International Journal of Economics and Management Sciences
Vol. 2, No. 9, 2013, pp. 44-53

MANAGEMENT JOURNALS
managementjournals.org

Measuring Efficiency of Reformed Public Hospitals in Saudi Arabia: An Application of Data Envelopment Analysis

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ABSTRACT

The study aims at investigating the efficiency of public hospitals that have been reformed to operate under private sector management of through the full operating system in KSA. The study applied Data Envelopment Analysis(DEA) on the sample of reformed hospitals based on the ministry of health data for 2011. The study found that although the Saudi government achieved many positives results such as: attracting the excellence human resources, rising of the level of government health services, attracting national capital to the health sector, and reducing the administrative burden of the government sector, there are (60%) of the study sample had not achieved relative efficiency due to different reasons. The study concludes that health reform is complex, and requires policy consistency, stability, and government institutions with strong implementation capacity and government credibility. Public hospitals reform requires close coordination between policy design and implementation, and a matching of the scale and pace of reform to the capacity for implementation. Over time, through iterative evaluation, policy review and adjustment, KSA can identify what works best, and move to more consistent policies, standards of service delivery, and equity of access across its hospital system.

Keywords: *Economics; efficiency; public hospitals, DEA, KSA.*

1. INTRODUCTION

Since the late 1980s, many upper-income countries, transition economies, and developing countries have implemented organizational and management reforms of public hospitals, for example, UK, Germany, Singapore and Brazil. Many countries and local governments have undertaken pilot reforms in selected hospitals (often major tertiary teaching hospitals) for example, in Malaysia, and Thailand. Public hospital reform has been advocated in every region of the world because of common problems: inefficiency, waste, user dissatisfaction, brain drain of personnel to the private sector or emigration, failure to reach the poor, fraud, and corruption. These problems are often attributed to their nature as public hospitals, which are typically characterized as lacking incentives for good performance, penalties for poor performance, and managerial freedom for hospitals wishing to change.

Health car in Saudi Arabia has increased and improved significantly during recent decade. Especially in the areas of equity and accessibility of services, as well as the movement towards universal coverage. Thirty years later, the 5-year development plans were introduced by the government to improve all sectors of the nation, including health care system. Since then, substantial improvements in health care have been achieved in Saudi Arabia. (Walston et.al, 2008). Currently the Ministry of health (MOH) is the major government provider and financer of health care services in Saudi Arabia, with a total of 244 hospitals (33277 beds) and 2037 primary health care (PHC) centers. See table (1).

Table(1)
Evolution of MOH's hospitals and its share of total government spending

Years	No. of hospitals	No. of beds	Gov. budget(SR. millions)	MOH budget	%
1990/1991	116	26886	245	12	4.9
1995/1996	176	26955	280	16.7	6
2000/2001	189	27826	335	19.7	5.9
2005/2006	209	28430	380	22.8	6
2010/2011	230	30214	4500	25.2	5.6
2011/2012	244	33277	475	29.52	6.2

Source: Health statistical year book, Riyadh, Saudi Arabia, Ministry of Health. Different issues

Before the year 1399 hospitals run and managed by MOH, which known " self-operating system", where MOH was responsible for hiring all Saudis and foreigners hospital staff according to the civil service system. But there are a number of factors led to the transformation from self-operating system to another system based on private sector participation in operating public hospitals, which are:(Al-Husaini,2006)

- MOH established new five large and modern high-tech hospitals during the years of National Development Plan II (1395-1400) in Jeddah, Jizan, Hofuf, Medina and Al Khobar, but it had not available qualified human resources capable to run these facilities, therefore, MOH held bilateral cooperation agreements between Saudi government and other countries, where the new hospitals had been running by specialized staff from these countries.
- MOH desire to carry out planning, organization, supervision and controlling functions, which eventually would lead to integration in providing high quality and efficient health services and ensuring its continuity.
- Saudi government desire to increase the opportunities for the private sector to manage, operate and maintenance projects that set up by the government in the framework of the free market orientation.
- The success of the first experiment to run some military hospitals affiliated to the Ministry of Defense and Aviation by the private sector for nearly 30 years ago, and it followed with running King Faisal specialist hospital and the research center by specialized international company. These experiments have achieved tangible success where medical center archived rapid advancement in the level of health services to cope with the technical development in the field of health care and providing the best possible quality services.
- MOH's desire to cope with modern methods that applied in many countries in North America, Europe and East Asian countries in the field of management, operation and maintenance hospitals which confirmed success of the private institutions in carrying out these tasks in reducing the cost and improving the level of service performance.

