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Designing a Novel Educational Structure for Organizational Commitment Using a Fuzzy Model (Case Study: Faculty Members of Iran's Open Universities)

M. Arab Sadeghabadi[1,*]

[1] Master's Program in Organizational Design, Department of Public Management, Faculty of Management, Islamic Azad University, North Tehran Branch, Tehran, Iran

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ABSTRACT

In today's complex and competitive world, organizations encounter critical challenges that directly influence their survival and long-term growth. This study addresses the design of a novel educational structure aimed at fostering and enhancing organizational commitment among faculty members of Iran's Open Universities. To achieve this objective, a fuzzy modeling approach was employed as a robust analytical tool for evaluating the relationship between educational factors and organizational commitment. The findings revealed a significant and positive correlation between the proposed educational structure and overall organizational commitment. Specifically, the analysis demonstrated that subdividing inputs into distinct dimensions teaching–learning processes (0.761), management skills and expertise (0.801), educational assessment (0.692), educational vision and mission (0.818), and job satisfaction (0.770) had notable impacts on strengthening commitment levels. Among these, educational vision and mission, together with management skills and expertise, were identified as the most influential predictors of faculty commitment. These results highlight the importance of strategic foresight in educational leadership, suggesting that managers with clear visions and strong professional competencies are more capable of shaping faculty engagement and contributing to the sustainable success of academic institutions.

1. INTRODUCTION

Utilizing capable human resources for renewing and developing organizational knowledge has become a fundamental issue for today's organizations. Long-term success of knowledge-oriented organizations relies on the quality of human capital focused on knowledge [1]. The main objective of knowledge-oriented organizations is to provide innovative goods and services based on new knowledge. The role of knowledgeable employees as the most essential assets for innovation is undeniable [2]. Therefore, organizations strive to design a suitable framework and model for knowledge employees. Hence, continuous improvement of the roles and responsibilities and meeting the

* Corresponding Author: moh.arab1987@gmail.com
Master's Program in Organizational Design, Department of Public Management, Faculty of Management, Islamic Azad University, North Tehran Branch, Tehran, Iran

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expectations arising from rapid changes are inevitable for universities to analyze and cope with new paradigms and challenges. Recently, many countries have undergone significant restructuring in their higher education systems to increase their competitive advantage and enhance their position in the global market. One of the key factors in the success of organizations is organizational commitment. Organizational commitment is recognized as an influential factor in employee motivation and performance, significantly affecting organizational performance and success. Therefore, designing an appropriate educational structure that contributes to the creation and strengthening of organizational commitment is of great importance. In this regard, the design of a novel educational structure can be used as an effective solution for the creation and strengthening of organizational commitment. This study focuses on faculty members of open universities in Iran. Faculty members play a crucial role in the educational and research performance and development of these organizations. Therefore, strengthening organizational commitment among faculty members can improve the performance and effectiveness of these organizations. In this study, a fuzzy model is used as an effective tool in designing an educational structure. The fuzzy model, as a powerful analytical method, has the ability to model ambiguity and uncertainty and can be used as a suitable solution for complex problems.

2. LITERATURE REVIEW

Parsa and Ahanchian (2020) conducted a study on the representation of the scientific structure of the educational management field based on the lived experience of faculty members. The present research aims to describe the phenomenon of the scientific structure of educational management from the perspective and interpretation of professors in this academic field. Data analysis was carried out through semi-structured interviews using a descriptive phenomenological research approach and employing the seven-step Kvale analytical method. The results indicated a lack of consensus among faculty members regarding the scientific structure of the educational management field. The academic identity of the field was found to have different dual perspectives in three sections: theoretical foundation, interdisciplinary nature, and the domain of the field [3].

Heydari et al. (2017) investigated the relationship between organizational justice, job satisfaction, and organizational commitment among faculty members at Isfahan University. The study aimed to determine the relationship between organizational justice, job satisfaction, and organizational commitment. The sample included all faculty members of Isfahan University, and 230 individuals were selected randomly as the sample. The research method was correlational, and data were collected using three questionnaires: Niehoff and Moorman's (1993) organizational justice questionnaire, Shuffler's (2006) job satisfaction questionnaire, and Allen and Meyer's (1990) organizational commitment questionnaire. The reliability of the organizational justice questionnaire was 0.88, job satisfaction was 0.92, and organizational commitment was 0.88. The study concluded that the more managers pay attention to justice and fairness in the university, the more employees work with enthusiasm and commitment, leading to the effective achievement of the university's goals [4].

Beesoti et al. (2018) investigated the training of university staff for the change of direction in curriculum programs. The study aimed to present a professional development experience for higher education university staff within the framework of an international Tempus project that focuses on redirecting university curriculum programs for sustainable development. The project involved a curriculum review to transform sustainable development principles into university courses. The results provided evidence that the curriculum review provided participants with an opportunity to discuss various principles, teaching methods, educational processes, and teaching methods for Education for Sustainable Development (ESD) [5].

