Fuzzy hierarchy sensitive with Delphi method to evaluate hospital organization performance

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A B S T R A C T

The conventional accreditation policy of Taiwanese hospitals involves helping promote and executing national healthcare quality policies, certifying healthcare quality, supervising the management of health care organizations, pursuing a harmonious relationship between care providers and patients, and enhancing national healthcare quality. However, the quality indicators in use by Department of Health, Executive Yuan, Taiwan (DOH) cannot indicate overall organization performance of each hospital and assess hospital operating crisis. In many cases the preference model of the human decision maker is uncertain, and it is relatively difficult for the decision maker to provide exact numerical values for the comparison ratios. This study proposal fuzzy analytic hierarchy process (FAHP) and fuzzy sensitive analysis-based approach to resolve the uncertainty and imprecision of service evaluations during pre-negotiation stages, where the comparison judgments of a decision maker are represented as fuzzy triangular numbers. A novel fuzzy prioritization method, which derives crisp priorities (criteria weights and scores of alternatives) from consistent and inconsistent fuzzy comparison matrices, is also proposed. Importantly, the proposed model can provide Taiwan’s hospital accreditation policy a reference material, making it highly applicable for academic and government purposes.

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1. Introduction

To enforce health insurance and enhance medical technology, the Taiwanese government implemented the NHI plan in March 1995. The NHI scheme has resulted in financial unbalance. Therefore, the Bureau of National Health Insurance (BNHI) has sought to prevent further increases in health care expenditures and implemented a Global Budget System (GBS) in July 2002. Under the policy change environment, the hospitals’ managers need to change their management strategy, by discarding their past conservative attitudes. Other than fundamental improvement of diagnosis treatment technology and replacement of medical equipment, appropriate assistance and caring for patients should be as well taken into consideration. The conventional accreditation policy of Taiwanese hospitals involves helping promote and executing national healthcare quality policies, certifying healthcare quality, supervising the management of health care organizations, pursuing a harmonious relationship between care providers and patients, and enhancing national healthcare quality. However, the quality indicators in use by DOH cannot indicate overall organization performance of each hospital and assess hospital operating crisis. Furthermore, when facing the same operating objects payment standard and medical environment with finite medical resource, competitiveness is naturally to soar. This situation is exacerbated by large reductions of the medical budget by government, which has caused an operating crisis in hospitals. According to report from DOH, the number of hospitals in Taiwan declined by 231 or 29.35%, from 787 in 1989 to 556 in 2004. Additionally, the number of public hospitals declined by 5 or 5.38%, from 93 in 1989 to 88 in 2004; correspondingly, the number of private hospitals declined by 126 or 32.56%, from 694 in 1989 to 468 in 2004 (DOH, 2005). Therefore, administrators or decision makers of the hospitals requires effectively monitoring the organizational performance of the hospitals.

Organizational performance is a perhaps the key issue for top administrator (Finkelstein & Hambrick, 1996). Although the position held by administrator is multifaceted, their most important role is to ensure the long-term success and viability of their organizations (Andrews, 1987). To fulfill this role, administrator must be able to monitor and interpret organizational performance. Such tasks are facilitated through comparisons of performance indicators against referent points. Nevertheless, the organization performance problem is a multi-criteria problem, and evaluating an ideal model requires suitable criteria and strict comparison performance of each hospital and assess hospital operating crisis. Furthermore, when facing the same operating objects payment standard and medical environment with finite medical resource, competitiveness is naturally to soar. This situation is exacerbated by large reductions of the medical budget by government, which has caused an operating crisis in hospitals. According to report from DOH, the number of hospitals in Taiwan declined by 231 or 29.35%, from 787 in 1989 to 556 in 2004. Additionally, the number of public hospitals declined by 5 or 5.38%, from 93 in 1989 to 88 in 2004; correspondingly, the number of private hospitals declined by 126 or 32.56%, from 694 in 1989 to 468 in 2004 (DOH, 2005). Therefore, administrators or decision makers of the hospitals requires effectively monitoring the organizational performance of the hospitals.

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screening. Evans (2004) proposal an effective performance measurement system, which includes the selection of appropriate measures and approaches for analyzing results, is central to aligning an organization’s operations with its strategic direction. Kast and Rosenzweig (1974) suggested incorporating efficiency and effectiveness analysis to assess organizational performance. In the existing efficiency and effectiveness analysis studies have utilized data envelopment analysis (DEA) to evaluate performance (e.g., Abagail, Donald, & David, 2005; Butler & Li, 2005; Laine & Linna, 2005). Venkatraman and Ramanujam (1986) contended that organizational performance should include financial performance, business performance and organizational effectiveness. However, the organization performance is a multi-criteria decision-making (MCDM) problem. Among those well-known methods, MCDM is relatively new to be employed to evaluation of performance. MCDM aims at using a set of criteria for a decision problem. Since these criteria may vary in the degree of importance, the analytic hierarchy process (AHP) methodology is employed to prioritize the selection criteria (i.e., assign weights to the criteria). In the existing measurement of performance or studies have utilized AHP to set up a hierarchical skeleton within which multi-attribute decision problems can be structured (Kim, Yang, Yeo, & Kim, 2005; Nieminen & Takala, 2006; Uzoka & Michael, 2005; Wu, Lin, & Chen, 2007; Wu, Lin, & Lin, 2009; Chang, Wu, & Chen, 2008; Chang, Wu, & Lin, 2009; Yurdakul, 2005).

AHP has thus been successfully applied to a diverse array of problems. Despite its popularity, this method cannot adequately resolve the inherent uncertainty and imprecision associated with the mapping of a decision maker’s perception to exact numbers. In the traditional formulation of AHP, human judgment is represented as exact numbers. However, in many cases the preference model of the human decision maker is uncertain, and it is relatively difficult for the decision maker to provide exact numerical values for the comparison ratios. The decision makers could be uncertain about their own level of preference, due to incomplete information or knowledge, complexity and uncertainty within the decision environment, or a lack of an appropriate measurement units and scale.

Therefore, this study proposes an evaluation framework through modified Delphi method. Next, the study presents FAHP and fuzzy sensitive analysis-based approach to resolve the uncertainty and imprecision of service evaluations during pre-negotiation stages, where the comparison judgments of a decision maker are represented as fuzzy triangular numbers, followed a case which identifies proposed model capable of choosing an effective monitor and fuzzy sensitive analysis-based approach to resolve the uncer-tainty and rank, in order of preference, the set of alternatives. This problem thus requires constructing an evaluation procedure to prioritize the selection criteria (i.e., assign weights to the criteria). The decision-maker does not know in advance the values of $W_i$, $i = 1, 2, \ldots, n$, but he is capable of making pair-wise comparison between the different criteria.
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