



ORIGINAL ARTICLE

Correlates of Perceived Competitive Advantage among Hospital Management: A Multilevel Analysis

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Purpose: As the hospital industry continues to undergo significant change and becomes an increasingly competitive environment, the concept of competitive advantage has received a considerable degree of attention in the healthcare literature. Using a multilevel modeling approach, this study evaluated the contributions of hospital characteristics and market competition on perceived competitive advantage of hospital managers in Taiwan.

Methods: Data for this study were mainly collected using a questionnaire that was mailed to the top executives of 432 accredited hospitals in Taiwan in 2009. Valid responses were obtained from 182 hospitals for an effective response rate of 42.1%.

Results: Respondents indicated relatively moderate assessment of perceived competitive advantage (mean = 3.5, standard deviation = 0.72, on a five-point Likert scale). There were no significant correlations between the group-level predictor (competition of local healthcare market) and the individual-level ones. Results of multilevel analysis to simultaneously examine the effects of individual-level (hospital characteristics; level 1) and group-level (competition of local healthcare market; level 2) predictors on perceived competitive advantage indicated that the predictors at hospital level had a statistically significant effect on respondents' perception of competitive advantage of their hospitals. Nonetheless, there was insignificant market competition variation in perceived competitive advantage among respondents.

Conclusion: We conducted a multilevel analysis that reflected the hierarchical structure of our data, where hospitals were nested within healthcare markets of different intensities of competition. Our results join a body of healthcare literature suggesting that hospital level is a significant predictor of hospital performance. However, we found no evidence of a strong relationship between the degree of local market competition and perceived competitive advantage of respondents. Taken together, the results of our empirical study shed light on some interesting issues regarding competitive advantage.

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1. Introduction

As the hospital industry continues to undergo significant change and becomes an increasingly competitive environment, the concept of competitive advantage has received a considerable degree of attention in the healthcare literature.¹ Briefly, competitive advantage occurs when an organization acquires or develops attributes and resources that allow it to outperform its competitors by offering customers greater value.² The ability of a hospital in a local market to develop strategic competencies which are relatively superior to its competing hospitals, and thus result in competitive advantage, is increasingly critical for its survival and growth in today's extremely turbulent healthcare environment.

The theme of sustainable competitive advantage of organizations has been the primary focus of the strategic management literature over the past few decades. For example, Barney³ and Wernerfelt⁴ propose the resource-based view; Hunt⁵ offers the resource advantage theory; while there is the market orientation discourse as well.^{6,7} In addition, Porter² proposes three generic strategies with which a firm can defend against external competing forces and gain a competitive advantage: (1) low cost; (2) differentiation; and (3) focus. Indeed, the increase in external environmental challenges has forced not only for-profit companies, but not-for-profit organizations (e.g., hospitals) to adopt a variety of strategies aimed at achieving competitive advantage to build viable and sustainable organizations.^{8–13}

Although numerous scholars have empirically scrutinized the topic of competitive advantage of hospitals, the impact of a nested data structure is relatively seldom tackled. It is quite reasonable that the perceived competitive advantage of hospital executives in

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the same healthcare market (i.e., encountering the same degree of rival intensity) is likely to be more closely correlated than that of their counterparts in different healthcare markets. Multiple observations of perceived competitive advantage are nested within a single healthcare market. The problem with such a nested data structure is that it violates the assumption of independent responses required by traditional statistical techniques such as ordinary least-squares multiple analysis, and it will lead to an inflation of the probability of a Type I error.¹⁴ Multilevel analysis (also termed multilevel modeling or hierarchical linear modeling) provides a technically robust framework to resolve the challenge when data have a hierarchical structure.

Multilevel analysis sophisticatedly integrates analyses at both the individual and the collective level by taking the nested structure of data (e.g., hospitals being grouped together in healthcare markets) into account. By using multilevel modeling, variances within healthcare markets and variances between markets are systematically disentangled; as a result, individual and aggregate predictors can be simultaneously accounted for. Moreover, standard errors are also more correctly calculated than traditional ordinary least-squares regression analysis with multilevel data and varying market sizes are taken into account.^{14–18}

Because of the importance of competitive advantage for hospital management, this research endeavored to uncover the factors that affect hospital executives' perception of competitive advantage of their hospitals. Specifically, the research question of the study is: "To what extent is perceived competitive advantage of hospital managers determined by hospital characteristics and to what extent by market competition?" The current study extends previous literature using multilevel modeling to account for the nested data structure that may mask a relationship between predicting factors and competitive advantage, as noted above. Addressing these issues has the potential to enrich understanding of the vital theme of competitive advantage of hospitals.

