Studying Effects of Production Factors in Hospitals
Affiliated with Tehran University of Medical Sciences (2008 -2011)

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Abstract
Introduction: Hospitals as important sector of health care system has special location in Health economic science. In order to achieve Hospital goals, trying to evaluate and improve hospital performance by policy makers and decision makers is essential. Aim: This Study was conducted to determine Effects of Production Factors in hospitals affiliated to Tehran University of Medical Sciences (2008 -2011)

Material and Methods: In this cross-sectional study that was conducted in 2012, Research community was hospitals that affiliated to TUMS. Need date (human and capital resource information and production-performance indexes) was collected from data center of research deputy of university and hospitals and registered at information sheets and then was analyzed by stochastic frontier anlyze method through Cob-Duglas production function with SFA software.

Results: findings showed that all of production factors had positive production elasticity and positive marginal production too and were located in rational economic area except Nurses. Capital factor or hospital bed had highest positive production elasticity and positive marginal production and physician had highest average production. Production function coefficient was indicated more than 1 and showed that Studied industry had Increasing returns to scale.

Conclusion: Based on this research, with highly efficient allocation of resources in most hospitals can be achieved very significant economic savings. Labor and Capital resources have more costs for hospital Industry, there fore policy and decision makers must determine need for resource by using economic analysis and correct planning methods and then employ them, appoint optimal capacity for centers to service delivery, enhance positive efficiency indexes and distinguish the ways that is more effective in boosting of resource performance

Keywords: Hospital Efficiency, Hospital Economic, Data Evolvement Analysis, Stochastic Frontier Analyze

Introduction
Today, the health sector is one of the most important service sectors and indicators of development and social welfare, so economic recognition of this sector is very important (1). Nowadays, Health systems are one of the largest sectors of the world economy. Universal health care spending makes up about 8 percent of gross domestic product (2), in most developing countries about 5 to 10 percent of government expenditure has been allocated to the health sector (3). Government health spending in developing countries, makes up about 3 to 4 percent of GDP, this figure was much higher than that in developed countries and governments have a significant role in meeting the health care needs of the community (4).

The increasing rise of health care costs, Lead the economic experts, managers, doctors and nurses to find new ways to limit costs and improve efficiency (5). This increasing costs along with growing technology notes the necessity of paying attention to the economic concepts in the health sector (6).On the one hand, resource constraints in the health care sector along with the uncovered health needs of the sections of the population and on the other hand rising expectations by considering the development of public health achievements, remind especially to policy makers, politicians and health care managers, the necessity of more Using of the resources of the health care sector (7). Since paying attention to the health care and investment in this field lead to an increase in labor productiv-
ity and increased production, therefore, optimal resource allocation and deployment of resources in this sector is very important (8). In the basis of increasing advances in medical knowledge and technology and health care methods on the one hand, and lifestyle changes and Cultural and social structure shifts, alterations in the pattern of diseases and medical needs of people, and the rapid growth of population, on the other hand, the supply of health care facilities and services has faced with new difficulties and barriers. However, the optimal use of human and financial resources for effective production and delivery of health care services requires having knowledge of economic rules (9). Among the various components of health systems, hospital services are known as the most important factor in the increasing of the costs in many countries, this rising is growing faster in the public sector than the other sectors (10). Today, with decreasing funds from donations that were actually the main source of funding for the creation of hospitals, governments are more than before responsible for funding the health care units. Indeed, today hospitals become economic enterprises with highly varied and complex products, that a large part of the health care resources are allocated to them (11). About 50 to 80 percent of the health sector budget and a large share of trained staff and specialists of the health sector are dedicated to the Hospitals (3). In Iran, about 7 percent of GDP has been allocated to health sector costs and about 40 percent of public health expenditure is accounted for hospital care (12). Despite the large volume of resources devoted to hospitals, there is a gap between the growth of available resources and required resources, and this problem determines the necessity of effective use of human and capital resources. Poor management leads to the waste of resources, including money, manpower, buildings and equipment. Such a waste means that a certain proportion of services (outputs) can be achieved by fewer resources, by avoiding wasting of human and financial resources; they can be used in order to provide better services by better quality and better cost (13).

Shortage of public funds for investment in order to create new capacities and a greater variety of products, and lack of attention to the private sector and to some productive and public investments, and difficulties in attracting foreign investments, necessitates the perfect use of existing facilities and investments that are made in the past (14). Economic- Financial analysis provides particular logical framework for analyzing important issues in health care (15).