Mofarrah et al. (2013) examined instructors' perceptions to improve teaching performance by changing their teaching roles and the impact of these beliefs on their performance. Mofarrah et al. (2014) evaluated the impact of demographic factors on instructors' beliefs in teaching, indicating a weak effect of demographic factors on instructors' teaching beliefs [6].

Meyer et al. (2007) demonstrated that organizational justice, especially interactive and procedural justice, is a significant predictor of organizational commitment. Moon et al. (2008) argued that organizational justice in its procedural and distributive dimensions has a positive relationship with the acceptance of costs in the organization. Bowler and Brass (2006) in the United States studied the perspective of 141 employees in a social network and

found that working in a social network played a role in the acceptance and execution of organizational citizenship behavior.

3. METHODOLOGY

This research is considered practical in terms of its objective. The research aims to understand complex behavioral patterns through studying the correlation between these patterns and assumed variables. This approach is particularly useful when the goal is to explore relationships between variables that have not been studied before. The statistical population of this research consists of 420 faculty members from various universities in the country. The sample size for this research, according to Morgan's table, is 201 individuals. The required data was collected through in-person questionnaires and made available.

Two separate questionnaires were used to analyze the data for faculty members. The analysis of the obtained data was conducted in two dimensions. First, from a descriptive statistical perspective, an examination of the demographic characteristics of the sample population was carried out, considering factors such as gender, age, education, and respondents' work history. In the second dimension, inferential statistical analysis was performed to investigate the relationships between the research variables.

To examine the relationships between the research variables, an initial validity test was conducted on the research criteria using confirmatory factor analysis. Subsequently, based on structural equation modeling in the MATLAB environment, the research model was developed. Structural equation modeling is an analytical procedure that has seen increased application in recent decades, indicating a convergence of relatively independent research tools in psychology, biology, sociology, and macroeconomics, among many other sciences.

4. MEASUREMENT MODEL ANALYSIS

Table 1. represents the correlation matrix between the variables of the study in the structure of the innovative educational system.

6	5	4	3	2	1	
					1.000000	Organizational commitment
				1.000000	0.385080	Teaching-learning process
			1.000000	0.556127	0.383209	Management skills and expertise
		1.000000	0.559844	0.408579	0.476773	Educational evaluation
	1.000000	0.564997	0.606762	0.501130	0.343853	Vision and mission of education
1.000000	0.718978	0.784363	0.729988	0.622488	0.547623	Job quality

Based on the results of the correlation coefficients, it can be stated that at a 99% confidence level, there is a significant positive relationship between the factors of the educational structure and organizational commitment. To analyze the internal structure of the questionnaire and identify the constituent factors of each construct or latent variable, confirmatory factor analysis is employed. Additionally, in this section, using confirmatory factor analysis, the measured equations related to each construct (latent variable) are extracted and interpreted (Khan Mohammadi Ataqsara, 2009).

Confirmatory factor analysis is presented as follows for the research constructs:

Table 2. presents the factor loadings of the variables in the structure of the innovative educational system.

	Teaching-learning process	Management skills and expertise	Educational evaluation	Vision and mission of education	Job quality
q1	0.807258				
q2	0.803716				
q3	0.678009				
q4	0.709584				
q5	†	0.606972			
q6		0.803978			
q7		0.874674			
q8		0.785252			
q9			0.707966		
q10			0.704992		
q11			0.825604		
q12			0.622264		
q13				0.637047	
q14				0.857614	
q15				0.834574	
q16				0.762051	
q17					0.688121
q18					0.864162
q19					0.822943
q20					0.730120

All factor loadings are statistically significant at a 99% confidence level. The results of the confirmatory factor analysis for the structures of the variables in the innovative educational system are summarized in Table (2). The factor loadings related to the structures of the innovative educational system variables have all become statistically significant at a 99% confidence level. The results indicate that the studied constructs are valid and have high reliability, as all factor loadings are statistically significant at a 99% confidence level and contribute significantly to the measurement of the intended construct.

Table 3. presents the factor loadings for the organizational commitment variable.

	finance	Faculty	Internal processes	Growth and learning
q34	0.695192			
q35	0.621701			
q36	0.646561			
q37	0.790113			
q38		0.669508		
q39		0.648289		
q40		0.652665		
q41		0.803507		
q42			0.789758	
q43			0.692842	
q44			0.811967	
q45			0.727076	
q46				0.781113
q47				0.723018
q48				0.749196
q49				0.819223

All factor loadings are statistically significant at a 99% confidence level. Results of the relationship between the structures of the innovative educational system and organizational commitment are presented in Table (4) using Pearson correlation coefficient.

