

## Association between managers' Competency and Technical Efficiency in General Hospitals in Iran

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ARTICLE INFO	ABSTRACT
<p><b>Article type:</b> Original Article</p> <hr/> <p><b>Article history:</b> Received: 05-Mar-2017 Accepted: 03-Apr-2017</p> <hr/> <p><b>Keywords:</b> General hospitals Managers' Competencies Technical efficiency Tehran Iran</p>	<p><b>Introduction:</b> Inefficient management of hospitals leads to the substantial waste of resources. Therefore, hospital efficiency has recently been a major concern among researchers. The present study aimed to evaluate the association of the management competency and technical efficiency in the general hospitals of Tehran, Iran.</p> <p><b>Materials and Methods:</b> This descriptive-analytical, cross-sectional study was conducted in 28 general hospitals in Tehran, Iran in 2015. In the first step, a survey was performed among 224 managers at different levels in the hospitals using a researcher-made management competency self-assessment questionnaire. In the second step, technical efficiency in the selected hospitals was measured by the Data Envelopment Analysis (DEA). Data analysis was performed using SPSS, Enterprise Management Software (EMS), and Deap1, 2.</p> <p><b>Results:</b> The average of competency was relatively high among the hospitals managers. However, more than half of the hospital performances were observed to be inefficient. Moreover, the results indicated that the competency of hospital managers was significantly correlated with their field of education, participation in training courses, and managerial experience. Also, a significant, direct association was observed between the competency of managers and technical efficiency in the studied hospitals.</p> <p><b>Conclusion:</b> According to the results, although the level of technical efficiency was favorable in the studied hospitals, the hospital managers with high competency should further develop and improve their performance and efficiency in these hospitals.</p>

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### Introduction

The increasing emphasis on hospital management in recent years could be attributed to the impact of the new public management theory (1-3). Managers of healthcare systems are responsible for achieving the views and goals that are set by healthcare policymakers (4). Healthcare managers are expected to have several competencies to enable them to perform their managerial functions effectively and efficiently (5-8).

Competency is defined as the capability or ability and having the required knowledge, judgment, skills, energy, experience, and motivation to effectually respond to the demands of professional responsibilities

(9-11). In public and private sectors, competent managers contribute to the enhancement of efficient management and sustainable healthcare service delivery (7,12,13).

In the healthcare system, hospitals play a pivotal role in delivering healthcare services, which constitute 50-80% of the total healthcare expenditures (12,14). Which means the need for increasing management efficiency in hospitals (15,16).

Efficiency assessment of hospitals is essential to improving management, resource collaboration, and resource allocation (17, 18).

One of the performance measurement methods is the comparison of the inputs and outputs in order to estimate the efficiency of hospitals (19). Technical efficiency is the ability of a decision-making unit to produce the maximum output from a specified level of input (20).

In the present study, the methods applied to measure hospital efficiency were data envelopment analysis (DEA) and stochastic frontier analysis (SFA) (21).

Furthermore, assuming the variable returns to scale, the second DEA model was presented in order to distinguish the net efficiency from scale efficiency (19).

Also, frontier-based methods were used to compare the actual performance of hospitals with an estimated efficient frontier, which is known to have a remarkable impact on the estimated efficiency (21- 24).

All managers and policymakers must use available resources effectively to ensure coverage of a wide variety of healthcare services (25). With this background in mind, the present study aimed to evaluate the association of management competencies and technical efficiency in the general hospitals of Tehran, Iran.

## Materials and Methods

### 2.1 Study Design and Setting

This descriptive-analytical, cross-sectional study was conducted in 28 general hospitals in Tehran, Iran in 2015.

### 2.2 Study Population and Samples

Based on a sampling formula and cluster sampling, 28 out of 85 general hospitals in Tehran were selected for the study. Study population consisted of the managers in different levels, who were selected via census sampling, including hospital directors, senior administrators, head nurses, clinical laboratory directors, department directors, supervisors of non-medical department, directors of medical imaging departments, and supervisors of the medical records departments in the hospitals. In total, 224 samples were selected for the research.

### 2.3 Research Instruments

Data were collected using a researcher-made questionnaire and checklist. To design the questionnaire, a literature review was carried out in order to identify the competencies of the hospitals managers (4,6,8,26,27). Finally, a self-assessment questionnaire was developed, which contained 61 items in 11 dimensions. Items in the questionnaire were scored based on a five-point Likert scale (range: 1=Very Poor-5=Excellent), and the participants completed the questionnaires.

Face validity of the questionnaire was confirmed by a panel of experts, including five healthcare policymakers and healthcare management specialists. Impact scores (significance of the frequencies) were estimated to be more than 1.5 for all the items in the

questionnaire. In addition, content validity ratio and content validity index were calculated to be 0.70 and 0.69, respectively. Moreover, reliability of the questionnaire was confirmed using the Cronbach's alpha for each competency in the dimension of management (Table 1).