The previous factors led Saudi government to shift from "self-operating system" to new operating system by private companies as a method of privatization. Saudi government followed gradient progress policy which began running hospitals through bilateral cooperation agreements between Saudi government and the governments of other countries, then it followed by partial operation system and comprehensive operation system, and ended up to full operating system. (Ateeq,2002)

The current study focuses on the "full operating system" that followed by the Kingdom after the emergence of cons in other phases of operating systems. Saudi government started to adopt this system in 1400, when AMI company was responsible for full operation of King Fahd Hospital in Baha. In 1411, the MOH applied this system in many hospitals in KSA such as: King Abdul Aziz University in Jeddah , King Saud Hospital in Bisha, and Al-Amal hospitals group in Riyadh, Jeddah and Dammam. According to the MOH statistics , there are currently about 37 hospital affiliated with the MOH operated according to full operating system .

The study aims at evaluating and measuring the efficiency of a sample of public hospitals that have been managed by private sector in order to identify which hospitals are more efficient(According to providing the greatest quantity of services or outputs) by using available inputs, and which hospitals are not. In addition, determining the amount of inputs which should be reduced (or output which should to be raised) for less efficient hospitals in order to achieve the required efficiency.

The study adopt Data Envelopment Analysis (DEA)which is one of the benchmarking analysis technique that widely used for the efficiency measurement of hospitals. It is popular in evaluating hospital efficiency because it is applicable to the multiple input-output that is essential for the nature of a health care system. (Linna et al., 2006)

The reminder of the study is organized as follows: Section two reviews the relevant empirical literature on measuring efficiency of hospitals using DEA techniques. Section three illustrates data, and methodology. Section four describes and discusses the empirical results. Section five is conclusion and recommendations.

2. LITERATURE REVIEW

Efficiency has become one of the most attractive work areas of healthcare management literature. Studies on hospital efficiency mostly focus on the issue of maximum gain with limited resources (Sorkis and Talloru, 2002). The interest on hospital efficiency has increased because of the desire to control the increasing costs. Accordingly, hospital resources and their processes became critical and, as a result, the number of studies has increased in recent years. (Bakar et al., 2010).

Modeling efficiency measurement is a non-parametric way was introduced first by Farrell (1957) including that measurement of price and technical efficiencies and the derivation of the efficient production function.

Literature review of DEA studies on hospital efficiency shows that there many studies applied in both developed and developing countries. The first DEA model developed by Charnes et al. (1978), named the CCR model, was based on the assumption of Constant Return to Scale (CRS) in order to measure the efficiency of decision making units (DMU). Later, Banker et al. (1984) enhanced the CCR model and developed the BCC model using the Variable Return to Scale (VRS). They used empirical data from a sample of North Carolina hospitals to compare efficiency to characterizations obtained from DEA of econometric models. The DEA model was able to identify inefficiencies and uncover return to scale possibilities in individual hospitals that were not evident in the trans-log model. In addition, they reported that DEA's efficiency estimates appeared to be more closely related to the degree of capacity utilization than were the trans-log estimates.

Vivian (1990) used DEA and he found that public non-profit hospitals were more efficient than private non-profit hospitals. Dittman et.al,(1991), attempted to demonstrate how DEA can be useful to hospital administrators and health care planners. They used actual data collected by the American hospital association through its monitored data service. They found that the efficiency with which a hospital operates may well depend on the local or regional labor market, the competition among health care providers in that market, and the demographics of the service area. They concluded that inefficiency score and the resource conservation potentials were based on a unit's so-called contraction path, where all of the controllable inputs were required to be reduced by the same factor.

