method to be pursued by all managers. Any manager should find out based on his or her talent, experience and studies that which method is the right one in what place, in what time, in what way, and for what people.

However, it is the management that makes decision about human resources, work method, organization, personnel policies, planning, finance, budget, and so on. Each of these items may systematically affect the organizational efficiency. Management is a major problem in the administrative system of Iran as it lacks stability and cohesion and has a very short age.

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