**Table1: Mean and Cronbach's alpha of the dimensions of competency in managers**

Dimensions	Number of items	Cronbach's alpha	Mean
Leadership and strategic management	6	0.84	3.49
planning	5	0.83	3.57
Financial management	6	0.95	3.23
Change management	5	0.83	3.26
Knowledge management	6	0.81	3.14
Service management	4	0.84	3.41
Decision-making	4	0.84	3.17
Human Resources management	8	0.90	3.44
Patient orientation	3	0.80	3.12
Information and communication management	7	0.89	3.11
Honesty & Integrity	7	0.93	3.23
Total managers' competencies	61	0.86	3.28

The second instrument of the research was a researcher-made checklist to collect the data on the technical efficiency of the hospitals. The checklist consisted of the input variables (number of physicians, nurses, non-clinical staff, and active beds) and output variables (number of outpatient visits, dismissed patients, and surgeries, bed occupancy rate, and hospitalization admission). The first and foremost stage of the study was selecting the best set of input and output variables in each efficiency measurement. The input and output variables in the current study were selected based on the conducted literature review (16,17,25,28)

The main ethical considerations in the study were the respondents' rights to self-determination, anonymity, and confidentiality. All the collected data remained anonymous, and data collection was performed during October-November 2015.

### 2.4 Data analysis

Data analysis was performed in two stages. Initially, the scores of technical efficiency were estimated using the DEA method based on the input-oriented model by assuming the variable return to scale (VRS) and using the Deap1, 2 and enterprise management software (EMS) software. Efficient hospitals obtained were graded one or 100, and inefficient hospitals were scored less than one or 100.

The VRS model was used to measure the pure technical efficiency and scale efficiency in each hospital. Based on the VRS model, we analyzed whether the production of hospitals indicated

increasing, constant or decreasing VRS according to the studied variables. Increasing VRS was confirmed if the  $s$  value was greater than zero ( $s > 0$ ), while constant VRS was observed with the  $s$  value of zero ( $s = 0$ ), and decreasing VRS was indicated if the  $s$  value was less than zero ( $s < 0$ ).

In the following model,  $\theta$  is the technical efficiency of  $r$ , hospital  $y_{rj}$  represents the output of  $r$  in  $j$  hospital and  $x_{ij}$  shows the amount of  $i$  is the input of  $i$  in  $j$  hospital. In addition,  $i$  includes the amounts of 1, 2, 3, and 4 for the number of the physicians, nurses, other staff, and active beds, respectively.

$$\begin{aligned} \text{Min } y_1 &= \theta - \varepsilon(\sum sr+ - \sum si-) \\ \text{St: } \sum \lambda_j y_{rj} - sr+ &= yr1 \quad j=1,2,\dots,12 \\ r &=(1,2) \\ \sum x_{ij} \lambda_j + si- &= xi\theta \quad i=(1,2) \\ \lambda_j, sr+, si- &\geq 0, \sum \lambda_j = 1 \end{aligned}$$

Data analysis of management competency was induced by SPSS Version 22, and mean and standard deviation were used to describe the data. In the final stage, normality of the data was evaluated using the Kolmogorov-Smirnov test, and hypothesis testing was performed using t-test, independent-samples t-test, ANOVA, and Pearson's correlation-coefficient. In all statistical analyses, P-value of less than 0.05 was considered significant.

**Results**

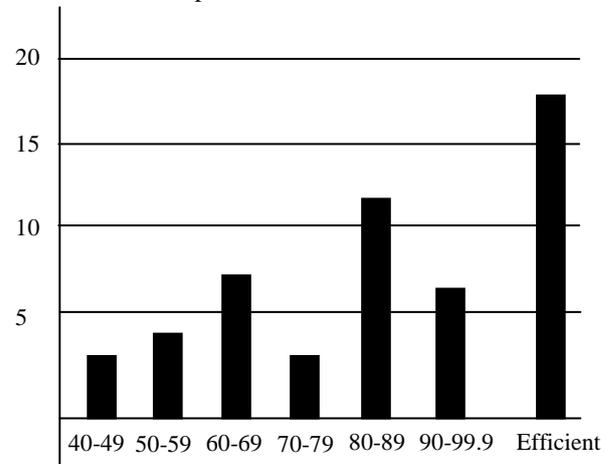
In the present study, response rate of the questionnaire was determined to be 89.3. The majority of the managers (69%) were male, and most of them had more than 10 years of work experiences. Only 10% of the managers had healthcare management degrees (Table 2).