Making decision about the optimal provision of health care is a complicated task and decision-makers require having information about the performance of the health care systems. The task of health economists is analyzing the issues and reported results of the economic evaluations in different forms for health policy makers (16).

In 2006, Rezapour and Asef Zadeh, in a study titled "The estimation of the production function in education and treatment centers of Qazvin University of Medical Sciences", showed that all production inputs excluding physicians had positive production elasticity and positive marginal product. Cobb - Douglas production function Coefficient production was estimated about 1.28 for the studied hospitals and It was shown that these centers had increasing returns to scale (17). In 2005, Rezapour in a study titled "Economic behavior in public teaching hospitals affiliated to Iran University of Medical Sciences" estimated the average marginal product of labor and capital, respectively, 25 and 18 inpatient admissions. The elasticity of the total cost to the labor rate was 0.69 and the elasticity of the total operating cost to the fund rate was estimated to be 0.048.

The cost elasticity of the production and also the coefficient of production function of studied hospitals was estimated respectively 0.738 and 1.29. Showing that injection of human and capital resources to these health centers would reduce the average cost of production units in the long term (18). In 2005, Rezapour and Haghparast, in a study titled "The Performance of production inputs in general teaching hospitals affiliated to Iran University of Medical Sciences", showed that all production inputs excluding the paramedics have had a positive impact on the process of production. Nurses have had the maximum impact and physicians have had the minimum positive impact on production. In this study, the substitution Elasticity of paired inputs of doctor and nurse, practitioner and bed, nurse and bed, were respectively estimated to be 0.62, 0.19 and 0.10 (19).

By the estimation of hospitals production function, the impact of inputs on the hospital outputs can be identified and then become more effective in attracting and recruiting human and capital resources based on the economic principles and prioritizing the assimilation of the resources by considering the hospitals financial resources constraints. Therefore the present essay aimed to study the effect of human and capital resources on outputs of the hospitals affiliated to Tehran University of Medical Sciences during the years 2008 to 2011, by using the stochastic frontier analysis with Cobb - Douglas production function.

Material and Methods
In this descriptive - analytical study which was conducted in 2010, research population included hospitals affiliated to Tehran University of Medical Sciences. In this study the researchers collected data through observation and interview and tools for data collection were information forms.

Statistical information needed for the study was panel (a combination of cross-sectional and time-series data), which was collected from the statistics Center of the research Deputy and hospitals affiliated to the university and then data was recorded in the information forms. Information forms contained variables such as number of doctors, nurses, and other non-medical staff, including administrative-financial staff, diagnostic imaging staff, support staff, number of active beds, number of hospitals inpatient admissions, patient days and bed days.

This study aimed to estimate the impact of human and capital resources on the hospitals production in which
the stochastic frontier analysis (Stochastic Frontier Analysis; SFA) was used. The Frontier4.1 software was utilized to estimate the function. In this method, the estimated function of Cobb-Douglas (according to the test LR) were considered as follows: \( Q = \alpha L^\alpha K^\beta \)

In this function, \( \alpha \) is coefficient of production technology, \( L \) denotes labor, \( K \) denotes the capital, \( \alpha \) represents the production elasticity of the labor, and \( \beta \) represents the production elasticity of capital. Also, in this function, the coefficient of function is equal to the sum of production elasticity of the factors and inputs: \( n = \alpha + \beta \)

### Production inputs:

With regard to the types of Empirical studies in hospitals economy, there are two types of inputs, including:

- a) Human resources of production, including: number of medical staff, nurses and nurse's aides, the number of personnel in diagnostic-imaging departments and the number of hospitals administrative-financial staff
- b) Capital resources: number of active beds in the hospital

### Production Variable:

In this study, with regard to the similar studies that have been conducted, the indicator of number of inpatient admissions, was selected as the dependent variable or output.

### Estimation function in this study:

Cobb-Douglas, is the most widely used type of production function to estimate production functions in the health systems. By calculating \( \ln \) of both sides of the function, the function for the under studied hospitals can be rewritten as following:

\[
\ln Y = \alpha + \sum \beta_i \ln x_i
\]

Where \( x_i \) represents production inputs such as human resources that include number of medical staff, nurses and other personnel considering the number of personnel in diagnostic-imaging departments and support staff, and it also represents the inputs such as capital resources which include the number of active beds. In this function, the coefficients of each one of the production inputs is indicative of their corresponding elasticity(20). With regard to the fact that hospital is a multi-product enterprise, selection of the number of inpatient admissions as a production variable and also using one type of production function for estimation, are considered as the limitations of this study.

