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Original Article

The Effects of Collaboration Culture on Knowledge Creation: A Study in Hospitals Affiliated to Qom University of Medical Sciences

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Abstract

Background & Aims: Organizational culture and knowledge management affect all aspects of an organization. Thus, in this study, we aimed to investigate the impact of the components of Collaboration culture on knowledge creation in hospitals affiliated with Qom University of Medical Sciences in 2017.

Materials and Methods: This cross-sectional-analytical research was conducted on 570 employees of the hospitals affiliated with Qom University of Medical Sciences. The research tool was a researcher-made questionnaire with a five-point Likert scale. The validity of the questionnaire was confirmed through content validity and convergent validity, and its reliability was assessed by Cronbach's alpha method and composite reliability. The data were analyzed using SPSS 20 and Lisrel 8.8 software employing exploratory factor analysis, confirmatory factor analysis, and structural equation modeling.

Results: The means and standard deviations of Collaboration culture and knowledge creation were 3.071 ± 1.301 and 3.28 ± 1.11, respectively; their Cronbach's alpha coefficients were 0.972 and 0.944; their composite reliability indices were obtained as 0.782 and 0.847, and the convergent validities of these domains were as 0.810 and 0.852, respectively. Exploratory factor analysis classified the constructs into the two sections of learning culture and knowledge creation, which were confirmed by fit indices.

Conclusion: The results showed that the Collaboration culture component has a positive and meaningful relationship with the knowledge creation component. Therefore, hospital managers should notice the benefits of providing the necessary infrastructure for the implementation of knowledge management and holding workshops for employees to educate them on the fundamentals of cooperation culture and knowledge creation.

Keywords: Hospitals, Intersectoral collaboration, Culture, Knowledge

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1. Introduction

Knowledge is a valuable resource for the growth of people and an invaluable capital for the organization. In fact, in stable societies, the relationship between knowledge management and healthcare has always been considered a vital element for social development [1,2]. Knowledge management is defined as the process of creating, acquiring, sharing, preserving, and applying knowledge [3,4]. Organizational knowledge management generally focuses on facilitating knowledge transfer among people and the development of shared knowledge within an organization [5]. In healthcare organizations, similar to other organizations, knowledge-based groups and intellectual asset protection cores are frequently seen among individuals and sectors, but these are not utilized for learning and organizational decision-making. On the other hand, losing human resources due to various reasons leads to the exit of intellectual capital from the system, highlighting the necessity of the effective use of organizational knowledge resources [6]. Compared to the business sector, healthcare agencies have recently accepted the philosophy of knowledge management [7]. Therefore, it is necessary to use knowledge management systems to enforce the sustainability and feasibility of health processes [8]. On the other hand, knowledge creation raises a stable competitive advantage in the functional performance of organizations and leads to the provision of the best possible services [2,9]. For this reason, healthcare experts have recently shown research interest in evaluating the quality of a hospital-oriented knowledge environment [10]. Executive managers, experts, and specialists working in healthcare centers have wide knowledge needs; however, professional knowledge assets are often limited or difficult to possess, which subsequently limits the creation of professional knowledge [2,3].

Knowledge creation is one of the ways to achieve a competitive advantage, and this important is accessible through interaction and Collaboration. Therefore, in organizations where people have high Collaboration

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attitudes, knowledge management and, accordingly, professional knowledge creation have a special place [1]. New professional knowledge can be created by experts through exchanging and merging knowledge [11]. One of the basic and inherent features of knowledge management in healthcare centers is its competitive advantage, rendering the capability of producing professional knowledge essential to remain in such a competition [1,12]. Because of this, having a positive attitude or perception toward knowledge management can facilitate knowledge creation or knowledge sharing by hospital staff [13].

Organizational culture refers to social ideologies, functions, norms, and behaviors and can provide the organization with opportunities for integration and distinction [14]. Organizational culture, as an important knowledge infrastructure, refers to an organization's perspectives and values and the determinants that nurture learning and cooperation [15]. The most valuable ideas emerge when employees can put together their mental efforts based on the cooperation culture [11]. Poor and inflexible organizational culture causes employees to accustom to the existing procedures, so there will be no desire for cooperation to solve the organization's problems. On the other hand, in a dynamic and flexible organizational culture, employees can keep their organization on the path of progress and react well to sudden changes [16].

