

Evaluation of Social Security Hospitals on the Basis of BSC Technique by Using AHP (Field Study: Social Security Hospitals of Zanjan)

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ABSTRACT

Hospital operating unit as the largest and most expensive health care system is important. The aim of this study was to evaluate and rank the performance of social security hospitals AHP technique BSC is based on In this study, two social security hospitals in the province during the year 1390 have been examined. Mtvzn the scorecard as a tool for design and evaluation indicators AHP has been used as a tool to rank. The results indicate that software Imam Hossein Zanjan Hospital No. 1 and No. 2 Abhar hope to have stepped out. And considering all the performance indicators of hospital quality improvement is needed.

KEYWORDS: Balance Score card(BSC), Analytical Hierarchy process (AHP), Performance Evaluation

1-INTRODUCTION

Conventional evaluation way the performance of organizations is studied financially, which can create deviational result. To remove this deficiency Kaplan and Norton(1992) suggested a way to evaluate the performance of organizations, which is called Balance score card (BSC). This way helps managers to understand many of relations and effects and helps to get rid of traditional beliefs of performance assessment. Finally it cause to solve the problems and make application decisions. (hung, lai, lin, 2010)

Analytical Hierarchy process(AHP) is one of the most comprehensive designed systems to decision making by multiple standards, because this technique allow to formulate the problem as Hierarchy process. It also considers the different quantity and quality measures of problem. this process involus different options of decisions making and has the possibility of sensitiveness analysis on standards and substandard, therefore shows the rate of compatibility and un compatibility of decision that is one of the excellent advantages of this analytical technique.

2. LITERATURE REVIEW AND RESEARCH HYPOTHESIS

2.1 Conceptual Background

So far different experimental researches have been done by internal and external researchers, some of them are included:

1. To develop and improve the strategic measurement of medical companies, by the use of Hierarchy process of BSC. (2010, Lee-Hsuan lin, Mei-chi Lai, Hao-Chen Huang)

The results of this study present reliable and rational way for business parts in order to explain and perform their strategies according to AHP the confidence of constant share value, intellectual assets, maintain of assets quality and managing the clients relationships are classified strategies, to perform strategies. AHP helps managers to perform strategic applications effectively in order to improve the results.

2. The way to improve the ingoing and satisfaction of San Diego university' clients. San Diego university in California was seeking the ways to improve the satisfaction of it's clients in administrative services such as library, lodgings administration, disciplinary force and transportation system. In 1994 the assistant of university employed BSC way in 27 service sectors, the results were unexpected. In administrating salaries and payments the mistakes decreased about 80% financial affairs decreased the date of payment from six weeks to three days. Innovation programmer attracted significant attention, so that in 1999 university owned the Education quality CUP from Rochester technology institute.

3. Research and study based on evidence, of evaluation performance of education institutes and university by BSC. (2010, Sen-kuei laio, sun fun chen)

On the base of BSC concept this study has been considered to help the settlement of evaluation performance system for social education institutes and it's technique is analyzed based on evidence. On the basis of BSC concept, literature analysis, specialist interview and Analytical Hierarchy process(AHP) this research is used to study indicators of performance management. Using of this study can provide a practical framework to construct and transfer from management system of performance evaluation to other institutes of social education.

4. Performance evaluation of the hospital medical evidences sector by BSC procedure (Ajami Sima, 1389, 37-47). The main purpose of this study is performance evaluation of Medical evidence sector of fatemat AlZahra, Najaf Abad by BSC procedure. According to this commission medical evidences sector of hospital was measured, then obtained quantity score of hospital was measured, then obtained quantity score corresponded to expected quantitative score.

5.Homogeneous procedure BSC-TOPSIS to evaluate higher management college of Tehran (Mehrgan Mohammad Reza, Industrial management Editions,1383).

The results of this research show that university "A" in the four aspects of BSC model has significant relative preference which causes it being situated in final grade and being at higher position to others. The main reason for this condition is the selection of client-oriented procedure and good results from the view point of client and concentrate on learning and development aspects. In this research college "4" achieved first grade, college "C" second grade and college B third grade & D fourth grade.

3. METHODOLOGY

3.1 Questionnaire Design

Main question: Have social security hospitals achieved their strategic management purposes in 1390 on the basis of BSC?
 Sub questions: 1. Have determined financial patients indicators in strategy of social security hospitals been achieved in 1390?

2. Have determined patients indicators in strategy of social security hospitals been achieved in 1390?

3. Have determined internal processes indicators been achieved in the strategy of social security hospitals been achieved in 1390?

4. Have determined learning and growth indicators been achieved in the strategy of social security hospitals been achieved in 1390?

