Presenting a Model to Assess Organizational Performance Based on the Concept of Knowledge Management Using Regression Model, Decision Tree, Gray Relational Analysis and DEMATEL Method (Case Study: National Library and Archives of Iran)

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ABSTRACT
Many organizations have recognized that knowledge is the most important resource in today's economy. With regards to knowledge-based views of the firm, organizations are actively embracing knowledge management with the expectation of acquiring and maintaining high levels of organizational performance. The relationship between knowledge management (KM) and organizational performance has been the subject of discussion in management literature. However, the various researches on the effect of knowledge management on organizational performance have yielded conflicting findings and recommendations in different contexts. This study proposes a contingency model for investigating the effects of multiple organizational factorsincluding organizational structure, organizational culture, organizational motivation for sharing knowledge and organizational intelligence on KM and testing the impacts of KM on organizational performance to resolve these contradictions. These effects were tested through structural equation modeling and decision rules were extracted from C5.0 decision tree.Also, The Gray Relational Analysis technique was used In order to rank indicators. Finally, by using DEMATEL method, the relation matrix was built. The sample included 278 employees in the National Library and Archives of Iran.

Keywords
Knowledge Management, Organizational Performance, Organizational Structure, Organizational Culture, organizational Intelligence

1.INTRODUCTION
Knowledge management, as a field of study, has now existed for more than 30 years. It has moved beyond an academic theory to an essential component of organizational life[1]. That is why researchers always emphasized the importance of developing unique knowledge within firms to deliver new services and to distinguish it from competitors for achieving advantage [2]. Delivering unique services to customers helps to improve customer satisfaction and sales volume, and so firms have observed the influence of knowledge development over performance [3][4]. A firm's performance is frequently enhanced when the strategy includes acquiring and managing knowledge-basedresources[5]. Successful knowledge management requires more than individual employees sharing a repository of experiences. Rather, knowledge management requires an active systematic effort on the part of the organization to recognize and capture new knowledge [6]. Firm success often relies upon the firm's ability to accumulate knowledge and process it to enable organizational learning [7]. Firms with the ability to accumulate and manage knowledge will outperform less focused firms [8].

As a matter of fact, one of the key benefits of introducing KM practices in organizations is its positive impact on organizational performance. The research conducted in Croatia suggests that KM positively affects organizational outcomes of company innovation, product improvement and employee improvement [9].In addition, Researchers often imply this positive effect of KM on organizational performance [10].Since knowledge resides within the brain of employees; firms develop various strategies to create organizational knowledge through leveraging employees' knowledge. Human resource managers get involved in the activities of finding suitable leadership style that supports implementation of knowledge management (KM) programs to augment organizational performance[11].

The literature on cross organizational cooperation reveals many organizational factors that may influence the KM process[12].In this survey, the effects of different organizational factors including organizational structure, organizational culture, organizational motivation and organizational intelligence that may affect knowledge management are assessedaccording to what is said in theKMconcept.

2. LITERRATURE REVIEW

Organizational performance is considered as a dependent variable in this study, one of the most important structures in management research and undoubtedly the most important measure of success in business enterprises. Performance in terms is mood or quality of function. The organization performance is a wide mix of receipts non-tangibles such as increasing organizational knowledge and receipts tangibles, such as economic and financial results. Various models have tried to identify and evaluate organizational performance. Various models have tried to identify and evaluate organizational performance [13]. So it is a broad concept and covers of what the company produces and areas with which they interact. In other words, Organizational performance is defined how do missions, tasks and organizational activities and their results [14].

The literature has been unable to agree on a definition or the concepts behind KM [15]. For instance, Nonaka and Takeuchi (1995) consider KM to be the capability of an organization to create new knowledge, disseminate it throughout the organization, and embody it in products, services, and systems[16]. Jennex (2009) holds that Knowledge Management is really about leveraging what the organization "knows" so that it can better utilize its knowledge assets, and connecting knowledge generators, holders, and users to facilitate the flow of knowledge through the organization [17].

Perhaps the most significant gap in the literature is the lack of large-scale empirical evidence that KM makes a difference to organizational performance. While survey research is beginning to appear in KM journals, the bulk is descriptive [18]. Of some survey studies that examine relationships between KM and other factors only a few articles (discussed below) empirically investigate the relationship between some internal factors, KM and organizational performance.