Available research shows that organizational culture plays an important role in supporting knowledge management plans in hospitals [3] and contributes to the continuance, expansion, and stability of the organization in a competitive environment [12]. The results of studies show that the culture of cooperation among employees in official and non-official meetings is one of the knowledge-creation methods in hospitals [1]. Other studies have reported that socio-technical drivers, such as the culture of cooperation, trust, and learning, can independently predict the knowledge-creation process [12]. Other studies conducted in this area have highlighted the need to pay attention to interactions Collaboration, and information exchange among personnel, as a valuable collection in order to produce professional knowledge [11]. It has also been indicated that Collaboration and interaction between employees, networking, objectification, and information sharing can lead to knowledge creation [17]. Other researchers have described a strong correlation coefficient between organizational culture and knowledge management, as well as a positive relationship between the culture of Collaboration and knowledge management [18,19]. According to the aforementioned, it can be concluded that the culture of Collaboration plays an important role in knowledge management and, particularly, knowledge creation. Nowadays, hospitals are facing many challenges in delivering the best possible services to clients [2]. On the other hand, healthcare provision is a knowledge-based process; therefore, knowledge management and having a dynamic and flexible culture in hospitals can be an opportunity for the organization to improve its functional performance and place itself on the path of progress [5,20]. So far, little research has been conducted on the effects of the culture of Collaboration on knowledge creation in healthcare centers, and most of the available studies have been carried out in administrative and service environments. Thus, the present research aimed to investigate the impact of the culture of Collaboration on knowledge creation in the public hospitals of Qom province, Iran.

2. Materials and Methods

This was a cross-sectional-analytical study conducted in 2018. The statistical population of the study included all the headquarters staff (administrative, financial, and support), medical staff (doctors, nurses, midwives, operation room technicians, and anesthesiologists), and paraclinical staff (laboratory and radiology) of the six teaching hospitals affiliated with Qom University of Medical Sciences. Based on the standard sample size proposed in factor-analysis studies, suggesting between 3 and 20 samples per variable [21,22], the sample size was calculated as 200. As the statistical population consisted of six independent hospitals with different numbers of employees, we initially used the stratified sampling proportional to size method so that the number of subjects from each hospital is proportional to the number of its employees. In the next step, from a list of personnel provided by the administrative unit of each hospital, subjects were randomly recruited from each ward using a systematic sampling strategy. It should be noted that in order to increase the accuracy of the data, a total of 570 samples were recruited in this research. The participants in this study were selected among those having at least four years of work experience and full-time activity in the hospitals studied. Therefore, these participants were completely familiar with procedures because of their rich 4-year experience, attending numerous meetings, and being members of hospital committees. Incompletely answered questionnaires were excluded from the study. Eligible participants were initially requested to sign a written informed consent form and were assured that their information would remain confidential.

The research tool in this study was a researcher-made questionnaire. These items (variables) in this tool were identified and modified after conducting a library study, reviewing related articles, and based on consultation with experts who were university professors. This questionnaire consisted of two sections. The first part included demographic information (age, gender, educational level, work experience), and the second part

included questions about the dependent and independent variables. The items related to the dependent variable (i.e., knowledge creation) were extracted from studies by Gold et al and Najafbeygi et al and then were modified and adjusted accordingly [23,24]. The items related to the independent variable of the culture of Collaboration were extracted from studies by Islam et al, Gold et al, and Najafbeygi et al [23-25]. and then were modified, adjusted, and used. Finally, the variables of the culture of Collaboration and knowledge creation were measured based on four and six items, respectively, on a 5-point Likert scale. Complete agreement (i.e., completely agree) was assigned with a score of five, and full disagreement (completely disagree) with a score of one.

