

# The exploration of consumers' behavior in choosing hospital by the application of neural network

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## Abstract

The economic in Taiwan has been dramatically improved in the last two decades. During this period, the national health insurance was first conducted in 1995 and plans of health insurance payment have been modified several times. Demands of high quality and service on medical care are brought up in consumers' mind. Nowadays, hospital operating environment is getting more and more competitive. Therefore, how to take the advantage of competitiveness is the urgent topic of gaining advantage of competitiveness.

The research applied neural network to classify consumers' behavior in choosing hospitals. A quantitative research of questionnaire was first conducted to explore consumers' behavior in choosing hospitals in southern Taiwan. Factors of consumers' behavior were categorized into four types. Then, a back propagation neural network classification model was developed. The model demonstrates the usefulness of 85.1% classification rate in classifying consumers' styles. Finally, their marketing implications were discussed. Based on the results of the research, the evidence is enough to suggest that the neural network model is useful in identifying existing patterns of hospitals' consumers.

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## 1. Introduction

The living quality and value systems of people have been dramatically changed when the economics of Taiwan was improved in the last two decades. Demands on high quality of medical care were brought up in consumers' mind. Nowadays, hospital operating environment is getting more and more competitive. Consequently, how to take the advantage of competitiveness is the urgent topic of gaining advantage of competitiveness. Focusing on consumers

and providing what they need is one of best ways to increase satisfaction.

Most consumers did hospital shopping before they choose a hospital. The behavior of how people choose is diverse and its influencing factors are very complicated. Thus, if there are any method which can be used to find out the relationship between consumers and doctors or hospitals, and serve with proper marketing strategy, it will be a good help on improving advantage of competitiveness.

## 2. Literature review

### 2.1. Medical care development and marketing in Taiwan

The medical care industry has been dramatically developed in the last two decades in Taiwan and it has resulted in an extremely risk position. A lot of efforts have been

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made to keep the equity and accessibility by the Taiwan government. Meanwhile, the medical care industry is also facing global competition since Taiwan joined WTO (Qiu, 2001). Further, the new total payment rule of national health insurance program was conducted recently. The competition of medical care market is getting fierce. According to the report, more than 200 small hospitals are on the verge of out of business in last seven years (Public Television Service Online, 2005).

The development of the medical care industry in Taiwan includes three main periods, establishment, expansion and control. Characteristics and competition of the medical care market development are listed in Table 1 (Liu & Chen, 1999).

Hospitals are accommodating themselves to the changing situation. Although, marketing may be unpopular in the past, managers of hospitals start to choose the benefits of marketing nowadays (Gronroos, 1990). The viewpoint of the operation is evolving from manufacturing oriented, product oriented, sales oriented to marketing oriented (Webster, 1992). How to gain competitive advantage by enhance operating strategy is a crucial issue to business success. Therefore, hospitals should learn to respect consumers, develop distinguishing features of medical care, explore their needs and improve satisfaction.

Nearly 98% of all care have been reimbursed under Taiwanese National Health Insurance (TNHI) since its inception in 1995. However, the rapidly raised healthcare cost has embarrassed government's finance in last few years. Therefore, many new rules such as the cost-containment mechanism and global budgeting system were conducted and hospitals could no longer claim all expenses. For example, TNHI eliminated payment for antacid drugs in October, 2005. Then, antipyretics and Analgesics, chlorpheniramine maleate, etc. were no longer included in the insurance payment since 1966. Moreover, according to National Health Insurance Law (revised on May 18, 2005), coinsurance for different levels of hospitals was classified. For example, if a patient goes to a academic hospital

or district hospital but not via the transfer system, the coinsurance payment will increase from \$6 to \$11 US dollars.

## 2.2. How does consumer choose hospitals for medical care

Perceptions of quality are no longer the only consideration of seeking medical service. Consumers' behaviors of choosing a hospital are changing from passive to aggressive. In the relationship of patients and hospitals, the patient could be viewed as a consumer of medical service who chooses in the medical care market in which physicians are major suppliers (Engei, Kollat, & Blackweii, 1968; Howard & Sheth, 1969; Kotler, 1975; Nicosia, 1969; Robinson & Cooper, 1980–1981).

Berkowitz and Flexner (1981) mentioned that patients could shop among hospitals and make comparisons in early 1980s. They also found that consumers focused on four factors including quality of care, cleanliness of the facility, attitude of the hospital staff, and the reputation of the hospital. Boscarino and Stelber (1982) analyzed and ranked the frequently cited criteria. The criteria are ranked as follows: near to home, doctor uses, specialist doctors, better equipment, quality of facility, familiar staff, past experience with staff, less expensive, size and religious affiliation. Wolinsky and Kurz (1984) presented four dimension/factors for hospital choice including knowledge (prior use of the hospital, new facilities, condition-specific reputation and nearness to home), cost (cost of care), quality (quality of medical care, and courtesy of care), and recommendation (doctor's recommendation, and friend's recommendation). In 1984, 1985, and 1986, the National Research Corporation (NRC) has studied hospital selection factors and they are ranked as follows: medical staff quality, emergency care quality, nursing care quality, complete service available, doctor recommends, modern equipment, courteous employees, good surroundings, used hospital before, cost of care, family recommends, close to home, private rooms, and friend's recommendation. Andrus and Kohout (1985) assessed the effect of rural consumer satisfaction on the decision of outshopping

Table 1  
Development of the medical care industry in Taiwan

| Period                    | Characteristics  | Market situation            |
|---------------------------|--|-----------------------------|
| Establishment (1947–1970) | Short of medical resource<br>Small scale<br>Only strategy of epidemic prevention   | No competition              |
| Expansion (1971–1984)     | High growing rate of economics<br>Number of hospitals increases<br>Better services<br>Professional business management<br>Most hospitals locates around metropolis<br>Scale difference appears | Competition with each other |
| Control (1985–Now)        | Establishment of transformation system<br>Restriction of government medical policy<br>Restriction of insurance policy<br>Raise of consumer awareness   | Furious competition         |

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