5. if the importance and priorities of the four way of BSC are different from hospitals view?

3.2 RESEARCH METHODOLOGY

Present research is applicable in purpose and is descriptive in the light of subject characteristics .It also is measurable in the purpose of collecting date. It is field-study at the way of collecting data. The questionnaire has been used to collect information. The collected data are analyzed by using of statistical techniques (Estivdent test) and operational research MADM, such as Analytical Hierarchy process (AHP) which have agreement with research procedure and kinds of variables .collected data are analyzed and hypotheses are examined statistically. spss and expert choice soft wares are used to accelerate the study.

3.3 Sampling Method and sample size

In fact statistical population include, all of element swchich a subject of certain research find meaning of it. we want to draw a conclusion from it. statistical population is combination of cases which are in agreement with certain properties. In this study social security hospitals of zanjan have been selected as statistical population. the questionnaire has been used to consider and compare clients aspect. It is necessary to mention that this questionnaire has been designed based on servqual model or gap analysis which designed by ,and it's purpose society is patients. Because the number of patients is very much ,so a certain day as society volume of every hospital in client aspect (patients) is considered. From Cochran formula a sample of patients of every hospital was selected according following table. (Sai Aresi ,1389,43).

Table1: Number of people

Client aspect in every hospital	Number of society	Society sample
hospital of omid Abhar	756	255
Emam Hosein hospital of Zanjan	790	259

Table 1 presents the sample and the population of each community shows, as can be seen in the total number of people in hospital emergency Abhar 756 samples used 255 and the total number of people in Imam Hossein hospital of Zanjan is 790 samples used in 259 patients .

$$n = \frac{Nt_{\alpha/2}pq}{Nd^2 + t_{\alpha/2}^2 + pq}$$

N=Total number of statistical population

$t^2 = 1.96^2 =$ Estivdent when meaningful level of test equals %5

$d = \%5 = d^2 = 0.0025$

P=0.5 =possibility of adjective existence

q=05= possibility of adjective unexistence

n=capacity sample

Omid hospital of Abhar:

N=756 t=1/96 d=0.05 p=q=0/5 n=?

$$n = \frac{756 * (1.96)^2 * 0.5 * 0.5}{756 * 0.0025 + (1.96)^2 * 0.5 * 0.5} = \frac{726.0624}{2.8504} = 255$$

Emam Hosein hospital of Zanjan:

N=790 t=1/96 d=0.05 p=q=0/5 n=?

$$n = \frac{790 * (1.96)^2 * 0.5 * 0.5}{790 * 0.0025 + (1.96)^2 * 0.5 * 0.5} = \frac{758.716}{2.9354} = 259$$

3.4 Data Analysis

Results of BSC aspects

- Analysis and Main question test

The main question is that: Have social security hospitals obtained the goals of strategic management in 1390 based on BSC?

Table2 :explanatory statistics for strategic purposes.

Table2:One-Sample Statistics

Mean of standard Deviation	Standard Deviation	Average	number	Variable
.05011	.24548	3.8715	24	Goals of strategic management structure

According table 2, the mean value equals to 3.87 and it is greater than 3,so the strategic goals in social security hospitals is greater than Mean.

Table3:One-Sample Test

	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Strategic purposes of management structure	17.393	23	.000	.87153	.7679	.9752

Table3: Mean test for strategic purposes

As shown in table3 ,sig=0.00<0.05,so that test is meaningful in %95 confidence Interval. Therefore the Mean is not equal to 3.

Indicator	The percent of indicator achievement	
	Emam Hosein Hospital	Omid Hospital of Abhar
client	% 72	% 62
financial	% 97	% 99
Internal processes	% 75	% 67
Development&learning	% 74	% 63

According table4 hospitals have obtained considered goals of financial aspects. Emam Hosein hospital achieved greater than %70 of considered goals in other dimensions. Omid hospital of Abhar couldn't achieve many purposes of other aspects.

- Subquestion results of first question

Have the financial identified indicators been achieved in strategy of social security Hospitals in 1390?

Table5:explanatory statistics of Financial variable

Table5:One-Sample Statistics

variable	number	Mean	Standard Deviation	The Mean of standard Deviation Error
Financial indicators	24	4.0104	.57332	.11703

Table 6: Mean test of financial indicator

Table 6: One-Sample Test

Test to Means equality						Financial indicators
%95 confidence Interval		Mean Difference	.sig	Df	T	
upper	lower					
1.2525	.7683	1.01042	.000	23	8.634	

In table 6, there are explanatory statistics related to financial indicator, in which financial indicator has the mean of 4.01, $\text{sig}=0.00 < 0.05$ therefore mean test in confidence Interval is %95 meaningful. The mean of this indicator is not equal and the value of mean is greater than 3, so financial indicator is greater than 3 in hospitals.

