

# 國立臺灣師範大學 101 學年度碩士班招生考試試題

科目：專業論文解析

適用系所：運動休閒與餐旅管理研究所  
(運動休閒管理組)

注意：1.本試題共 3 頁，請依序在答案卷上作答，並標明題號，不必抄題。2.答案必須寫在指定作答區內，否則依規定扣分。

- 一、請論述在研究進行中如何判定資料分析方法的正確性 (10 分)。
- 二、請解釋研究工具信度與效度的定義，並論述提昇的信效度的方法(10 分)。
- 三、有位同學想要驗證國中學生每天花 30 分鐘以上運動，可以促進身心健康與社會互動，故至某國中放學後，召集國中生組成運動性社團，進行運動，預計於學年開始 (九月) 進行，於學年結束 (六月) 時完成。請論述下列問題：
  1. 請說明研究題目。(5 分)
  2. 請說選擇的資料收集方法，與使用該方法的原因。(15 分)
  3. 請說明能會遭遇的困難與解決策略。(10 分)
- 四、請根據所附論文內容，用中文回答下列問題。
  1. 請寫出此篇論文之適當題目。(10 分)
  2. 請撰寫此篇論文 300—400 字之摘要。(20 分)
  3. 請詳細條列出此篇論之主要發現與貢獻。(20 分)

## 1. Purpose

The product of a professional baseball team to provide is undoubtedly attempting to win. The various input factors required are the skills of the team members including managers. Different combinations of the input factors would influence a team's wins and efficiency. So it is helpful for the team to be able to identify its production function. It could serve as a reference for members' salaries, players' recruitment, and efficiency of the teams. This paper has two purposes. The first is to construct the production function to estimate the effect of each input factor. Secondly, the empirical results could help to illustrate the efficiency of teams, managers, and the marginal product of players.

## 2. Methodology

This study utilizes NPB data during the period of 1999 to 2008. During this time-period, owing to the bad economic situation of two parent companies (Kinki Railway and Daiei) in the Pacific league, the two teams were merged or transferred to new baseball clubs (Rakuten Eagles and Softbank Hawks respectively). The total number of team-level observations used remains 120. All the data of teams were collected from the Baseball Record Books and the Official Baseball Guides during these years.

# 國立臺灣師範大學 101 學年度碩士班招生考試試題

Following Zech (1981) and Smart, Winfree, and Wolfe (2008), a Cobb-Douglas production function is assumed to measure productive efficiency by using a stochastic production frontier. In this paper, “productive efficiency” means closeness to its production potential a NPB team approached. All the factors included in the production function consisted of output (winning percentage) and input (skills involved in winning games) variables. These skills may be summarized into five main categories of offense, defense, running, pitching, and coaching abilities. After taking some earlier studies (Depken, 2000; Kahn, 1993; Zech, 1981) as references, we selected the following eleven variables including batting average (*BA*), on base percentage (*OBP*), homeruns (*HR*), slugging average (*SLG*), fielding chances (*FC*), fielding percentage (*FP*), stolen bases (*SB*), earned run average (*ERA*), strikeout-to-walk ratio (*SOBB*), manager’s lifetime won-lost percentage (*MWL*), and the number of years managed in NPB (*MY*) as the input terms. The production function for NPB is of the following form:

$$Win\% = aBA^\alpha OBP^\beta HR^\gamma \dots MY^\omega.$$

In order to control the different units of variables, we indexed each variable to its average of each league year by year. Efficiency is then a measure of the real average winning percentage relative to potential production (i.e. predicted winning percentage). It is described as follows:

$$efficiency = \frac{averageWin\%}{aBA^\alpha OBP^\beta HR^\gamma \dots MY^\omega}.$$

To compute each player’s marginal product (MP), we can substitute the team’s skills data with and without each player into the production function. The difference between them serves as a measure of that player’s MP. A player with the highest MP should be MVP of that league.

### 3. Results

After the screening by step-wise regression, the logarithmic form of NPB production function was as follows:

$$\begin{aligned} \ln WI &= -0.0101 + 1.2919 \ln BAI \\ &+ 0.4730 \ln OBPI + 0.1427 \ln HRI \\ &- 0.8643 \ln ERAI + 0.2952 \ln MWLI. \end{aligned}$$

The adjusted R-square is 0.815, where *WI*, *BAI*, *OBPI*, *HRI*, *EARI*, and *MWLI* are ratios of winning percentage, BA, OBP, HR, ERA, and MWL divided by the league averages respectively year by year. We should notice that the defense and running abilities were not significant at the .05 level to be selected in. The equation contains only five input variables but seems quite reliable to explain about 81.5 percent variance higher than that of Zech (1981). The model was also passed the multicollinearity test.

The summation of the exponents is 1.3885 greater than one, so increasing returns to scale are indicated for NPB. The regression result also shows hitting frequently contributes most to a team’s success, about 3 times than on base ability, 9 times than power hitting, 1.5 times than pitching. However, the homerun hitters or ace pitchers often attracted more than hitters (except for Ichiro). The efficiency of the teams are ranked as follows: Softbank, Hiroshima, Lotte, Nippon-Ham,

# 國立臺灣師範大學 101 學年度碩士班招生考試試題

Yomiuri, Hanshin, Rakuten, Yakult, Seibu, Yokohama, Orix, and Chunichi. Softbank can get about 4 more wins than its potential, while Chunichi will lose 7 more games than it should. The Yomiuri spent most to recruit talents but ranked 5 in the middle quite different with the impression of wasting money.

We chose 18 managers who managed over 3 seasons during the sample period. The five most productively efficient managers are Higashio, Hoshino, Valentine, Nagashima, and Ogi. The last 5 inefficient managers are Ohsima, Nomura, Brown, Okada, and Nashida. Higashio can win 6 more games under the players he owned, while Ohsima will lose 8 more games.

As the player's MP, the 5 most valuable players for the 2008 season are Kanemoto, Ramirez, Ogasawara, Kurihara, and Murata for the Central league; Cabrera, Iwakuma, Inaba, Darvish, and Nakazima for the Pacific league. The most notable result showed that only 2 pitchers entered the MP list due to the relatively small coefficient for the pitching variable.

## 4. Conclusion

This study has employed a Cobb-Douglass production function to build the relation between output and input variables for NPB. The main results showed that,

1. Increasing returns to scale exist.
2. Hitting for average plays the most important role contributing to a team's win.
3. The production function is also utilized to measure the efficiency of teams and managers. By the MP method, each league's MVP is provided. The results are somewhat different with our usual impression or the sportswriters' balloting.