2. Methods

2.1. Study population

The main goals of the study were to probe perceived competitive advantage among hospital executives, and then look into the impacts of predicting variables on such perception. The study population was all 432 accredited hospitals (excluding psychiatric hospitals) in Taiwan (year 2007 data). Upper-level administrators of those hospitals (i.e., superintendent, vice-superintendent, or other upper-level executives) who were knowledgeable about their hospital policies and performances were explicitly asked to complete our survey questionnaire.

2.2. Survey procedure

In late February 2009, we mailed out self-administered questionnaires to the identified hospitals, accompanied by a covering letter to pinpoint the preferred respondents. A reminder letter, along with the original questionnaire, was sent out to nonresponders 3 weeks later. In the end, 182 valid questionnaires were used in the data analysis, representing a 42.1% effective response rate.

To examine the representativeness of the responding hospitals, we performed a Chi-square test on all predictive variables between participating hospitals and total sample hospitals, including competition of local healthcare market, hospital ownership and level, and teaching status. We detected significant differences in competition of local healthcare market ($\chi^2 = 12.60, p = 0.002$) and hospital ownership ($\chi^2 = 9.40, p = 0.009$) between participating hospitals and the study population.

2.3. Variable measurement

We developed the survey questionnaire based on a thorough review of the literature and consultations with experts. The questionnaire collected three sets of information: (1) Respondents' perception of competitive advantage of their hospitals – Regarding the outcome variable of the study, respondents were asked to evaluate on a five-point Likert-type scale with respect to five questionnaire items. A composite score was then calculated by averaging a respondent's responses to those five questionnaire items. The higher the score, the better the competitive advantage of the sample hospital is perceived by that respondent. A sample questionnaire item is: "The overall reputation of your hospital is relatively superior to your close competitors in the eyes of customers". (2) Hospital characteristics – There are two kinds of variables, which are hospital ownership (public, private and not-for-profit) and hospital level (medical center, regional hospital and district hospital). (3) Sociodemographic characteristics of respondents.

An important variable of interest for the present study is competition of the local healthcare market. While advocates of hospital market competition assert the important role played by competition when assessing costs, quality, efficiency or profits, the evidence in the literature is inconsistent.^{19–22} In this study, competition of the local healthcare market was measured by the Herfindahl–Hirschman Index (HHI), which is a commonly accepted measure of market concentration in the health services and health economics literature. The HHI is based on the market shares of all competitors in a market, and is calculated by squaring the market share of each firm competing in a market and then summing up the resulting numbers. A lower index indicates a less concentrated market, meaning it is more competitive. The HHI can range from a minimum of close to 0 (a perfectly competitive market) to a maximum of 10,000 points (a monopoly market). A market in which the HHI is below 1000 is regarded as unconcentrated, between 1000 and 1800 as moderately concentrated, and above 1800 as highly concentrated.²³ As indicated previously, for this study competition of the local healthcare market was measured by the HHI (calculated on the basis of total discharges), and grouped as a three-category classification: high degree of competition ($\text{HHI} < 1000$), moderate competition ($1000 \leq \text{HHI} \leq 1800$), and low competition ($\text{HHI} > 1800$). Information used to calculate the HHI was obtained from the Department of Health, Taiwan.

2.4. Validity and reliability of the survey instrument

The validity of the structured questionnaire was established by calculating a content validity index (CVI) with the assistance of five reputed academic experts and industry managers. They were asked to evaluate each item in the questionnaire for the extent to which it reflected the identified concept. The CVI was established at 0.80 for all questionnaire items used in the study.

The reliability of the questionnaire was evaluated using the test–retest reliability method. Ten respondents from the participating hospitals were purposively selected and given the same questionnaires 2 weeks apart. The test–retest reliabilities of all selected items were assessed by using the measure of intraclass correlation coefficient (ICC).²⁴ The values of ICC of the selected items ranged from 0.78 to 0.85 (all $p < 0.05$), indicating a satisfactory test–retest reliability of the questionnaire.

2.5. Statistical analysis

The data were first analyzed at the bivariate level. Next, a multilevel analysis was done to simultaneously examine the effects of group-level and individual-level predictors. As aforementioned, the main

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