Ozcan, Luke and Haksever (1992) used DEA to show that government and non-profit hospitals were indistinguishable from one another regarding their percentages of inefficient scores. Kooreman (1994) analyzed the technical efficiency of Dutch nursing homes with respect to the use of labor. White and Ozcan (1996) studied the effect of church-ownership on hospital efficiency, using a sample of California hospitals, and they found that religious hospitals were more efficient than secular (public) nonprofit hospitals.

Harris, Ozgen and Ozcan (2000) and Ferrier and Valdmanis (2004) applied DEA methods to analyze the effects of merger on hospital efficiency. Harris, Ozgen and Ozcan (2000) found scale efficiency to be the dominant source of efficiency improvements, but they did not find improvements in technical efficiency one year after a merger. Ferrier and Valdmanis (2004) used methods very similar to those used in this study to evaluate the effects of hospital mergers. They compared efficiency scores one year before, the year of and one year after the merger using matched pairs of hospitals. They found no significant change in technical efficiency in the year after a hospital merger. However, disruptions associated with consolidations likely take more than a single year to resolve themselves and improvements in technical efficiency can only then emerge.

Dino Rizzi and Vincenzo Rebba(2006**)** applied DEA method to measure the efficiency of 85 (public and private) hospitals in Veneto, a Northern region of Italy. They found that the imposition of a lower bound on the virtual weight of acute care discharges weighted by case-mix (in order to consider policy-maker objectives) reduced average hospital efficiency. Moreover, they showed that, in many cases, low efficiency scores were attributable to external factors, which were not fully controlled by the hospital management; especially for public hospitals low total efficiency scores could be mainly explained by past policy decisions makers on the size of the hospitals or their role within the regional health care service. Finally, non-profit private hospitals

exhibited a higher total inefficiency while both non-profit and for-profit hospitals are characterized by higher levels of scale inefficiency than public ones.

Consequently, Nayar and Ozcan (2008) concluded that DEA is constructive technique for health care managers to investigate opportunities in accordance to efficiency improvement.

Al-Shayea (2011) applied DEA for measuring the relative efficiencies of units delivering similar services. This technique is applied to study the performance and efficiency of King Khalid University hospital departments. The results showed that only two departments out of nine have 100% efficiencies throughout the 12 months period. M. Sahin and Bulent (2011), investigated the efficiencies of hospitals in Turkey with respect to their ownerships for the years (2001-2006) by adopting DEA, they found that the average efficiencies of state hospitals remarkably increased while the average efficiencies of private hospitals decreased especially after the starting of reforms in the state-owned hospitals. Barnum, et al.(2011), developed efficiency indicators valid for non-substitutable variables by using a sample of 87 community hospitals, they compared the new measures' efficiency estimates with those of conventional DEA measures. DEA substantially overestimated the hospitals' efficiency on the average, and reported that many inefficient hospitals to be efficient. Further, it greatly overestimated the efficiency of some hospitals but only slightly overestimated the efficiency of others, thus making any comparisons among hospitals questionable.

It is clear from previous studies, they tried to measure the impact of ownership on hospital efficiency using DEA , but that there is rarity of studies that tried to measure the impact of privatization of management on the efficiency of public hospitals in general and Saudi Arabia in particular. This reflects the significant of the current study that attempt to measure the efficiency of the reformed Saudi government hospitals.