Fugate in a research entitled "Linking improved knowledge management to operational and organizational performance" empirically examined the importance of knowledge management processes to operational and overall organizational performance. The results of this study indicate that a shared interpretation of knowledge among operational personnel meditates how knowledge is disseminated and used to design and implement a unified operational response to that knowledge. Further, results support a strong positive relationship between this knowledge management process operational and organizational performance [19].

A study of firms in Croatia entitled "Exploring knowledge management to organizational performance outcomes in a transitional economy" indicates that knowledge management positively affects organizational outcomes of firm innovation, product improvement and employee environment. Moreover, itillustrates the importance of the management of knowledge and not just the presence of knowledge. The model results indicate insignificant results between employee knowledge based capability and the organizational outcomes [9].

Using the questionnaire proposed by Albrecht, Mooghali&Azizi present a coefficient correlation of 0.931 between KM and OI[20]. Yaghoubi et al. more realistic, found that almost 59.2 percent of the existing changes in OI are defined by strategic processes of KM [21]. However, Zarbakhsh et al. emphasize that although Albrecht organizational intelligence tests have been used frequently in research and diagnostic works, no serious measure has been taken to standardize this test [22]. Moreover, an article entitled "A Knowledge Management and Organizational Intelligence Model for Public Administration" shows the importance of KM and OI for public administration and concludes that the KM-OI model is useful to identify influential factors that must be taken into consideration to improve the processes of creation (KM) and application of knowledge (OI) [23].

Wahba in a study entitled "The impact of organizational structure on knowledge management processes in Egyptian context" after Collecting and analyzing data based on correlation coefficient of Pearson and hierarchal regression, showed that there was a direct relationship between organizational structure dimensions and knowledge management more in service sector than the product sector [24].In another paper entitled "Linking organizational culture, structure, strategy, and organizational effectiveness: Mediating role of knowledge management", results suggest that knowledge management fully mediates the impact of organizational culture on organizational effectiveness, and partially mediates the impact of organizational structure and strategy on organizational effectiveness [25].

In a study entitled "The Relationship between Organizational Culture and Knowledge Management" statistical techniques like step by step regression as well as Pearson Correlation Coefficient has been used. The results indicatedthat there is a meaningful relationship (about 99%) between different kinds of organizational culture and six dimensions of knowledge management [26].

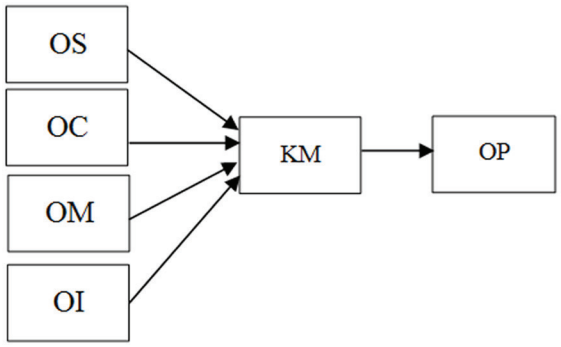
Cruz in a study entitled "The influence of employee motivation on knowledge transfer" shows that knowledge transfer improves through intrinsic motivation, however extrinsic motivation is not significant on knowledge transfer. This result is interesting bearing in mind that people are involved with a non-profit organization due to intrinsic reasons rather than for financial rewards [27].In addition, the result of a paper entitled "Effects of extrinsic and intrinsic motivation on employee knowledge sharing intentions" showed that motivational factors such as reciprocal benefits, knowledge self-efficacy, and enjoyment

in helping others were significantly associated with employee knowledge sharing attitudes and intentions. However, expected organizational rewards did not significantly influence employee attitudes and behavior intentions regarding knowledge sharing [28].

A research entitled "An integrated approach of critical success factors (CSFs) and grey relational analysis for ranking KM systems" proposes novel approach for evaluating KMSs. Proposed approachcombines two well-established managerial methodologies; critical success factors (CSFs) and grey relational analysis. This approach uses CSFs as a method to define KM evaluation criteria and uses grey relational analysis to score and prioritize knowledge initiatives[29].