### Results

The results show that among the hospitals production inputs, capital factor or hospital active beds, had the maximum positive impact and physicians had the minimum positive impact on the hospital output in the studied industry. Meanwhile, the nurses as an input had negative elasticity and production but this is not statistically significant. According to research findings, production inputs with the exception of nurses are in the second or economic area and this inefficient input is located in the third area. In addition, in this study coefficient of production function is estimated to be 1.143, this also indicates that the under studied industry generally has an increasing return to scale expansion. The results also showed that the maximum amount of average production is related to the physicians and minimum amount of average production was belonged to the other staff. Given that the obtained LR in this function was greater than 4 in amount, this shows that the estimated function is considered as an appropriate function for prediction and policy making in the under studied industry.(Table 1).

Other findings from the study were that the highest average length of stay of patients in the studied industry is related to the 2009 and the lowest is related to the year 2011. An average length of inpatient stay has declined in the studied industry over time. The maximum average of bed turnover in the studied industry refers to 2010 and the minimum is related to the year 2009. The maximum average of turnover intervals (gap days) in the under studied industry is relevant to 2008, and the minimum is related to the year 2010. The maximum average of bed occupancy rate is referred to 2010 and the minimum rate is related to the year 2008. The maximum empty bed days in the under studied industry was referred to 2008 and the minimum rate is related to the year 2010 (Table 2).

| Table 1. Results of the estimation of the production function of studied industry |
|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| \( \ln Y = 4.09 + 0.017 \ln X_1 + 0.044 \ln X_2 + 0.15 \ln X_3 + 1.02 \ln X_4 \) | \( T \text{ test } (6.61) \) | \( (1.76) \) | \( (0.55) \) | \( (2.26) \) | \( (5.97) \) |
| MLE= 23.84 | LR= 168 | input | \( EX_1 \) = Elasticity of production | \( AP \) = Average production | \( MP \) = Marginal production |
| Physician(\( X_1 \)) | 0.017 | 248 | 4 | |
| Active bed(\( X_2 \)) | 1.02 | 50 | 51 | |
| Other personnel(\( X_3 \)) | 0.15 | 30 | 4.6 | |
| Nurse(\( X_4 \)) | -0.044 | - | - | |

<p>| Table 2. A display of average of performance indicators in the studied hospitals |
|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|</p>
<table>
<thead>
<tr>
<th>Annual average in the study period</th>
<th>2012</th>
<th>2011</th>
<th>2009</th>
<th>2008</th>
<th>Performance indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.33</td>
<td>5.09</td>
<td>5.14</td>
<td>5.56</td>
<td>5.53</td>
<td>Average Length of stay</td>
</tr>
<tr>
<td>50.20</td>
<td>50.88</td>
<td>50.89</td>
<td>49.39</td>
<td>49.67</td>
<td>Average of bed turnover</td>
</tr>
<tr>
<td>1.98</td>
<td>1.92</td>
<td>1.68</td>
<td>1.83</td>
<td>2.51</td>
<td>Average of turnover intervals</td>
</tr>
<tr>
<td>72.56</td>
<td>73.1</td>
<td>76.46</td>
<td>75</td>
<td>65.7</td>
<td>Average of bed occupancy rate</td>
</tr>
<tr>
<td>416159</td>
<td>431689</td>
<td>364969</td>
<td>372161</td>
<td>495817</td>
<td>Total empty bed days</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Index</th>
<th>undesirables</th>
<th>moderate</th>
<th>desired</th>
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<tr>
<td>Bed Occupancy (%)</td>
<td>less than 70</td>
<td>60-70</td>
<td>more than 70</td>
</tr>
<tr>
<td>The average of length of stay (day)</td>
<td>more than 4</td>
<td>3/5-4</td>
<td>less than 3/5</td>
</tr>
<tr>
<td>Bed turnover (time)</td>
<td>less than 17</td>
<td>17-24</td>
<td>more than 24</td>
</tr>
<tr>
<td>Occupancy Intervals (day)</td>
<td>more than 3</td>
<td>2-3</td>
<td>less than 2</td>
</tr>
</tbody>
</table>

