

Evaluating the Performance of Service Quality in the Hospitals of Traditional Chinese Medicine with Data Envelopment Analysis

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ABSTRACT After the practice of National Health Insurance, medicine industry has been fiercely changed in Taiwan. With the introduction of national health insurance, the citizens do not worry about medical expenses, individual financial risks are reduced and the development of medicine industry is accelerated to enhance the convenience of the citizens seeing a doctor. Nevertheless, the medical expenditure is rapidly increasing, the number of times the public seeing a doctor continuously soars to a new height, and the development between fundamental clinics and hospitals becomes seriously unbalanced. As a result, the health insurance payment policies are constantly adjusted and changed and the operation of hospitals of traditional Chinese medicine are encountering severe challenges. This study therefore tends to explore the business performance of traditional Chinese medicine industry. The research results would provide specific suggestions for improving the management of traditional Chinese medicine industry. According to the qualified hospitals of traditional Chinese medicine and the hospitals with the department of traditional Chinese medicine in 2011, total 17 DMUs are proceeded Delphi Method and Data Envelopment Analysis. The research results present that one DMU (Decision Making Units) appears strong-form efficiency=1 on the quality of service, about 6% of all DMUs, showing the better efficiency of the quality of service; 6 DMUs reveal the marginal inefficiency of the quality of service between 0.9 and 1, about 35% of all DMUs, showing the knowledge outsourcing efficiency being easily enhanced; and, 10 DMUs present the knowledge outsourcing inefficiency lower than 0.9, about 59% of all DMUs.

RESEARCH BACKGROUND

The rapid development of economy in the societies in Taiwan has resulted in the constant development of service industry. It not only increases the demands of the public for medical services, but also enhances the expectation of quality of service (Han 2009). It therefore becomes a critical issue for the operation of hospitals of traditional Chinese medicine to acquire the first strike in the uncertain medical market for the competitive strength, market share, business control, and initiative, to cope with the changes of medical economic environment and health insurance and the payment system and to formulate effective business strategies for the sustainable

development of hospitals of traditional Chinese medicine.

The medical circle in Taiwan is facing the strong impact of national health insurance, and the medical payment is gradually adjusted and reduced. Such policy changes would affect the business styles of hospitals of traditional Chinese medicine in the future. The corporatization of hospitals of traditional Chinese medicine is a trend in the era and the fundamental surviving method. A hospital of traditional Chinese medicine is a service enterprise with patients being the served subjects, that is, the external customers. Satisfying customers' needs is the key objective of a hospital of traditional Chinese medicine being corporatized. When the personnel in hospitals of traditional Chinese medicine are increasing but the population growth is decreasing, the medical population ratio in hospitals of traditional Chinese medicine is decreasing. Furthermore, the practice of national health insurance, the change of medical payment, and the competition among enterprises in the same in-

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dustry have the initiative of dentists intangibly move to the customers and become the customer-selected medical environment. To cope with the changing speed, the medical transformation and change of hospitals of traditional Chinese, medicine have changed from pure medical treatment to the medicine industry stressing on quality of service. Consequently, merely the hospitals of traditional Chinese medicine with satisfactory quality of service are favored by customers and could ensure the competitiveness in the medical market.

Quality of service is an inevitably competitive factor and survival condition in traditional Chinese medicine services. Traditional Chinese medicine is a kind of service industry, or more definitely, Quality of service is the core competitiveness and one of the important features being differentiated from the others in the same industry (Morrall and Katherine 1994). From the aspect of service receivers, the enhancement of quality of service could promote the satisfaction and result in the sense of belonging and identity for re-consumption (Anderson et al. 1994). Customer loyalty could simultaneously support the survival, profit, and development of an enterprise, enhance the global performance of hospitals of traditional Chinese medicine, and positively promote the recurring feedback. Medical personnel play a critical role in a service situation that the performance is often considered as a part of the overall service product mix. Practically, human performance is mostly unstable and a manager could hardly control the certain quality of service permanently. In this case, the service performance of service differentiation, quality control, and customer evaluation present the key functions on the service personnel in hospitals of traditional Chinese medicine serving the customers.