The current research-oriented study is to provide a profound insight on examining the effects of four factors on KM and the impacts of KM on organizational performance (P) in the National Library and Archives of Iran (Figure 1). Accordingly, four internal factors including organizational structure (OS), organizational culture (OC), organizational motivation (OM) and organizational intelligence (OI) are considered as independent variables. Also, knowledge management and performance as the dependent variables are taken into consideration in this investigation.

Figure 1. Conceptual model of the research



Organizational Performance:

organizational performance is the organization's ability to attain its goals by using resources in an efficient and effective manner [30].

Knowledge Management:

Knowledge management is a collaborative and integrated approach to the creation, capture, organization, access, and use of an enterprise's intellectual assets. [31].

Organizational Structure:

organizational structure is the formal system of task and reporting relationships that controls, coordinates, and motivates employees so that they cooperate to achieve an organization's goals[32].

Organizational Culture:

It is the set of shared values, beliefs, and norms that influence the way employees think, feel, and behave in the workplace [33].

Organizational Motivation:

Organizational motivation is distinguished from capacity, refers to the internal motivation of an organization [34].

OrganizationalIntelligence: It is the capacity of an institution in applying all its mental forces and their focus on conducting the mission [35].

3. RESEARCH HYPOTHESIS

The Main Hypothesis

Knowledge management has a positive impact on organizational performance.

Sub-Hypotheses

a) There is no significant relationship between knowledge management and organizational structure.

b) There is a meaningful relationship between organizational culture and knowledge management.

c) There is a meaningful relationship between knowledge management and organizational motivation.

d) There is a meaningful relationship between organizational intelligence and knowledge management.

e) Ratings obtained by using gray relation analysis arerobustin each level.

4. RESEARCH METHOD

This study is considered as an applied research in terms of purpose and a descriptive survey in terms of data collection. In order to collect data, three types of questionnaires were used. The first one measuring OS, OC, OM and organizational performance is retrieved from Chuang's standard questionnaire. The second questionnaire for knowledge management is based on Rašula's questionnaire in his paper andthe questionnaire of organizational intelligence is taken from DeAngelis's paper. The statistical population included the National Library and Archives of Iran. Cochran formula has been used to determine sample size. The sample size is 278 selected out of the population of 1000. All of the items were rated on a five-point Likert scale ranging fromstrongly disagree (1) to strongly agree (5).Also, reliability of the questionnaire has been calculated by Cronbach's alpha method.Considering the total (>70%) Cronbach's alpha coefficient which is 0.813 indicates high reliability of the questionnaire content. The reliability used in the research is shown in Table 1.

Table 1. Reliability Statistics

Variables	Cronbach's Alpha	Number of Questions
Organizational Structure	0.911	3
Organizational Culture	0.630	3
Organizational Motivation	0.828	3
Organizational Intelligence	0.862	7
Knowledge Management	0.732	22
Organizational Performance	0.785	8
All Variables	0.813	46

5. DATA ANALYSIS AND FINDINGS

By using factor analysis, we make sure whether the existing factors can be reduced to several hidden factors and whether the statements of questionnaire which each of them belongs to a special variable, are able to measure the variable or should be removed.Three sections including internal factors (OS, OC,OM&OI), knowledge management and organizational performance were tested with KMO measure of sampling adequacy and the Bartlett's test. Results of the KMO and Bartlett's test are shown in Table 2.