Table 4. Pearson Correlation Coefficient Statistics

P-Value	Pearson statistic value	Variable
0.000	0.648	Factors of modern educational structure and organizational commitment

In the above table, the relationship between the relevance of the innovative educational system structure and organizational commitment is measured. As observed, considering the Pearson correlation coefficient value of 0.648 and the obtained significance level less than 0.01 (P-Value < 0.01), it can be acknowledged that the relationship between the variables is statistically significant at a 99% confidence level. In other words, the null hypothesis is rejected, and the alternative hypothesis is accepted. Therefore, there is a significant and positive relationship between the factors of the innovative educational system and organizational commitment. Additionally, the Pearson correlation coefficient indicates that the relationship between the two variables is relatively strong and positive. In other words, the innovative educational system factors are almost 65% directly related to the increase in organizational commitment. Therefore, the innovative educational system factors can contribute to increasing organizational commitment by approximately 65%.

5. REGRESSION METHOD

To examine the effects of independent variables and identify the fitted model, the regression analysis method has been utilized. One of the conditions for using regression analysis is the lack of correlation between errors. In other words, if the assumption of independence of errors is rejected, and the errors are correlated, regression cannot be used. To determine this, the Durbin-Watson test is employed, where the independence of errors (the difference between actual and predicted values by the regression equation) is determined. Thus, we have:

Table 5. Durbin-Watson Test:

Watson's camera stats
model 1.877

The Durbin-Watson statistic should fall within the range of 1.5 to 2.5 Here, the obtained value is 1.877, which is within the acceptable range (1.5 to 2.5). Therefore, the assumption of independence of errors is not rejected, and regression analysis can be applied.

Table 6. Residual Statistics:

Standard deviation	Average	The most	The lowest	
1	0.000	5.845	-0.862	Standard predicted value
0.962	0.000	2.307	-2.736	Standard residual value

This table provides estimates of residuals, representing the differences between the observed and predicted values of the dependent variable. Residuals are essentially the error estimates in the model. If the model fits the data well, residuals should follow a normal distribution. Additionally, the standardized predicted values and standardized residuals should have a mean of zero and a standard deviation of one. This holds true for the current model, where all variables entered the model simultaneously without specific order or blockage.

Table 7. Summary of Regression Model:

Modified	Coefficient of explanation	Multiple correlation coefficient
0.629	0.667	0.817

This table outlines the relationships between the (Innovative Educational Structure) and the (Organizational Commitment) variable. The multiple correlation coefficient (R) for independent variables with the dependent variable (Organizational Commitment) is approximately 0.817. The coefficient of determination (the effect and prediction) for independent variables is nearly 0.667, and the adjusted coefficient of determination, based on the degrees of freedom, is 0.629. In other words, the impact of innovative educational structure factors on organizational commitment is approximately 67%. This value indicates a relatively strong coefficient, demonstrating the relative efficiency of the model.

Table 8. Analysis of Significant Level of Determination Anova:

Sig	F- statistic	Mean squares	Degree Of Freedom	Sum Of Roots	Model
0.000	66.233	10.972	4	43.88	Explained (regression)
		0.166	50	8.284	Leftovers
			54	52.172	Total

Considering the F-statistic values and the significance level smaller than 0.05 (sig < 0.05), we conclude that the relationship is statistically significant at a 99% confidence level. In other words, there is a significant relationship between innovative educational structure factors and organizational commitment. Therefore, the null hypothesis is rejected, and the research hypothesis is confirmed. Consequently, a meaningful relationship exists between innovative educational structure factors and organizational commitment

Table 9. Regression Weights:

Sig	T value	B standard	B Non-standard	Model factors
0.058	-1.940	-	-0.81	Fixed coefficient
0.039	2.116	0.181	0.796	Factors of the modern educational structure and organizational commitment

In this table, the standardized and unstandardized coefficients (betas) for each variable on the dependent variable (organizational commitment) are presented along with their t-test values and observed significance levels. The beta coefficients represent the standardized impact of each independent variable on the dependent variable, while the t-values provide a measure of how strongly each variable predicts the dependent variable. Based on these coefficients, the regression equation for predicting the increase in organizational commitment can be expressed in terms of the independent variable and the constant term.

Standardized coefficients indicate the relative strength of the predictors in terms of standard deviations, facilitating comparison of the impact of different variables.

6. FUZZY LOGIC SYSTEM

Given the complexity of the surrounding world, accurately determining the governing relationships is often challenging. Therefore, we resort to approximate descriptions by utilizing fuzzy logic systems. The foundation of fuzzy logic is based on the theory of fuzzy sets, a generalization of classical set theory in mathematics.