In this study, the questionnaire's psychometrics features were assessed using content validity, face validity, and convergent validity. Regarding content validity, the content validity index (CVI), and content validity ratio (CVR) were measured by ten experts in the field. For calculating CVR, the questionnaire was provided to ten university professors in the field of health management to express their opinions about each of the questions as either "it is necessary", "it is not necessary, but it is important", or "it is not necessary". Using the related formula, CVR was then calculated, and according to Lawshe's table, the items acquiring values greater than 0.62 were accepted [26]. Moreover, the same ten experts were requested to assess the queries in terms of relevancy, simplicity, and clarity on a four-point Likert scale (for example, 1: irrelevant, 2: somehow relevant, 3: relevant, and 4: completely relevant) to calculate CVI. Then the CVI score was calculated by summing up the scores of positive responses (i.e., the highest scores, 3 and 4) given by all the scorers, and finally, the items that acquired a score higher than 0.79 were selected [26]. Face validity, as a qualitative parameter, assesses the level of difficulty, inconsistency, and ambiguity in the questionnaire's phrases, as well as in the meanings of words for each item. Experts' opinions were considered, and minor modifications were introduced to the items of the questionnaire.

Also, in this study, Cronbach's alpha and composite reliability were used to evaluate the tool's internal consistency and reliability. Exploratory factor analysis was used to summarize and categorize the variables, and confirmatory factor analysis was used to assess the measurement model and determine the construct validity (or latent variable) of the instrument using SPSS20 and Lisrel 8.8 software. Also, structural equation modeling was used to determine the model's fit indices.

3. Results

The results showed that 33.3% of the participants were male, and 66.7% were female. Also, the mean age of the participants in this study was 35.41 ± 6.901 years. Of the participants, 62.6% were nurses; 1.8% were midwives, 14.5% were working in the middle-level managerial sectors; 4.6% were paraclinical experts, and 10.2% were working in other parts of the hospitals. Regarding education level, 88% of the participants had bachelor's degrees; 7.4% held master's degrees; 1.1% had professional doctorate degrees, and 3.5% had specialized doctorate degrees. The mean (standard deviation) scores of the cooperation culture and knowledge creation components were obtained as 3.07 ± 1.30 and 3.28 ± 1.11, respectively.

The results of exploratory factor analysis, along with varimax rotation, showed that the Kaiser-Meyer-Olkin (KMO) value of the sample population in this study was equal to 0.938. Bartlett's sphericity test rendered a statistically significant result at the level of $P = 0.001$. Further, the two factors revealed eigenvalues greater than one, explaining 86.872% of the total variance of the dependent variable by the predictor variables. The predictor variables that had commonalities of less than 0.5 were omitted in the exploratory factor analysis.

Table 1 summarizes the results obtained from the measurement model (or confirmatory factor analysis), showing that standard coefficients were between 0.85 and 0.95, which are suitable for subsequent analyses. Also, the factor load of each indicator, along with its construct, revealed a "t" value greater than 1.96, reflecting that the hidden construct had the least required accuracy. Table 1 demonstrates the R2 value, which ranges from 0.72 to 0.90. The internal consistency of the instrument was evaluated by Cronbach's alpha coefficient and composite reliability, rendering the values of 0.944 and 0.782 for the cooperation culture component and 0.972 and 0.847 for the knowledge creation component, respectively. Also, convergent validity, which examines each item's correlation with its questions, and in fact, represents the average shared variance (AVE) of each item with its questions, was obtained as 0.810 for the Collaboration culture component and as 0.852 for the knowledge creation component.

Fit indices generated by Lisrel software have been provided in Table 2, revealing good fit indices in all cases. Table 3 shows the direct, overall, and indirect standardized effects of the collaboration culture component on knowledge creation. As shown, the Collaboration culture component, with a path coefficient of 48%, had a direct effect on knowledge creation in hospitals affiliated with Qom University of Medical Sciences.

Figure 1 describes an estimation of the standard coefficients of the study's model, which is an output of LISREL software and represents acceptable standard coefficients. All these coefficients and their numerical values have been presented in Table 1.