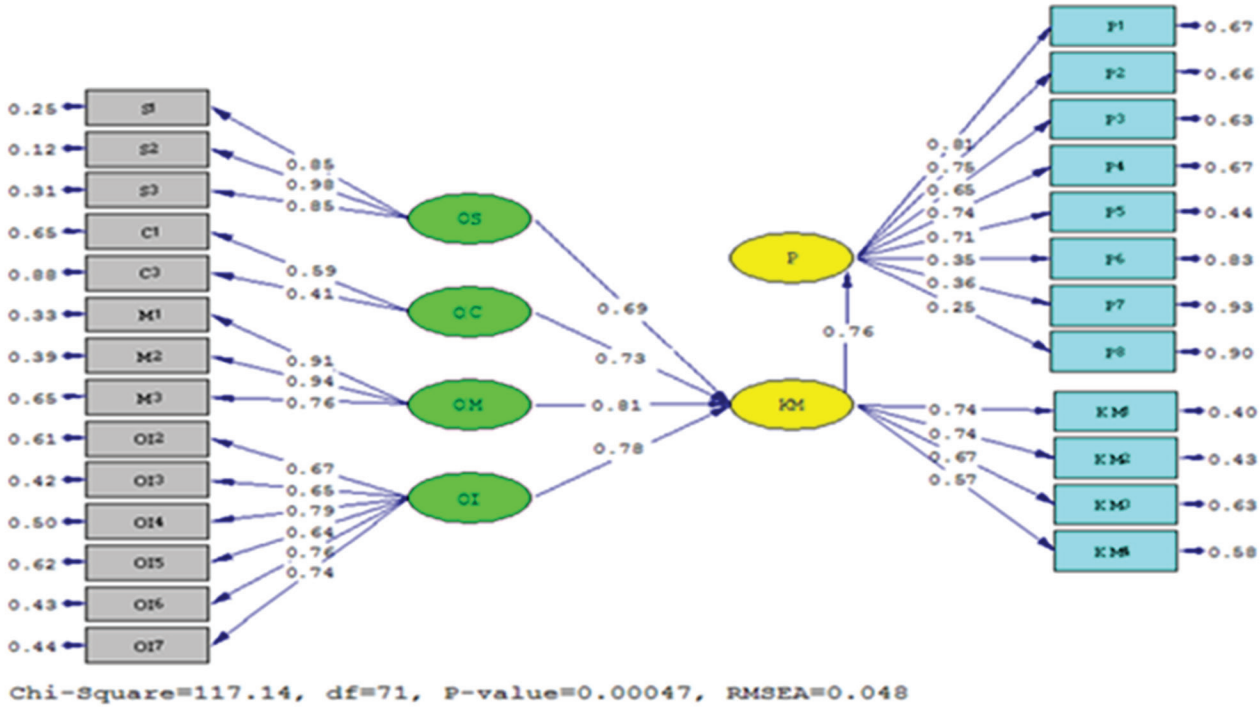
Table 2.KMO & Bartlett's Test

Sections	KMO Measur	Bartlett's test		
		Chi-Square	df	Sig.
Internal Factors	0.859	1.956E3	120	.000
KM	0.772	2.062E3	231	.000
OP	0.811	658.975	28	.000

As shown above, conditions were met for exploratory factor analysis in all sections. Afterwards, we used principle component analysis as an extraction method in order to estimate communalities of all indicators.All communalities were greater than 0.5 except the first OI indicator (OI1) which was eliminated at this point. After varimax rotation of the remaining 45 indicators, only 41 indicators achieved high loadings. So, indicators such as OC2 (0.47), KM8 (0.188), KM13 (0.233) and KM20 (0.104) were omitted due to low loadings.

SEM (Structural Equation Modeling) is a useful technique for testing and estimating casual relations between constructs. The fit indices of the structural model are summarized in Table 3. The overall model indicates a strong predictive validity. X2/df should be less than 3 and the obtained amount is 1.65 which shows a good fitness of the model. RMSEA (Root Square Error of Approximation) is equal to 0.048 in the present model which is less than 0.08

Figure 2. Hypotheses Testing Results



and it is acceptable. GFI (Goodness of Fit) and AGFI (Adjusted Goodness of Fit Indexes) are also 0.96 and 0.93. Thus, the structural model fil was great according to the obtained results shown in figure 2.

Table 3. Fit Indices of the Model

Fit indices	Recommended	value	Fitness
χ2/df	1-5	1.65	yes
RMSEA	<0.1	0.048	yes
GFI	>0.9	0.96	yes
AGFI	>0.9	0.93	yes
RMR	<0.05	0.039	yes
NFI	>0.9	0.95	yes
NNFI	>0.9	0.91	yes
IFI	0-1	0.95	yes

Figure 2 presents details regarding the parameter estimates for the model. Totally, all hypotheses were supported. Knowledge Management affects organizational performance (β=0.76, T-value=5.23).All internal organizational factors including organizational structure (OS), organizational Culture (OC), organizational motivation (OM) and organizational intelligence (OI) have significant effects on organizational performance (β=0.69, t-value=4.69; β=0.73, t-value=8.07; β =0.81, t-value=7.30;β =0.78, t-value=5.39).