3. DATA AND METHODOLOGY

3.1 Data

To investigate efficiency in the reformed public hospitals in Saudi, we select a sample of (20) hospitals that operating under fully operational system, we obtain health data for the year 2011 from MOH's Statistical Yearbook. As shown in table(2)

Table(2)
Inputs and output of selected hospitals

Hospitals	Inputs				Output			
	No. of doctors	No. of nurses	No. of beds	No. of Allied Health	visits reviewers	No.of inpatients	patients benefiting from radiography	laboratory tests
Al-Mojama	169	390	262	216	93066	11524	35081	73331
Al-Ola	100	251	133	132	36680	7851	23860	45495
King Fahd in Jeddah	515	904	612	320	270528	6776	73223	12038
King Khalid in Hail	664	165	939	861	27487	73732	13232	36581
King Fahd in Hofuf	163	336	150	186	60646	1614	39799	71287
Hira in Mecca	168	371	202	176	84244	9091	29122	665636
Hafer Al- Batin	480	788	439	369	12157	2655	88778	127643
King Khalid in Tabuk	782	166	951	703	52282	5787	200933	17823
Al Amal in Dammam	156	322	200	177	94334	14315	42426	82547
Prince Salman in Riyadh	533	977	910	681	36834	55327	13547	414305
King Fahd in Al-Baha	170	322	215	184	109379	11383	39070	114589
King Saud in Bisha	169	390	262	216	93066	11524	35081	73384
King Khalid in Najran	156	322	200	177	94334	14315	42426	82547
King Fahd in Medina	693	148	910	101	30069	55603	13212	215908
King Abdul Aziz in Jeddah	386	569	895	244	257002	6246	73223	10594

king Fahd in Jizan	230	145	310	101	30069	5560	13212	21590
Ohed in Medina	497	105	742	545	19886	27874	10666	18529
Al-Amal in Jeddah	214	601	350	315	11197	49527	67332	133165
Al-Qurayyat	163	356	150	186	60646	16144	39799	71282
Al Amal in Riyadh	436	106	597	449	191196	24181	82759	125587

3.2 Methodology

Data Envelopment Analysis (DEA) is an empirically based methodology that eliminates the need for some of the assumptions and limitations of traditional efficiency measurement approaches. The basic DEA model as introduced by Farrell in 1957 and later developed by Charnes, Cooper and Rhodes (CCR Model) uses an oriented radial measure of efficiency, which identifies a point on the boundary with the same mix of inputs (input orientation) or outputs (output orientation) of that of the observed unit.(Kontodimopoulos and Niakas, 2005)

DEA is a technique to measure relative efficiency of a set of decision-making units (DMUs) having similar multiple inputs to produce similar multiple outputs. The relative efficiency of a DMU is defined as the ratio of the sum of its weighted outputs, to the sum of its weighted inputs.

The objectives are to identify units that are relatively inefficient and setting targets for them based on examining the operational practices of the units classified as efficient. The underlying concept of DEA is based on Pareto optimality(Charnes et. al., 1994). A DMU is considered relatively efficient if there is no other DMU or a combination of DMUs which can produce at least the same amount of all outputs with less of one input and not more of any other input(Cooper et.al., 2003) It computes the comparative ratio of outputs to inputs for each unit, with the score expressed as 0–1 or 0–100%. A DMU with a score less than 100% is inefficient compared to other units. It is used to identify best practices and is increasingly becoming a popular and practical management tool.

In the first stage, DEA assesses efficiency by estimating a frontier based on input or output orientation. Then, each DMU is assigned an efficiency score by comparing the output and input ratio of the DMU on the efficient frontier. Mathematically, technical efficiency for each DMU is computed as follows: (Lavado and Cabanda, 2009)

Consider a system under evaluation, consisting of n DMUs. The inputs and outputs of every DMU are all nonnegative and every DMU has at least one positive input and one positive output, i.e., $x \geq 0$, $x \neq 0$ and $y \geq 0$, $y \neq 0$. Then, the economic efficiency of DMU is defined as follows:

$$\text{Efficiency} = \frac{\text{Weighted sum of inputs of DMU}_P}{\text{Weighted sum of outputs of DMU}_P} \qquad (1)$$

In this case, the DMUs can be easily compared. However, since the input costs and output prices are not always precisely available, DEA models are generally utilized for this purpose. It can be solved by one of two linear programming formulations:

- **The first formulation** is (CCR) that maximizes the outputs that can be obtained and constrains the sum of the inputs to be unity.(AL-Shammari, 1999).

$$\text{Max} \sum_{r=1}^{t} u_r \; y_{rjo}$$

Subject to:

$$\sum_{r=1}^{t} u_r \; y_{rjo} - \sum_{i=1}^{m} v_i \; X_{rj0} \leq 1 \quad \text{for } j=1,2,\ldots\ldots n \qquad (2)$$

$$\sum_{i=1}^{m} v_i \; X_{i0} = 1$$

$$u_r, v_i \geq 0 \quad \text{for } r=1,\ldots s;\ i=1,\ldots,m$$

y_{rj}: output r from unit j , X_{rj} :input I to unit j and u and v are scalar values chosen for each production unit such that the efficiencies of each unit are maximized and no efficiencies are greater than one. (Charnes et.al, 1994)

- **The second formulation** is developed by Banker, Charnes and Cooper (BCC model) that minimizes the inputs needed and constrains the sum of the weighted output at unity. The adopted DEA model represents the dual of the first linear programming formulation. The linear programming dual is expressed as the following: (AL-Shammari, 1999)

Min $\mu \quad Z_0$

Subject to:

$$X_{ij0} Z_0 \geq \sum_{J=1}^{n} \mu_i X_{ij0} \qquad i=1,2,.....m$$

$$\sum_{j=1}^{n} \mu_i X_{ij0} \geq y_{rj0} \qquad r=1,2,....t$$

$$\mu_j \geq 0 \quad : \quad j=1,2,\ldots\ldots n$$

$$\sum_{j=1}^{n} \mu_j = 1 \qquad (3)$$

This model estimates the technical efficiency depending on the size of existing operations in the DMU to provide services to the beneficiaries at the time of the measurement. The model also allows the possibility of having constant or increasing or decreasing returns to scale of inefficient units resulting from the change in the amount of inputs in order to get efficiency.(Cooper & Joe Zhu, 2003)

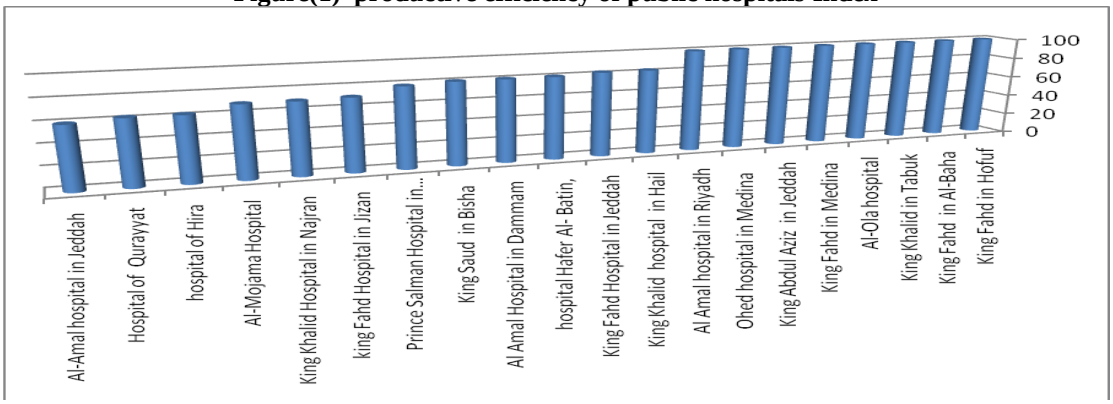
The study will adopt the two models for measuring the efficiency of health services provided by the reformed hospitals in various regions of the Kingdom. Accordingly, number of specialists, number of nurses, number of allied health and number of beds are used as input variables; while the number of patients visit outpatient, number of patients admissions to hospital, number of laboratory tests, and number of beneficiaries of radiological imaging are used as output variables.