Figure 2 shows the estimation of the significant coefficients of the study's model obtained from Lisrel software. All significance coefficients were acceptable, representing the acceptability of the results of structural

Table 1. The results of descriptive statistics and evaluation of reliability and convergent validity in confirmatory factor Analysis

Construct	Items	Mean ± SD	Standard Coefficients	Significance Coefficients	Outcome	R^2	Cronbach's Alpha	CR	AVE
Collaboration culture	Employees help each other perform their job duties to achieve common goals in their ward.	3.67 ± 0.854	0.92	28.25	confirmation	0.84	0.944	0.782	0.810
	When doing teamwork, employees prefer collective benefit over personal benefit.	3.22 ± 1.04	0.92	28.39	confirmation	0.84			
	Hospital employees tend to work as a team	3.39 ± 0.975	0.91	28.21	confirmation	0.82			
	When doing their work, hospital employees accept honest feedback and new ideas from each other.	3.32 ± 0.931	0.85	25.01	confirmation	0.72			
Knowledge creation	Employees are interested in producing novel ideas and knowledge related to their job.	3.27 ± 1.18	0.93	-	disapproval	0.86	0.972	0.847	0852
	Employees are interested in doing scientific research to solve their work problems.	3.28 ± 1.19	0.92	41.02	confirmation	0.84			
	Employees tend to develop new ideas through the system of recommendations and consultation meetings.	3.29 ± 1.18	0.92	40.26	confirmation	0.84			
	Employees learn from their mistakes and provide feedback to the relevant department.	3.29 ± 1.19	0.91	38.53	confirmation	0.82			
	After visiting pioneering teaching hospitals, employees present some new ideas	3.29 ± 1.20	0.91	39.34	confirmation	0.82			
	Employees participate in brainstorming sessions to find solutions to problems.	3.26 ± 1.19	0.95	45.13	confirmation	0.90			

Fit indices generated by LISREL software have been provided in Table 2, revealing good fit indices in all cases.

Table 2. Variables, test results, and fit indices in structural equation modeling

Fit Indices			
Chi-square/df	1.58	Normed Fit Index (NFI)	1.00
The goodness of fit index (GFI)	0.98	Relative Fit Index (RFI)	0.99
Adjusted Goodness of fit index (AGFI)	0.97	Incremental Fit Index (IFI)	1.00
Comparative fit index (CFI)	1.00	Root Mean Square Error of Approximation (RMSEA)	0.032
Non-Normed Fit Index (NNFI)	1.00	Standardized Root Mean Square Residual (SRMR)	0.014
Standard and Significance Coefficients of Research Items in Structural Equation Modeling			
Independent variable		Beta coefficient	Significance coefficient
Cooperation culture		0.48	11.46

Table 3. Investigating the direct, indirect, and overall effects of learning culture on knowledge creation in the public hospitals of Qom province

Type of effect	Variable	Collaboration culture	Collaboration Culture1	Collaboration Culture2	Collaboration Culture3	Collaboration Culture4
Direct Impact	Knowledge Creation	0.48	-	-	-	-
Indirect Impact	Knowledge Creation	-	0.441	0.441	0.436	0.408
Total effects	K. Creation1	-	0.410	0.410	0.406	0.379
	K. Creation2	-	0.406	0.406	0.402	0.375
	K. Creation3	-	0.406	0.406	0.402	0.375
	K. Creation4	-	0.401	0.401	0.397	0.371
	K. Creation5	-	0.401	0.401	0.397	0.371
	K. Creation6	-	0.419	0.419	0.415	0.387

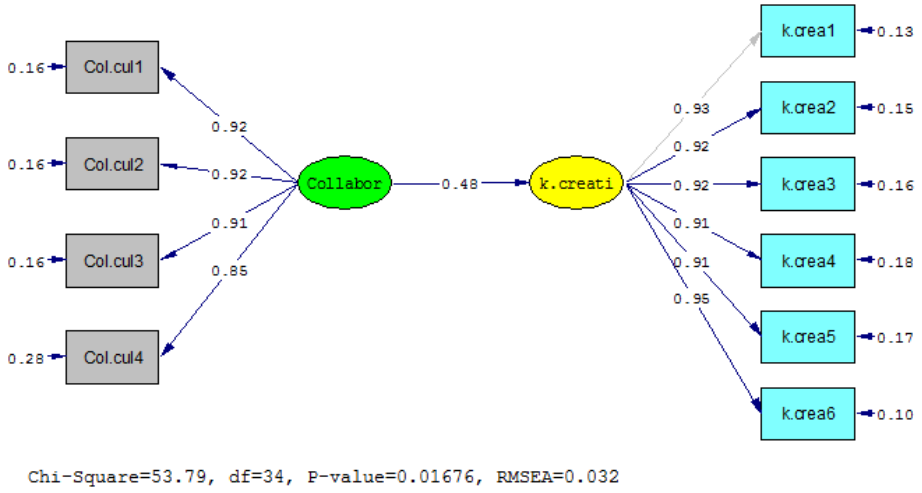

Figure 1. Estimating the standard coefficients of the research model by structural equation modeling and confirmatory factor analysis