DEMATEL was used in this survey to gain the interactions of internal factors (OS, OC, OM, OI) since it is a comprehensive method for building and analyzing a structural model involving causal relationships between complex factors. In order to do so,we used loadings of SEM demonstrated in figure 3.

We calculated the total-relation matrix to obtain cause and effect groups represented in table 4 and table 5. It is important to distinguish whether a critical factor belongs to the cause group factors or the effect group. The cause group implies the meaning of the influencing factors, whereas the effect group denotes the meaning of the influenced factors. If we want to reach a high level of performance in terms of the effect group factors, it is necessary to control and pay a great deal of attention to the cause group factors beforehand. From the result of segmenting the list of critical factors, it means that successful KM requires a high level of focus on the cause group (OI, OM) rather than the effect group (OS, OC). Several valuable cues can be obviously obtained for making profound decisions. For example, among these four critical factors, OM is the most important factor by the highest (D + R) priority of 31.558. Also, OI is the most influencing factor by the highest (D − R) priority of 3.768, but it is quite difficult to be changed. As to OS, it is themost easily influenced and moved factor because it has the lowest(D − R) priority of minus 3.294.

Figure 3. Loadings of internal factors

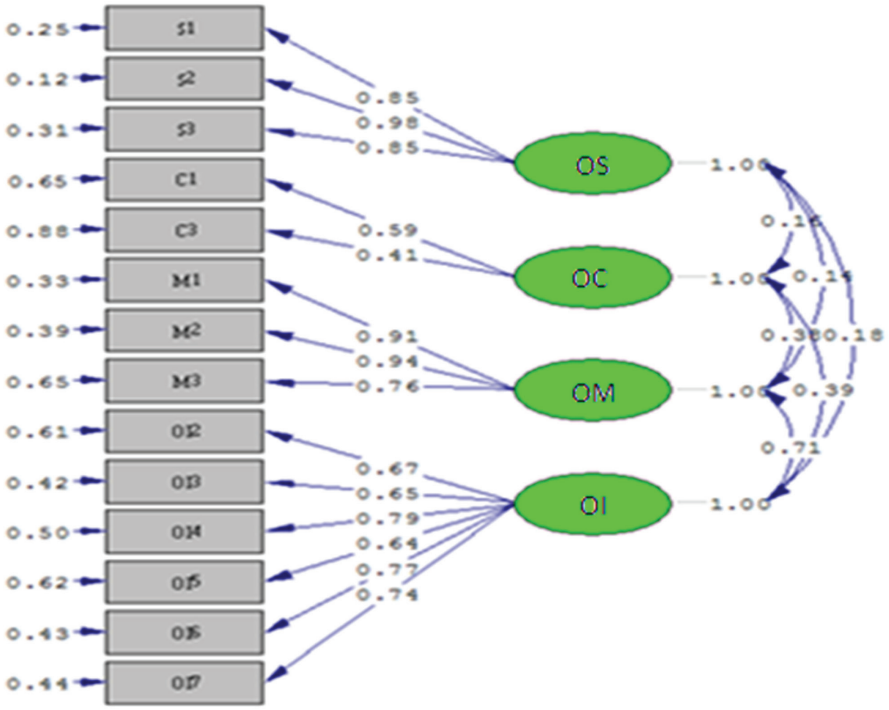


Table 4. The Total-Relation Matrix

	OS	OC	OM	OI
OS	1.157	1.636	1.926	1.644
OC	2.318	2.950	3.744	3.174
OM	2.989	4.327	5.312	4.095
OI	3.193	12.998	15.610	13.158

Table 5. The Cause & Effect Group Values

	OS	OC	OM	OI
D+R	16.018	25.184	31.558	30.084
D-R	-3.294	-0.812	0.337	3.768

The C5.0 is a decision tree by which we extracted decision rules and the weights of internal factors on KM.the weights obtained are represented in table 6.