Table 7: the value of indicator achievement

Hospitals financial indicators	Percentage of Indicator achievement	
	Omid hospital of Abhar	Emam Hosein hospital
Income of patients	%97	%99
Income of insurance	%94	%100
Cost of used and service goods	%99	%98
Health expenses	%99	%99
Total mean	%97	%99

In table 7, it is observed that the value of indicators' accomplishment and their total mean are greater than %90, so this shows that hospitals have been succeeded in their goals in financial dimensions.

- Analysis of subquestion of second question: Have the indicators of Determined patients in strategy of social security Hospitals of Zanjan been achieved in 1390?

Table 8: Descriptive statistics for patients variables

Table 8: one -sample statistics

Mean of indicator	indicator Deviation	mean	number	Variable
.02419	.39010	3.3395	260	Patients indicators

In table 8, Mean (3.33) Test provided for five indicators of client.

Table 9: Mean Test for client indicator

Table 9: one -sample Test

Test Value=3						Dutients indicators
95% confidence Interval of the Difference		Mean Difference	.sig	DF	T	
Upper	Lower					
.3871	.2918	.33947	.000	259	14.032	

with respect to table 9, and value of $\text{sig}=0.000 < 0.05$, is meaningful in 95% confidence interval, therefore the Mean of patients indicators is not equal to 3.

Table 10: perspective Of the index patient's

indicator	Percent of indicator achievement	
	Omid hospital	Emam Hosein Hospital
Sensible	%86	%78
guarantee	%62	%57
Reliability	%78	%60
Responsibility	%64	%62
Unanimity	%74	%53
Mean	%72	%62

According to table 10, Value of this Mean equals to 3.33 and it is greater than 3, patients indicators of social security hospitals are greater than average. As observed in table 10, the value of patients indicators in Emam Hosein hospital is greater than %70. This shows that the hospital obtained higher than %70 of Determined purpose. In Abhar hospital total mean equals to %62, so it obtained %62 of determined purposes.

- Analysis of subquestion of third question: Have determined internal processes indicators been achieved in the strategy of social security hospitals in 1390?

Table 11: Descriptive statistics of Internal processes variable

Mean of indicator	Deviation error of indicator Deviation	mean	number	variable
.12767	.62545	4.3646	24	Internal processes Indicators

Table 11, shows the descriptive statistics of Internal processes Indicators, its Mean equals to 4.36

Table 12: One-Sample Test

Test Value = 3						
Internal processes Indicators.	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
	10.688	23	.000	1.36458	1.1005	1.6287

Table12: Mean Test of Internal processes Indicators.

table12, shows the Mean of internal processes ,As it can be seen sig=0.000<0.05 so test is important in %95 confidence interval, therefore the mean of internal indicator isn't equals to 3,then internal processes of social security hospitals is greater than average.

Table13:internal process indicators

indicator	Percentage of indicator achievement	
	Emam Hosein hospital	Omid hospital of Abhar
Staff satisfaction	% 77	% 72
Patients satisfaction	% 69	% 64
Number of references	% 79	% 68
Facilities	% 76	% 67
Mean	% 75	% 67

In table 13, it is observed that total mean (total average) of internal processes indicators of Emam Hosein Hospital is %75 .It indicates that hospitals achieved higher than %70 of determined goals ,but total mean of Omid hospital is %67.

- Analysis and sub question fourth question Test.

Have determined learning and development indicators been achieved in the strategy of social security hospitals in 1390?

Table14:Descriptive statistics of learning &growth variable

variable	number	mean	Indicator Deviation	Mean of deviation error of indicator
Indicators learning&growth	24	4.2917	.44518	.09087

Table 14,Mean (4.29)test of learning &development indicator.

Table15:One-Sample Test						
Test Value = 3						
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Indicators learning&growth	14.214	23	.000	1.29167	1.1037	1.4797

Table15: Mean Test of learning&growth Indicators

Table15, shows descriptive statistics related to learning and development.Indicator Mean equals to 4.29.Table shows Mean test of learning &development.so test in %95 confidence Interval is meaningful,therefor the mean of internal processes is not equal to 3. As it's mean is 4.29 and is greater than 3,so learning and development indicators in hospitals is greater than average.