In classical set theory, an element is either a member of a set or not, adhering to a binary pattern of 0s and 1s. However, fuzzy set theory extends this concept, introducing the notion of graded membership. This means that an

element can belong to a set to varying degrees, not strictly binary. In this theory, membership of elements in a set is determined by a fuzzy function, denoted as μ(x), where x represents a specific element, and μ is a fuzzy function determining the degree of membership of x in the corresponding set. This degree of membership ranges between 0 and 1 (Formula 1)

$$(\tilde{A} = \{(x, \mu_A(x))|x \in X\} \quad (1)$$

Results Analysis of Fuzzy Logic System:

The fuzzy logic system has been implemented using MATLAB, and the designed system takes managers' innovation as input. In Figure (1), the output of the innovative educational structure on organizational commitment is determined with two inputs: innovative educational structure and innovation, as illustrated by the inputs in Figure (2).

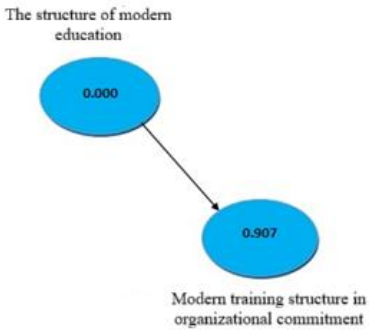

Fig. 1. Proposed System for Organizational Commitment Analysis

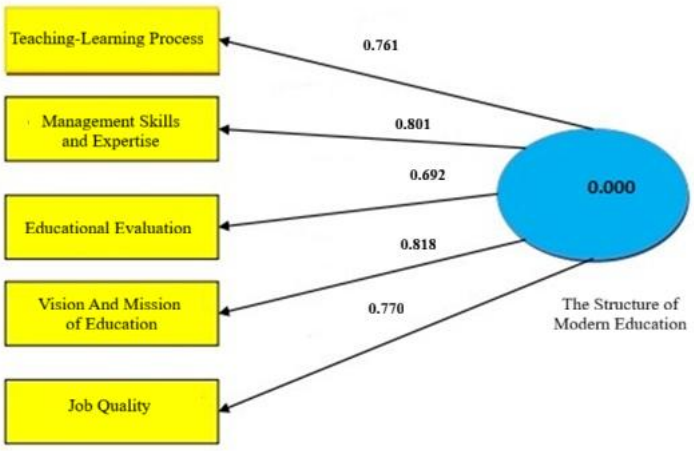

Fig. 2. Subdivision of Each Input into Subsections

Classification of Each Input into Subsections in the Teaching-Learning Process (0.761), Management Skills and Expertise (0.801), Educational Assessment (0.692), Educational Vision and Mission (0.818), and Job Satisfaction (0.770), arranged in descending order with the highest belonging to Educational Vision and Mission (0.818), followed by Management Skills and Expertise (0.801), Job Satisfaction (0.770), and the lowest for Educational Assessment (0.692) and Teaching-Learning Process(0.761) .

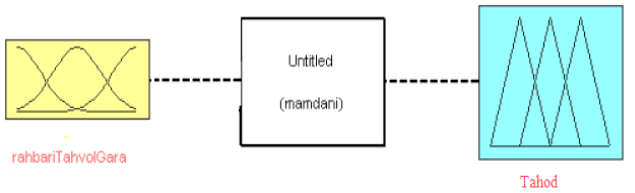

Fig. 3. Fuzzy Model for the System

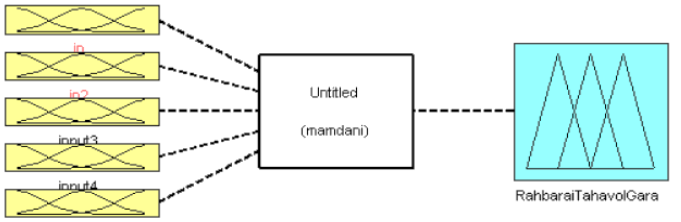

Fig. 4. Fuzzy Model for Innovative Management Structure Conclusion:

In this study, the design of an innovative educational structure to create and enhance organizational commitment in the faculty members of Iran's Open Universities was addressed. The fuzzy model was employed as a powerful analytical method to achieve this goal. The results indicated that designing an innovative educational structure can improve the performance of organizations. The findings showed a significant and positive relationship between all aspects of the innovative educational structure and organizational commitment. It was inferred from the research results that the educational vision and mission, along with management skills and expertise, have the most significant impact on organizational commitment. This suggests that managers who envision a successful future, are forward-thinking, prepare and guide the university's educational structure for future goals, and are willing to sacrifice their interests for the individuals' interests can increase student satisfaction and, consequently, enhance organizational commitment. Managers should strengthen other components of the innovative educational structure to foster growth and development for both themselves and the organization. In conclusion, this contributes to achieving goals and improving organizational commitment.

Transparency Statement

The data supporting this study are available upon reasonable request to the corresponding author, subject to ethical and confidentiality considerations.

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Declaration of Interest

The authors declare that they have no competing interests.

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