To make sure getting accurate results from DEA, we take into account the balance between the number of inputs and outputs and the number of hospitals involved in the evaluation, where the total number of inputs and outputs should not exceed the number of DUM. (Charnes, Cooper & Siford: 1994)

4. EMPIRICAL RESULTS

The results of measuring the relative efficiency in the selected sample of hospitals, using both (BBC) and (CCR) indicate that the number of hospitals that achieved general relative efficiency is (8) hospitals out of (20) which represents (40%). These hospitals are: King Fahd in Hofuf, King Fahd in Al-Baha, King Khalid in Tabuk, Al-Ola hospital, King Fahd in Medina , King Abdul Aziz university in Jeddah, Ohed hospital in Medina and Al Amal hospital in Riyadh. While there are (12) hospitals have not achieved general relative efficiency, as it shown on Figure(1). General efficiency index will be measured to identify the main reasons of inefficacy in the (12) hospitals. Is due to inefficiency of administrative process or the inability of the administrative system to overcome the external factors or environmental variables or due to both?

Figure(1) productive efficiency of public hospitals Index



General efficiency index divided into two sub-indices as follows:

1- **Internal technical index** or (internal operation efficiently): It reflects the level of efficiency of hospitals under assessment in using available resources (inputs) to provide the best services to the beneficiaries (outputs). This index was derived from the application of (BBC) model.
2- **External technical index**: It reflects the hospital level of efficiency to overcome the environmental factors that affect hospital. (such as: hospital location, mediation and nepotism, the nature of the civil presence in the hospital, the demographics of the city, the proportion of residents in the city,…. etc.). These factors have negative impact on the level of provided services (outputs).This index was calculated by dividing the general efficiency index by the efficiency of operations index.

The table (3) shows the general relative efficiency of the hospitals sample. The average relative efficiency of all hospitals is (84.6%). This means that, in order to achieve efficiency in these hospitals, they either have to provide the same level of output by using (84.6%) of the current inputs (number of doctors, nurses, medical assistance groups), or to reduce the inputs by (15.4%) to provide the current levels of services. While if the goal is to maximize output and maintaining the same amount of inputs, the selected hospitals should increase its services by (16.8%).

In order to identify the main reasons for why these hospitals could not achieve efficiency, we calculate the external productive efficiency index , which reflects efficiency level of hospitals managers to overcome on the environmental factors.

Table (3) shows that the hospitals average general technical efficiency index reached (84.6%), while the average internal technical efficiency is (89.5%), and the average external technical efficiency is (96.4%). This means that these hospitals are inefficient because of administrative weakness to overcome the external environmental factors rather than inability to manage the internal operations.

Public hospitals that could not achieve the relative efficiency are two groups:

- Inefficient hospitals due to administrative weakness to overcome the environmental or external factors only, which are: Al-Mojama hospital , King Khalid hospital in Hail, hospital Hafer Al- Batin,,Al Amal Hospital in Dammam, King Khalid hospital in Najran, King Fahd hospital in Jizan, and King Fahd hospital in Jeddah.
- Inefficient hospitals due to administrative weakness to overcome both internal and external factors, and the weakness of external operations, which are: King Saud Hospital Bisha, hospital Hira in Mecca,Prince Salman hospital in Riyadh, Al-Amal in Jeddah, and hospital Qurayyat.

Table(3)
Public hospitals' general, internal, and external technical efficiency indices and The causes of inefficiency for the year 1433H

Hospitals	G.T.E.index	Hospitals ranking	I.T.E.index	E.T.E.index	Causes of inefficiency
Al-Mojama	71	15	74.1	89.2	B
Al-Ola	100	1	100	100	-
King Fahd in Jeddah	84	9	100	97.2	B
King Khalid in Hail	84	9	100	91.5	B
King Fahd in Hofuf	100	1	100	100	-
Hira in Mecca	65	19	66.4	92.7	A&B
Hafer Al- Batin	80	12	99.6	99.2	B
King Khalid in Tabuk	100	1	100	100	-
Al Amal in Dammam	82	12	82.7	99.1	B
Prince Salman in Riyadh	78	14	92.2	91.5	A&B
King Fahd in Al-Baha	100	1	100	100	-