Literature and Evaluation Criteria

I. Quality of Service

With the change of economic model, the customer awareness is enhanced and service has become essential for the survival of an enterprise. An enterprise is no longer simply required the quality of products, but the added quality of service is a factor in customers selecting the enterprise. Without favorable quality of customer service, an enterprise could come to a deadlock

of business crisis, which is called service crisis (Davidow and Uttal 1984). The importance of studying quality of service therefore cannot be neglected in the business process of an enterprise. Buell (1984) defined service as various activities, benefits, or satisfactions provided with sales. Juran (1986) also defined service as work performed for someone else. Kotler (1984) further indicated that service was an activity or a performance provided by one party for another, but was essentially intangible, not involving in property, and not necessarily being attached to a real product. The definitions of quality in service industry is far more than those in manufacturing industry, as the product form in service industry and the type of business are different from those in manufacturing industry; besides, the definition of quality could be distinct, according to people or situations. In fact, service itself is a behavior model in the interactive process between service providers and customers. Kotler (1984) concluded the characteristics of service as (1) Intangibility, (2) Inseparability, (3) Variability, and (4) Perishability. Murdick et al. (1990) also proposed the following service characteristics, including the output of service not being standardized, customers participating in the service process, service not being able to be mass-produced, personal judgment of employees being added to the service process, measurement of service effect being subjective, and quality of service being restricted in the service process. Rosander (1980) considered that Quality of service should contain: 1. Quality of human performance, 2. Quality of equipment performance, 3. Quality of data, 4. Quality of decision, and 5. Quality of outcomes. Gronroos (1984) divided Quality of service into: 1. Technical quality, the results of a customer really acquiring in the service process and 2. Functional quality, the focus on the delivery of Quality of service. PZB et al. (1985) pointed out the factors in overall Quality of service as it being divided into Process quality and Output quality. Haywood-Farmer (1988) mentioned that timeliness and speed in the service process should be emphasized in Quality of service. Takeuchi and Quelch (1983) regarded: 1. performance measurement standard, 2. evaluation of service personnel, 3. service guaranteed contents, 4. service and maintenance policies, 5. supportive plan, and 6. charging method as a consumer evaluating services in the service process. Accordingly, the classifica-

tion of quality of service was changing with research time, location, and question. Sasser et al. (1978) regarded material, facilities, and personnel as the classification bases for service operation.

II. Evaluation of Service Operation Performance

Levitz and Brooke (1985) utilized financial ratio (liquidity ratio, financial structure ratio, business activity ratio, depreciation ratio, and profitability ratio), cost, and productivity for measuring the business performance of hospitals. Coyne (1986) established the evaluation criteria of financial performance with capital structure (liabilities/net worth), asset finance (total assets/liabilities), marginal profit (net profit/total revenue), and asset turnover (total revenue/total assets). Chakravathy (1986) considered that measuring the business performance of an enterprise with traditional profits could effectively discriminate the business performance. Howell and Soucy (1978) emphasized that an enterprise should change the performance measuring method to achieve the performance evaluation and proposed five non-financial performance evaluation criteria, containing quality measurement, stock measurement, material and waste, equipment and maintenance, and delivery. Choi and Mueller (1992) also mentioned to measure business performance with both financial and non-financial indicators, as the latter also played an important role in the permanent operation of an enterprise. Lumpkin and Dess (1996) measured the service operation performance of hospitals with sales growth, market share, profit, overall performance, shareholder satisfaction, business image and reputation, and employee commitment and satisfaction.

III. Establishment of Research Criteria

Summing up the above evaluation criteria for service performance, Delphi Method is utilized for evaluating quality of service performance of the hospitals in this study. Also named expert judgment, Delphi Method is a group decision with both qualitative and quantitative characteristics. Based on Interdisciplinary and Future oriented question survey, it is applied to certain issues with insufficient data or unknown situations. With anonymous experts repeatedly mak-

ing decisions and feedback for several rounds, the differences in expert opinions are reduced down to the least for a commonly acceptable answer.

According to the literatures, experts should present the following conditions (Whitman 1990) of (1) interests in attending the investigation with Delphi Method, (2) rich information for sharing with each other, (3) approved knowledge and technology in specific fields, (4) specializing in the investigated topic, including practical experiences and theoretical research, and (5) agreeing with the research results covering the special information possessed. Des (1996) also indicated that an expert should present knowledge standard, reliability, and precision and know the industry more deeply than an amateur so that the expert judgment was close to the fact than it of ordinary people. The value of Delphi Method is established based on such an answer.

RESEARCH CRITERIA AND SUBJECT

I. Establishment of Evaluation Criteria

The evaluation criteria are established with Delphi Method. The variables are defined as below.

(1) Input Variable

1. Finance, including personnel cost, medical supply cost, pension, board expenses, overtime pay, labor (health) insurance, and welfare.
2. Learning and Development, containing number of projects of employee, number of paper annually, cooperative program, performance appraisal of employee, and industry-academic cooperation.
3. Internal Procedure, including number of trans-department cooperative research and the accomplishment of operation target.

(2) Output Variable

1. Customer, containing medical market share and new patient growth rate.
2. Gross Sales (O1). Gross sales of a hospital are used as the output of Quality of service performance, and the accumulated operating revenue in 2009-2012 is regarded as the output variable in this study.