**Discussion**

One of the criteria for measuring success of organizational performance and determining levels of achievement in obtaining the desired goals, is organizational statistics and indicators (21). Performance indicators are quantifiable measures in order to measure the performance that help the organizations to measure and evaluate the rate of progress in achieving their objectives. These indicators reflect the critical factors of success and focus on such aspects of organizational performance that are momentous for the present and future of the organization (22, 23). Hospital indicators, show the Hospital performance in a variety of fields, so paying full attention to these indicators is essential. In addition, hospital indexes, as the most important factor in reflecting the hospital performance should be surveyed and compared at regular time periods (24). According to Kandrz, use of indexes such as average length of stay in hospital, bed turnover and bed occupancy can be effective in productivity and quality of service (25). On the other hand if we want to assess the managers and hospital performance from the point of view of efficiency, we can consider indexes such as, the bed occupancy rate, average length of patients stay, bed turnover, and the average of occupancy intervals. However, in the assessment of the hospital efficiency indexes, more bed occupancy rate and bed turnover indexes and the less extent of average length of hospital stay for patients and bed occupancy intervals, means that the hospital has a favourable status (26). Therefore, bed occupancy rate and bed turnover are considered as positive efficiency indicators and the average of occupancy intervals and the average of the length of stay are known as negative efficiency indicators.

The results of the study about the hospital performance indicators showed that average of bed occupancy rate, average of length of stay of inpatients, the average bed turnover and average of occupancy intervals in the studied industry did not follow any particular trend during the period of the study. The average of these indexes in the under studied industry during the study period are respectively estimated to be 72.56, 5.33 days, 50.2 patients and 1.98 days. The approved standard parameters of the Ministry of Health for these indexes (24, 27) are listed in Table 3, shows that all indices except the average length of inpatient stay are too high and improper. In one study by Ebadi Azar and Rezapour, percentage of bed occupancy rate, average length of stay, bed turnover and bed turnover intervals are respectively determined 57%, 6 days, 31 times 4.5 days (28). In a research by Sadeghi Far et al., these indices have been determined 66.12%, 2.92 days, 87.82 times, 2.02 days (27). In a study by Ameriuon et al., these indices are specified 79.18 percent, 3.47 days, 22.83 times and 0.96 days in a military hospital (26, 29).

In 2007, Hosseini Shokuh, in a study in 21 public and private hospitals of Tehran University of Medical Sciences has reported that the average bed occupancy rate (%) of the studied hospitals was 66.67 percent (30, 31). In 2010, He also conducted another study in 41 public and military hospitals in Tehran, in which he stated that the average bed occupancy rate was 78.55 percent (32). In a research by Jacob et al., in the intensive care units in Britain, the average bed occupancy rate was 79% and the mean average length of stay in the studied units was 4.41 days (33). The most appropriate bed occupancy rate, in most hospitals was considered to be 85 to 90 percent and the remaining 10 to 15 percent, are refered to the repairing beds, or changing and preparing the beds for the next patient (34), therefore in the studied industry there is a gap between the current status and the desired point, in terms of this index.

If BOR is high, this implies pressure and an excessive use of services which is likely to result in diminishing the quality of care but if bed occupancy rate is low, it shows low utilization of the facilities. Typically, in small hospitals the bed occupancy rate is lower than in large hospitals and in order to specify the work load in different sectors of the hospital, bed occupancy rate shoud be determined based on the evaluations, specialty fields and different units (35).

So in order to find and evaluate the gap between the current status and desirable point of bed occupancy rate in the studied hospitals, there is a need for additional studies about the mentioned reasons of the low BOR with considerations such as hospital size, and in specialized, sub specialty and general hospitals etc.

According to the standards in terms of the average length of stay, the mentioned index can be justified, up to four days, (36) but in the under studied industry, there is a discrepancy that is noteworthy for more studies. Further research can be done in order to find some ways to reduce the average length of stay in hospitals trough reviewing the process of the patients admission up to discharge, considering the treatment methods and clinical interventions for patients in comparison with national and international standards, conducting studies on the causes of readmissions, imposing unnecessary treatment to the patients, reducing medical errors, etc. If the patient’s stay is more or less than necessary, it represents unnecessary and hasty hospitalizations and also negligence in the on time diagnosis and treatment of disease, in any case, it would increase the hospital costs.