King Saud in Bisha	82	11	80.3	89.4	A&B
King Khalid in Najran	70	17	74.1	98.7	B
King Fahd in Medina	100	1	100	100	-
King Abdul Aziz in Jeddah	100	1	100	100	-
king Fahd in Jizan	71	15	81.8	97.2	B
Ohed in Medina	100	1	100	100	-
Al-Amal in Jeddah	60	20	66.4	92.6	A&B
Al-Qurayyat	65	18	72.4	90.5	A&B
Al Amal in Riyadh	100	1	100	100	-
Average	84.6	-	89.5	96.4	A&B

Where: G.T.E.index: General technical efficiency& I.T.E.index: Internal technical efficiency & E.T.E.index: External technical efficiency & A: Hospitals internal operation & B: Hospitals external Environment.

One of the main advantages of DEA (in addition to select inefficient DMU) is to specify the amounts inefficiency in these units and suggest suitable quantities in order to achieve the relative efficiency, Whether the goal is to maximize outputs or reduce inputs. The analysis also provides information about referred DUMs for every inefficient hospitals in the same area until it reaches the general efficiency level.

Table (4) shows the required or appropriate improvement in the King Fahd hospital in Jeddah, until it reaches the level of general efficiency, by adopting one of the following options:

- **First option (increasing output)**: King Fahd Hospital should use its current inputs, and in order to reach general efficiency (compared with referred hospital: King Abdul Aziz University in Jeddah) it should increase reception of patients in different outpatient clinics by (28.5%) , increase the number of inpatients by (42%), increase the number of laboratory tests in its centers by (51%), and increase reception of patients benefiting from radiography at its center by (32.6%), and it can increase outputs by the lower level of inputs such as beds and nurses.
- **Second option(Reduce inputs):** King Fahd Hospital could use its current inputs to achieve general efficiency, through decreasing the number of beds by (174) bed or (-28.4%), decreasing the number of doctors by (129) Doctor or (- 25%), reducing the number of nurses by (335) or (-40%), and also reducing the number of medical assistance by (76) or (-20%). It can also increasing the number of visitors, the number of inpatients auditors and laboratory tests by (5%), (10%), (12%), respectively.

Table(4)
Optimization required in King Fahd hospital in Jeddah to reach efficiency

Inputs and Outputs	A- Reduce Inputs Target				B- Maximizing Output Target		
	Actual Value	Target values	Optimization required	%	Target values	Optimization required	%
No. of beds	612	895	-174	-28.4	600	-12	-2
No.of doctors	515	386	-129	-25	515	0	0
No.of nurses	904	569	-335	-40	775	129	-14.3
No.of Allied Health	320	244	-76	-20	320	0	0
No.of visits reviewers	270528	257002	13526	5	347628	77100	28.5
No.of inpatients	6776	6246	530	10	9622	2846	42
No.of laboratory tests	12038	10594	1444	12	13843	1805	51
No.of patients benefiting from radiography	73223	73223	0	0	97093	23870	32.6

*Referred hospital: King Abdul Aziz hospital in Jeddah.

5. CONCLUSION

The research question addressed in this paper is do full operating system of reformed public hospitals increase its technical efficiency? We used data from the MOH's Statistical Yearbook for the year 2011 to calculate and analyze technical efficiency by adopting Data Envelopment Analysis. The study found that (60%) of selected hospitals have low efficiency due to either internal factors or external factors or both. Therefore, the study suggested two options to raise the level of efficiency either increasing output or reducing input, and it applied these two options on one of inefficient hospitals compared with efficient hospital. The study concludes that health reform is complex, and requires policy consistency, stability, and government institutions with strong implementation capacity and government credibility. Public hospitals reform requires close coordination between policy design and implementation, and a matching of the scale and pace of reform to the capacity for implementation. Over time, through iterative evaluation, policy review and adjustment, KSA can identify what works best, and move to more consistent policies, standards of service delivery, and equity of access across its hospital system.

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