RESEARCH METHOD AND SUBJECT

According to the qualified hospitals of traditional Chinese medicine and the hospitals with the Department of Traditional Chinese Medicine in 2011, the annual statistical reports in 2009-2012, the internal statistical data in the hospitals, and the open data of Ministry of Health and Welfare are regarded as the input/output performance criteria for the empirical analyses with Delphi Method and Data Envelopment Analysis. The results provide the reference for the improvement of hospitals of traditional Chinese medicine. Total 17 DMUs are selected as the research subjects.

Empirical Analysis of the Efficiency of Quality of Service of Hospitals of Traditional Chinese Medicine

I. Analysis of Quality of Service of Hospitals of Traditional Chinese Medicine

Substituting the input/output criteria for CCR and BCC models, the global production efficiency and pure technical efficiency of quality of service of the hospitals of traditional Chinese medicine were calculated. Dividing the efficiency from each other, the return to scale of the hospitals of traditional Chinese medicine was acquired. The global production efficiency, pure technical efficiency, scale efficiency, and return to scale are organized in Table 1.

From Table 1, Taipei City Hospital appeared to be global production efficiency=1, showing the relative efficiency. The rest of the hospitals of traditional Chinese medicine revealed lower global production efficiency, especially Show Chwan Memorial Hospital appeared the lowest, presenting relative insufficiency. In other words, in addition to the DMU with the efficiency=1, the rest 16 DMUs were comparatively insufficient, possibly because the inputs could not be effectively applied, or the optimal production scale was not achieved. Further analyses would be necessary.

II. Sensitivity Analysis

The input/output variables were gradually deleted for DEA in order to understand the sensitivity of efficiency (Table 2).

- (1) After deleting finance, all DMUs appeared lower efficiency than the original efficiency, that is, budget presented high importance for all DMUs.
- (2) After deleting learning and development, all hospitals of traditional Chinese medicine, except Taipei City Hospital, Taoyuan Chang Gung Memorial Hospital of the C.G.M.F., and Changhua Christian Hospital, showed lower efficiency than the original efficiency, presenting the higher importance of learning and development on such DMUs.
- (3) After deleting internal procedure, all DMUs, except Taipei City Hospital and

Table 1: Relative efficiency of quality of service of hospitals of traditional Chinese medicine

<i>Hospital of traditional Chinese medicine</i>	<i>Global efficiency</i>	<i>Technical efficiency</i>	<i>Scale efficiency</i>	<i>Return to scale</i>
Taipei City Hospital	1.00	1.00	1.00	IRS
TTT Hospital of traditional Chinese medicine	0.93	0.91	0.86	DRS
Taoyuan Chang Gung Memorial Hospital of the C.G.M.F.	0.97	0.95	0.96	IRS
Buddhist Tzu Chi General Hospital	0.88	0.86	0.87	DRS
Kaohsiung Municipal Chinese Medical Hospital	0.96	0.89	0.93	IRS
Taichung Veterans General Hospital	0.83	0.80	0.78	IRS
China Medical University Hospital	0.86	0.82	0.84	IRS
Chung Shan Medical University Hospital	0.87	0.85	0.83	IRS
Show Chwan Memorial Hospital	0.67	0.70	0.68	IRS
Changhua Christian Hospital	0.78	0.75	0.74	IRS
Taichung Hospital	0.91	0.86	0.82	IRS
Chi Mei Medical Center	0.84	0.81	0.85	IRS
Tainan Municipal Hospital	0.80	0.78	0.79	IRS
Kaohsiung Chang Gung Memorial Hospital of the C.G.M.F.	0.92	0.91	0.94	IRS
St. Joseph Hospital	0.76	0.73	0.70	IRS
Kaohsiung Medical University Chung-Ho Memorial Hospital	0.84	0.80	0.83	IRS
E-Da Hospital	0.90	0.88	0.90	CRS

Table 2: Sensitivity analysis of gradual reduction of a single input and output item