Table 6. The Weights on KM Target

	OS	OI	OM	OC
Weights	0.43	0.36	0.14	0.07

After analyzing 36 rules achieved from C5.0 decision tree, we summarized these rules by taking average of them in three ranges.The results show that the averages of KM in three ranges has a direct relation with organizational performance shown in table 7.

Table 7. Decision Rules of KM on OP

IF KM =	Then OP	IF KM =	Then OP	IF KM =	Then OP
2.053	1.25	3.526	2.75	3.842	3.375
2.158	1.5	3.105	2.75	3.895	3.375
2.316	2.125	2.368	2.875	3.947	3.375
2.421	2.125	3.316	2.875	3.05	3.5
2.683	2.125	3.789	3	2.789	3.5
2	2.25	3.368	3	2.579	3.625
3.158	2.25	2.948	3	4	3.75
2.842	2.25	3.632	3.125	4.211	4.375
2.105	2.375	3.737	3.125		
3.684	2.5	3.211	3.125		
2.263	2.5	3	3.25		
3.474	2.5				
3.263	2.5				
1.941	2.625				
3.421	2.625				
2.474	2.625				
2.632	2.625				
2.64		3.27		3.54	

GRA (Gray Relational Analysis) is a new analysis method, which has been proposed in the Grey system theory and is based on geometrical mathematics, which compliance with the principles of normality, symmetry, entirety, and proximity. GRA is suitable for solving complicated interrelationships between multiple factors and variables and has been successfully applied on cluster analysis, robot path planning, project selection, prediction analysis, performance evaluation, and factor effect evaluation and multiple criteria decision. Thus, it was used to prioritize and rank 14 sub-factors of four main internal factors in this research. Based on the calculated values of grey relational grade, Experimental results have shown clearly that the first sub-factor of organizational motivation is the most influential sub-factors (indicators) and the fifth sub-factor of organizational intelligence is the least influential sub-factors that will affect all independent variables. The rankings of each affecting sub-factorsare determined in table 8.

Table 8. The Rankings of Factors using GRA

Rankings	Factors	Scores
1	OM1	0.708824
2	OS3	0.689167
3	OC3	0.631517
4	OS2	0.607857
5	OI6	0.532965
6	OI2	0.517045
7	OI3	0.50744
8	OI4	0.494221
9	OM2	0.489444
10	OS1	0.474951
11	OM3	0.470126
12	OC1	0.469047
13	OI7	0.441517
14	OI5	0.418183

In order to do a robust test, each of 14 indicators were separately and repeatedly added to GRA software for fourteen times and the results were evaluated. Afterwards,wereceived the same ratings and orders each time and it

revealed that rankings obtained by GRA are robust in each level. Therefore, the last hypothesis was confirmed.

6.CONCLUSION

Knowledge management is one of the most important priorities of executives in order to raise organizational performance. The main reasons beyond measuring the influence of internal factors on KM and the impact of KM on performance are to stimulate management to focus on what is significant and also to justify investments in KM-related factors. In fact,the main contribution of this paper is proposing several novel approaches for evaluating organizational performance considering the mediating role of knowledge management.

Using SEM has shown that all internal factors including organizational structure, organizational culture, organizational motivation and organizational intelligence have certain effects on knowledge management. It also proves that there is a positive relationship between knowledge management and organizational performance meaning that KM affects OP.

C5.0 as a decision tree extracted decision rules by which it was proved that average values of knowledge managemet in three ranges (from least to the most)have a direct and positive effect on the average values of organizational performance. It also showed the weights of each internal factors influencing knowledge management.

The DEMATEL method is based on the graph theory that enables us to divide multiple factors into a cause group and an effect group in order to better capture causal relationships visibly. In this phase, the data of loadings was used to draw the initial matrixfor evaluating their interactions. It showed that the most affecting factor among internal factors is organizational motivation and the next one in organizational intelligence.

Finally GRA was used as a part of grey system theory, which is suitable for solving complicated interrelationships between multiple factors and variables; In this case, we evaluate how influential and affecting sub-factors of independent variables are according to the weights of the c5.0 decision tree assigned to each factors (OS, OC, OM, OI).

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