Table16: learning&growth Indicators

indicator	Percentage of indicator achievement	
	Emam Hosein hospital	Omid hospital of Abhar
Rate of staff satisfaction	%64	%64
Involving in hospital affairs	%65	%60
The number of published articals	%75	%60
The number of received certificates	%100	%50
Attendance ratio in specialized conferences	%80	%70
Performance ratio of specialized conferences	%80	%80
The rate of study & Reaserch	%60	%57
Mean	%74	%63

In Table16, it is observed that total Mean for Emam Hosein Hospital is %74 and this indicate that Emam Hosein Hospital could gain %70 higher that determined purposes. Omid hospital of Abhar has total mean of %63,so this indicate that Omid Hospital could gain %63 of determined purposes .table17:Results of weighting by AHP Procedure

Table17: Dimensions Weighting of BSC

Row	Aspect BSC	weight	priority
1	Financial aspect	.195	3
2	Learning aspect	.430	1
3	Organization processes aspect	.12	4
4	Client aspect	.255	2

Table17 shows that learning and development criteria with relative weight of 0.430 has the most importance.therefore among four dimensions of balanced evaluation it has high effectiveness.client aspect with relative weight of 0.255 is situated in next priority.Agreement rate of connected comparisons is 0.02 ,and because it is lower than 0.10,the agreement of these comparisons is acceptable.

- 1.weighting to measures of BSC dimensions

Table18 : prioritizing financial factors from hospitals aspect

Row	Financial factors	weight	priority
1	Income of insures organization	.224	2
2	Income of patients	.104	4
3	Health expenses	.502	1
4	Used and service costs	.17	3

In table 18,with respect to matrix connected comparisons of measures to financial factor,Health expenses with relative weight of .502 is situated at first priority. Therefore the agreement of this decision making matrix is acceptable.

Table 19: prioritizing learning and development factors from hospitals aspect

row	Learning & development factors	weight	priority
1	Articles and certificates	.237	2
2	Education	.366	1
3	Conference	.077	5
4	Partnership	.099	4
5	study	.221	3

Table19, shows that Education is an important factor and the factors of Articles and certificates and study are at next priority,the Rate of agreement is .03 which is acceptable

Table20 :prioritizing organization processes from hospitals aspect

Table 20: shows that employee satisfaction is a measure

Row	Organization process	weight	priority
1	Staff satisfaction	.38	1
2	Patients satisfaction	.27	5
3	Number of references	.115	4
4	facilities	.235	2

of the relative weight of .38 The first priority was placed on .01 Incompatibility rates. Less than .10 Obtained. Therefore incompatible The decision matrix is also acceptable

Table 21:prioritizing clients factors

Row	clients factors	weight	priority
1	Sensible	.355	1
2	Guarantee	.089	5
3	Reliability	.138	4
4	Responsibility	.219	2
5	unanimity	.199	3

Table21, shows that sensible factor with the relative weight of .355 is situated at first priority and responsibility factor with the relative weigh of .219 is at second priority.the rate of agreement is produced 0.07 lower than 0.10 then the agreement of this Matrix is acceptable.

Table22:Relative Weight of two hospitals from BSC aspect

	Learning & development	organization	client	financial
Emam Hosein hospital	.671	.704	.723	.737
Omid Hospital	.329	.296	.277	.263

Table22:The output of the software that Emam Hosein Hospital with respect to BSC (the process of organizational development and learning 0.67 and organization.704 and client.723 and financial.737) factor is situated at priority.

Table23: respect to results of software final weight and dimensions

7	0.0555	unanimity
6	0.061	responsibility
10	0.038	reliability
14	0.025	guarantee
4	0.098	sensible
13	0.029	facilities
16	0.014	Number of reference
12	0.033	Patient satisfaction
9	0.046	Staff satisfaction
9	0.100	study
8	0.045	partnership
8	0.035	conference
11	0.166	Education
1	0.107	Articles & certificates
2	0.025	Used and service costs
14	0.075	Health costs
5	0.015	Income of insurance
15	0.033	Income of patient
12		

In this study with respect to results of software final weight and dimensions prioritizing and the factors of performance evaluation on base of BSC procedure is according to above table. total agreement rate is 0.03 in which the final result also is acceptable.

4.RESULTS AND DISCUSSTON

4.1 Conclusion

Table24: Hospital from the view point of BSC indicators

priority	weight	Hospital	row
1	0.70	Emam Hosein	1
2	0.30	Omid Abhar	2

Based on balance score card (BSC) ,it is concluded that Emam Hosein hospital has better situation as compared with Omid hospital of Abhar .Results of weighting by AHP technique according to table 24 with respect of final weight of both hospitals from the view point of BSC indicators it is concluded that Emam Hosein hospital is situated at first rank and Omid hospital of Abhar at second rank.final weight of Emam Hosein hospital equals to 0.70 and final weight of Omid hospital is 0.30 total agreement rate is 0.03 which is lower than %10 therefore the agreement of find results is acceptable.

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