In most general hospitals that accept patients suffering from acute diseases, the average length of stay varies between 8-15 days. By reducing this index from 15 days to 10 days in a 500-bed hospital, the hospital can serve an additional 6000 patients for a year (35). Mac Dromot

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**Table 3. standards for hospital performance indices of the Ministry of Health and Medical Education of Iran**

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and and Stock in their paper, chose the average length of stay of a patient in the hospital to assess the performance of hospitals in the New York state of America, by using the the indices of operational management and hospital production (37) and mentioned that the average length of stay of a patient is an operational goal that includes many traditional operational performance aspects (38 , 39) which refers to the average time that a patient spends in the hospital ( 40 ). Most hospitals treat an average length of patient stay as a vital performance indicator (37). Previous studies have shown that this index is related to cost, efficiency, quality of care and speed of service delivery (40, 41) and therefore this index can be considered as an appropriate indicator for performance evaluation. Generally, Mac Dormot and Stock consider this index as a tool for organizational performance assessment in hospital, especially from the strategic perspective. Mac Dormot and Stoke stated that since the average length of stay is constantly relevant to different dimensions of performance, so it can be used as a comprehensive and reliable indicator in hospital performance assessment (37) and to confirm their comments, they have mentioned that many researchers in hospital affairs, have extensively used this index as an important tool that reflects multiple and various aspects of cost performance measurement (42-44), quality (40), efficiency (41) and profitability (45, 46) in their researches(47, 48).

Regarding the bed turnover, it should also be noted that the mentioned indicator is related with other performance indicators, especially BOR. Bed occupancy rate and bed turnover indices always have a reverse relationship and if despite this fact is observed in the hospital charts and statistics, the accuracy of the information can be doubted but there is no reasonable relationship between these indices and the patient's length of stay. There is a direct relationship between the length of stay indicator and BOR and the interesting point about the relationship between bed occupancy rate and bed turnover index is that if the length of stay is fixed in a period of time, even by increase in bed turnover rates, bed occupancy rate will decrease which in itself, this point is quite remarkable. In most cases, BOR and turnover indices have the opposite relationship and when BOR is just over 75 percent, these two variables are directly related (24).

The average of occupancy intervals index has a close relationship with other performance indicators (35). The higher rates of this index reduce the bed occupancy rate and the proportion of patients' admissions. An increase in the index rate increases the empty bed days and consequently lead to higher costs to the hospital (34).

The other results of the present study was that among the affecting production variables in the studied industry, the inputs of physicians, active beds, and other personal had the positive effect and nurses as an input had the negative impact. Among the mentioned inputs, the most positive effects belonged to the capital factor or active beds and the minimum impact was related to physicians. Considering that in this function, the obtained LR is more than 4, this shows that the estimated function is considered as an appropriate function for prediction and policy making in the studied industry.

According to the findings of the present study, the elasticity of physicians' production was estimated 0.017 that indicated 1 percent increase of physicians' number in the surveyed industry can lead to 0.017 percent increase in the number of inpatient admissions. Average and marginal production of physicians in the studied industry, were estimated respectively 248 and 4 inpatient admissions indicates that this input can be economically placed in the second area and increased use of this input can lead to increase of total production and reduction in the unit cost for the services.

In 2004, in a research by Rezapour, the Production elasticity of physicians has estimated 0.57 (19) and in 2005, he showed that the production elasticity of physicians was -0.55 and the marginal production was -114 per admission (17). In 1975, in a study by Mark Pauli, the marginal production of an additional doctor at under studied medical centers has been estimated 35 inpatient admissions annually (50). In Hansen's study (2000) the production elasticity and marginal production of the physicians were respectively estimated 0.18 and 156 inpatient admissions(51), Morris and Jensen in 1996, showed that the annual marginal production of an additional physician in medical centers was 6.05 admissions (52).

According to recent research findings, the production elasticity of active beds was estimated 1.02 which indicated that 1 percent increase in the number of the active beds in the studied industry can lead to more than one percent increase in the number of the inpatient admissions. The average and marginal production of active beds in the studied industry were estimated respectively 50 and 51 which indicate that this input is economically placed in the second area and the increase of the use of this input can lead to the increase of the total production and the reduction in the unit cost for services.

In the study by RezaPour (2004), the production elasticity of the active beds was 0.24 (19) and in 2005, the production elasticity of the active beds was 0.81 and the marginal production was estimated to be 54 per inpatient admissions (17). In the research by Mark Pauli in 1975, the marginal production of an additional bed in the under studied medical centers was annually estimated 3 inpatient admissions (50). In the Hansen's study in 2000, the elasticity of the active beds was estimated 0.54 (51).