**Table2: Demographic details of participant (Frequency and percent)**

Demographic details		N (%)
Gender	Male	138 (69)
	Female	62 (31)
Age	< 35	59 (29.5)
	35-50	104 (52)
	>50	37 (18.5)
Years of work experiences	<5	54 (27)
	5-10	71 (35.5)
	>10	75 (37.5)
Primary formal qualification	Healthcare/Hospital Management	20 (10)
	General Administration	38 (19)
	Non- hospital Management	122 (71)
Formal training course	Yes	107 (53.5)
	No	93 (46.5)
Intend to attend future training course	Yes	123 (61.5)
	No	77 (38.5)

Figure1 demonstrates the hospitals with a score of 100, which were considered to have adequate technical efficiency, and the hospitals with the score of less than 100 were technically inefficient. Among 28 hospitals,

13 cases (46.4%) were scored one or 100, and 15 cases (53.6%) were scored less than one. Mean scores of the dimensions of management competency are presented in Table 1. According to the information in this table, total mean score of management competency was 3.28, which is at an acceptable level.



**Figure 1: The distribution of efficiency scores of hospitals based on VRS model.**

The results of ANOVA parametric test were indicative of significant mean differences between the management competency with work experience and educational level of the hospital managers. Furthermore, the results of t-test revealed the association between management competency and participation in formal healthcare management trainings ( $P=0.003$ ), as well as the significance of the intention to participate in these courses in the future ( $P=0.01$ ) (Table 3). According to the Pearson's correlation-coefficient, management competency and technical efficiency of hospitals had a direct, significant correlation ( $r= 0.68$ ;  $P=0.006$ ).

**Table3: The relationship between managers' competencies and demographic variables**

Variables	ANOVA		independent samples test	
	F	Significance	t	Significance
Age	0.841	0.47	-	-
Years of (work experiences)	1.42	0.039	-	-
Educational degree	2.14	0.047	-	-
Sex	-	-	0.271	0.78
Participation in health care management training courses	-	-	3.057	0.003
Intention to participate in next health care management training courses	-	-	-2.594	0.01

## Discussion & Conclusion

In the current study, all the participants assessed themselves to be reasonably competent in all the dimensions of competency. In a study in this regard, Chadwell claimed that management competency was relatively high in the hospitals of Nepal (4). In another study conducted in Nepal, Khadka reported similar results (12). Moreover, management competency in South Africa was reported to be high by Pillay's researches (1,6,8,27). Therefore, similarities of the aforementioned results can be appraised as improved technical efficiency of mentioned hospitals.

In the present study, managers considered themselves to be more competent in the dimensions of 'leadership and strategic management', 'human resource management', and 'planning'. On the other hand, the lowest scores were obtained in the dimensions of 'knowledge management', 'patient orientation', and 'information and communication management'.

According to the National Center for Healthcare Leadership (NCHL) competency model, the competencies that were rated higher by the managers mostly involved patients, changes, and improvements, while the other competencies mostly involved legal and moral issues (29). Considering that organizations must embrace the concept of change in order to improve their status, managers of the studied hospitals in the current research are expected to take proper measures and plan to enhance these competencies for their organization to flourish in the future.

According to the findings of the current study, 53.6% of the studied hospitals did not have high technical efficiency which reflects the lack of optimal performance. Mean score of technical efficiency in the studied hospitals was 81.9% in our research, while it was reported to be 90% and 96% in the studies by Haajiali (25) and Hatam (30), respectively. Technical inefficiency in the hospitals evaluated in the mentioned studies could be due to the improper use of the active beds input. Moreover, other studies have indicated that the size of the hospital affects its technical efficiency, so that small hospitals have lower technical efficiency scores compared to large hospitals (31).

In the present study, the average difference in the management competency was not considered significant in terms of healthcare management degree and work experience of the managers; this is inconsistent with the results obtained by Pillay

(6,27,32), that reported the managers who have an educational degree in the field of healthcare management or more work experience in this regard assessed themselves to have higher competencies compared to the other managers (8).

Findings of the current research showed a significant association between management competencies and participation in healthcare management trainings that is similar to Supic "et al".s results reported participating in these training courses could improve the mental and practical competency of hospital managers (33).

Obtaining a healthcare management degree is more appropriate for the administration of hospitals, while the future sustainability of hospitals, especially in the public sector, mainly depends on developing the potentials of the managers as part of the extensive professional management and success in the substitute plans (27).

Furthermore, the significant positive correlation between management competency and technical efficiency of hospitals in the current study was indicative of factors such as the paramount importance of competition for hospitals in order to improve their performance and managerial methods (13,33).

In general, although the technical efficiency of the hospitals in our research was acceptable, managers with high competency must further attempt for planning to improve the technical efficiency of these hospitals.

Findings of the present study could provide valuable information for healthcare policymakers in order to train hospital managers on increasing the efficiency and effectiveness of hospitals. Moreover, it is recommended that hospital managers participate in management development programs and training courses. It also seems that recruiting managers with higher academic education levels in the fields related to healthcare management could be beneficial to enhancing the technical efficiency of hospitals.

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