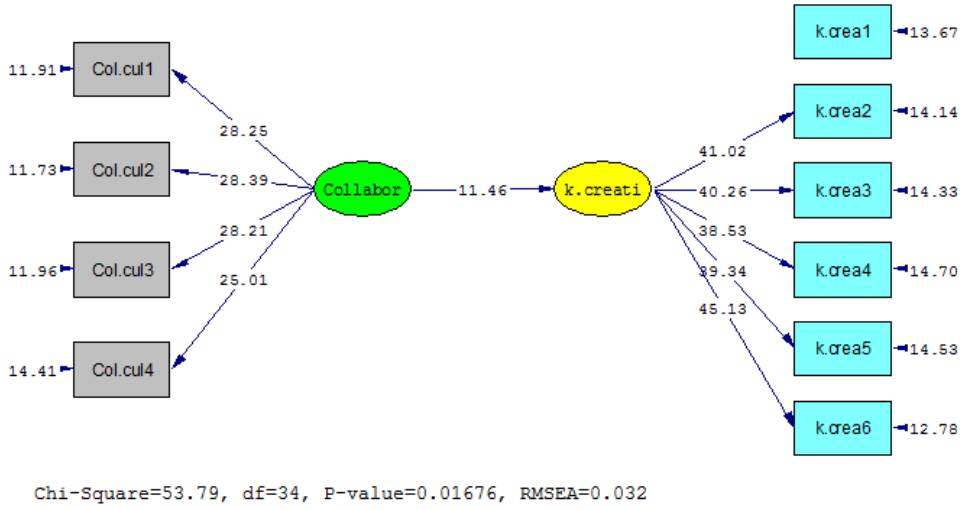

Figure 2. The estimation of the significant coefficients of the study's model Through structural equation modeling and confirmatory factor analysis

equation modeling and confirmatory factor analysis. All these coefficients and their numerical values have been presented separately in Table 1.

4. Discussion

In this study, structural equation modeling provided acceptable results in order to understand the effects of the culture of Collaboration on knowledge creation in hospitals affiliated with Qom University of Medical Sciences, understanding which can improve the process of knowledge creation in teaching hospitals. The present study is among few studies that have solely investigated the impacts of the culture of Collaboration and its related items on knowledge creation. Therefore, our findings can provide a basis for conducting more research in this area in the future.

In this study, we proposed an integrated framework regarding the link between cooperation culture and knowledge creation based on the available literature and previous studies and using factor analysis, confirmatory factor analysis measurement models, as well as structural equation modeling. Moreover, these findings were confirmed by various fit indices. As stated by Liao et al [27], factor loadings above 0.45 are significant and acceptable. In this study, the factor loadings of the items ranged from 0.85 to 0.95. Considering that significant coefficients (or "t" values) for all sub-factors of each main factor exceeded 1.96, it can be said that the variables assessed provided an appropriate estimation of the corresponding main factor, and therefore, the factors and variables could fit into modeling structural equations of the research (i.e., structural equations did not need to modify any factor or variable) [28]. Cronbach's alpha coefficients of the cooperation culture and knowledge creation components were obtained as 0.944 and 0.972, respectively, which are higher than the recommended

acceptable level (i.e., 0.70), as noted by Liao et al [27]. The composite reliability obtained in this study is higher than the recommended minimum value of 0.7, which shows acceptable composite reliability [29]. In their study, Taghavi et al recommended an AVE higher than 0.50 for variables [30]. In this study, the AVE values obtained for the culture of collaboration and knowledge creation components were higher than the standard, indicating good convergent validity (i.e., consistency of each component with its questions).