So necessary attempts to identify options and choices in order to enhance and improve the positive performance indicators (such as bed turnover and bed occupancy rate) and reducing negative performance indicators (average length of patient stay and the intervals of bed occupancy) and reducing the occupied bed days in the studied hospital is especially important to the managers and authorities.

According to the results of the current study, the production elasticity of the other personal as an input was estimated to be 0.15 which showed that one percent increase in the number of the personnel in the studied industry can lead to an increase of 0.15 percent in the number of inpatient admissions. Average and marginal production of the other personnel as an input in the studied industry, were estimated respectively 30 and 4.6. Indicating that the input is economically placed in the second area of the production and increasing the use of this input can result in increasing total production and reducing unit cost for the services. In 2004, Rezapour's study showed that the production elasticity of the other staff was -0.07 (19) and
in 2005, the elasticity production of the other staff was 0.73 and the marginal production was 37 inpatient admissions (17). Hansen's study in 2000 estimated the marginal production of non-medical staff to be 41 inpatient admissions (51).

According to the findings of the present study, the production elasticity of the nurses was estimated -0.044 indicating that an increase of 1 percent of physicians in the studied industry can lead to a reduction of -0.044 percent in the number of inpatient admissions. However, this is not statistically significant. This input is economically placed in the third production area and increasing the use of this input can result in reducing total production and increasing unit cost for the services. In 2004, in Rezapour's study the production elasticity of the nurses as an input was 0.33 and in 2005 the the production elasticity of the nurses was estimated 0.29 and the marginal production was 38.6 inpatient admissions (17). In 2000, in Hansen's study, the production elasticity and the marginal production of nurses were estimated respectively 0.67 and 215 inpatient admissions (51), and Morris and Jensen's study in 1996, showed that the annual marginal production of an additional nurse at medical centers was 20.3 admissions (52).

In all the mentioned studies, Nurses are one of the inputs that has a positive impact on the production process but in the present study the situation is different, however, as been noted in our study, this finding was not significant. In most cases in our study, the effectiveness of inputs in the production process is to some extent different from findings have been noted in other studies. These differences can be due to the number and type of under studied centers, differences in administrative structures and resources, differences of working methods, differences between the indices rates and the covered population, the ratio of inputs together and the ratio of medical centers to the population, the differences in the under studied geographical areas, and differences in virulence of the diseases and demographic characteristics, etc.

The results also showed that the coefficient of the Cobb-Douglas production function for the studied industry was estimated to be 1.143, which indicates that the industry total has the increasing returns to scale. In 2004, Rezapour's study showed that, the coefficient of the function was equivalent to 1.17 (19) and in 2005, it was equal to 1.28 (17). In Hansen's study (2000), was also shown that the studied hospitals had the increasing returns to scale (51), although in the Morris and Jensen's study in 1996, they had decreasing returns to scale.

Conclusion
In this Study, the effects of Production inputs on the outputs of the hospitals affiliated to Tehran University of Medical Sciences was determined by the use of the stochastic frontier analyze method through Cob-Duglas production function. In this study, the inputs with the maximum and minimum impact on the production in the studied industry were indicated. The capacity of performance improvement in the industry exists by the elimination of redundant inputs which are placed outside the production economic area. In the studied industry, many significant economic savings can be achieved by the optimal allocation of resources in most studied hospitals. Microeconomic analysis of health systems can be a good basis for policy making in order to improve the organizational performance of health care system. In general, the results of the study showed that the existence of increasing returns to scale in the under studied industry justifies the necessity of injecting the production resources with positive production elasticity and positive marginal production. Identifying the affecting factors on enhancement and improvement of the positive operational indices in the studied hospitals is essential because of the Positive and significant effect of active beds on the production process and the necessity of injecting this important resource in order to eliminate the scale inefficiency. Employing the inputs based on the economic and principled need assessment and priority setting in order to influence on the hospital outputs, if possible directing the resources to the active centers with high capacity, replacing inputs instead of employing new inputs, and prevention of excessive costs to the system by considering the substitution elasticity of inputs, removing unnecessary processes in affairs related to admission, hospitalization and discharge, reducing inessential administrative bureaucracy and carrying out reforms in order to enhance productivity level is a necessity for policymakers and authorities for optimal source allocation and improving the productivity.

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