<i>DMU</i>	<i>Original relative efficiency</i>	<i>Deleting finance</i>	<i>Deleting learning and development</i>	<i>Deleting internal procedure</i>	<i>Deleting customer</i>	<i>Deleting gross sales</i>
Taipei City Hospital	1.00	1.00	1.03	1.05	0.97	1.00
TTT Hospital of Traditional Chinese Medicine	0.93	0.98	0.86	0.87	0.90	0.89
Taoyuan Chang Gung Memorial Hospital of the C.G.M.F.	0.97	0.92	0.94	0.93	0.92	0.88
Buddhist Tzu Chi General Hospital	0.88	0.85	0.83	0.87	0.80	0.81
Kaohsiung Municipal Chinese Medical Hospital	0.96	0.96	0.96	0.96	0.96	0.96
Taichung Veterans General Hospital	0.83	0.83	0.83	0.83	0.83	0.83
China Medical University Hospital	0.86	0.80	0.82	0.81	0.76	0.79
Chung Shan Medical University Hospital	0.87	0.85	0.81	0.83	0.86	0.87
Show Chwan Memorial Hospital	0.67	0.60	0.61	0.63	0.54	0.58
Changhua Christian Hospital	0.72	0.75	0.73	0.74	0.71	0.70
Taichung Hospital	0.91	0.90	0.83	0.85	0.88	0.89
Chi Mei Medical Center	0.84	0.82	0.80	0.76	0.83	0.80
Tainan Municipal Hospital	0.80	0.78	0.72	0.77	0.72	0.70
Kaohsiung Chang Gung Memorial Hospital of the C.G.M.F.	0.92	0.93	0.82	0.80	0.88	0.87
St. Joseph Hospital	0.76	0.70	0.74	0.73	0.69	0.70
Kaohsiung Medical University E-Da Hospital	0.84	0.81	0.80	0.79	0.76	0.74
Chung-Ho Memorial Hospital	0.90	0.89	0.84	0.88	0.89	0.90
Number of efficient DMU	1	1	1	3	0	1

Data source: Self-organized in this study

Changhua Christian Hospital, revealed lower efficiency than the original efficiency, showing the importance of internal procedure on all DMUs. Apparently, internal procedure of hospitals of traditional Chinese medicine was comparatively insufficient.

- (4) After deleting customer, all DMUs appeared lower efficiency than the original efficiency, presenting the importance of customer on such DMUs.
- (5) After deleting gross sales, all DMUs revealed lower efficiency than the original efficiency, revealing the higher importance of gross sales on such DMUs.

CONCLUSION

According to the efficiency acquired with DEA and the information of the variables, quality of service of one DMU presents the strong-form efficiency=1, about 6% of all DMUs, showing the better efficiency of quality of service; quality of service of 6 DMUs reveal the marginal inefficiency between 0.9 and 1, about 35% of all DMUs, presenting the knowledge outsourcing efficiency being easily promoted; and, 10 DMUs present the knowledge outsourcing inefficiency

lower than 0.9, about 59% of all DMUs. Such results present the unfavorable efficiency of most private hospitals of traditional Chinese medicine, possibly because of the improper scale, that the investment should be increased to expand the operation scale. Different from private hospitals of traditional Chinese medicine, public ones acquiring public budget for the finance that both Finance and Gross Sales present limited effects on public hospitals of traditional Chinese medicine. In terms of Learning and Development and Internal Procedure, private hospitals of traditional Chinese medicine reveal more favorable technical efficiency than public ones do. Such a phenomenon might be a result from private hospitals of traditional Chinese medicine requesting more complete medical instruments, medical personnel, and internal procedure management; the technical efficiency therefore is better than public ones.

RECOMMENDATIONS

Based on the above research results, the following suggestions are proposed to enhance Quality of service of hospitals of traditional Chinese medicine.

1. Reinforcing the Internal Procedure Management in Hospitals

Hospitals of traditional Chinese medicine can no longer rely on increasing the quantity of medical services, but should actively make efforts on management, costs, and differentiation. Regarding the internal procedure management, a hospital of traditional Chinese medicine should strengthen the organizational structure, actively improve the internal efficiency, reinforce the cost awareness, continuously enhance the medical quality, and remain flexible organizational management to cope with external changes. In regard to external businesses, customer-oriented and patient-centered medical services allow a hospital of traditional Chinese medicine remaining the competitive strengths.

2. Reinforcing the Learning and Development of Employees

Medical quality of service requires proper manpower allocation. Quality of service would not be achieved without sufficient manpower. A lot of government organizations and hospitals reduce the manpower because of the budget. Such reduction increases work load and pressure and seriously affect medical quality of service. The minimum manpower allocation formulated in the hospital appraisal system is different from the service manpower for clinical practice. In this case, the employees in hospitals of traditional Chinese medicine should be reinforced the learning and development (medical and administrative personnel) in order to agree with the customer satisfaction idea of the hospital and should consider the standpoint of customers. Irregular evaluation of the medical practice process could actually master the service attitudes and skills (annual number of paper, cooperative program, employee performance evaluation) of the personnel (medical and administrative personnel), and such evaluation results could be taken into account for employee performance evaluation and promotion.

3. Presenting Guarantee and Concern of Patients

Physicians in hospitals of traditional Chinese medicine should be responsible for explaining

the effects and side-effects of drugs to the patients. It is also regarded as a part of medical quality promotion. A patient's needs should be considered as the priority, and the unified application model should be reduced so as to enhance the patient's right. A clean, comfortable, and efficient medical environment should be created when the new concepts of Medical Quality and Patient Safety are emphasized in the modern medical circle.

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