In the present study, the fit index of RMSEA was below the recommended upper limit of 0.05, reflecting the suitability of the fit model [31]. The results of this study showed that the ratio of Chi-square to the degree of freedom (χ^2/df) was lower than the recommended upper limit of 5. In addition, the SRMR fit index was lower than the recommended upper threshold of 0.08, and the GFI, AGFI, NFI, CFI, and IFI indices were also higher than the suggested lower limit of 0.90, reflecting a good fit [32].

The results of the present study showed that the culture of Collaboration component had a positive and significant effect on knowledge creation. In this regard, the direct effect of the culture of collaboration on knowledge creation attained an impact factor of 0.48. In line with the results of the present study, Najafbeygi et al, in a study on the state organizations of the Khorasan Razavi province of Iran, reported a net impact factor of 0.40 for the culture of cooperation on knowledge creation [24]. Consistently, Ajanaku and Mutula recognized that organizational culture, as an important infrastructure for the implementation of the knowledge management process, had a positive and meaningful impact on nurses' performance with an impact factor of 0.46, which was statistically significant [15]. The results of Lee, who conducted a study on four hospitals in South Korea, showed that the independent variable of collaboration culture had a positive and significant effect on the dependent variable (i.e., knowledge creation) in only two of the four hospitals with the impact factors of 0.13 and 0.26, confirming our observation in the present study [4]. In agreement with our results, Alavi et al demonstrated that people working in environments with an appropriate organizational culture, where cooperation is considered a value and there is strong Collaboration culture in the organization, employees feel more belong to and dependent on the organization, which eventually grabs their interest in participating in knowledge creation and knowledge sharing [33]. In another study, Minh and Loc declared that knowledge creation influenced organizational performance mediated through organizational culture (participation, Collaboration, responsibility, and loyalty), reporting a total impact factor of 0.31. These findings agree with the results of the present study, suggesting a role for organizational culture, as a crucial infrastructure in the process of knowledge management, in upgrading the organization's status through knowledge creation [34]. Confirming the results of the present study, Pourtaheri et al in their research found a positive and meaningful relationship between the culture of Collaboration and the knowledge management process ($\beta = 0.59$, $P = 0.001$), reflecting the high importance of the culture of collaboration in the hospital [19]. In another study, Khalaj and Zareiyan noted that the culture of cooperation had a positive effect on the implementation of knowledge management components with a path coefficient of $\beta = 0.33$ [35]. Also, Sohrabi et al, in their study, reported a positive correlation ($r = 0.92$) between organizational culture and knowledge management [18]. These findings, which all are in line with our results, embolden the importance of encouraging the collaboration culture in an organization in order to implement knowledge management.

Figure 2 shows the estimated significant coefficients of the model for the collaboration culture and knowledge creation components, as well as the variables clearly related to them. In this figure, the t-value represents statistical generalization calculations for all path coefficients. If the coefficient obtained for each path is less than 1.96, the path is omitted because the calculations related to that variable can only be applicable to the studied population, but they are not generalizable to the entire population with 95% confidence [36]. As demonstrated in Figure 2, this notion is true for knowledge creation and its No. 1 component.

5. Conclusion

The results of the present study showed that the hospitals affiliated with Qom University of Medical Sciences acquired average scores in terms of the cooperation culture and knowledge creation components. Also, the items of cooperation culture had the largest impact on the variable of "finding solutions to problems through knowledge-creating brainstorming sessions". Without implementing and institutionalizing cooperation culture and knowledge creation among hospital staff, it will be troublesome to provide quality services to patients. Therefore, it is of great importance to developing knowledge-based strategies to objectify the organization's hidden assets so that the hospital can maintain its competitive advantage. Therefore, it is suggested that hospital managers, along with providing the necessary infrastructure to implement the knowledge management process, hold training sessions for employees to teach them the basics of cooperation culture and knowledge creation.

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Conflict of Interests

The authors declare that this work is the result of a research project approved by Qom University of Medical Sciences and does not have any conflict with the interests of other organizations and individuals.

Ethical Approval

This article was a part of a research project entitled "Factors Affecting the Implementation of Knowledge Management in the Teaching Hospitals Affiliated to Qom University of Medical Sciences in 2018". This project received an ethics code (IR.MUQ.REC.2017.136) from the Ethics Committee of Qom University of Medical Sciences.

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