MEASURING EFFICIENCY OF PRACTICUM SUPERVISION AT SARAWAK TEACHERS' TRAINING INSTITUTE BY USING DATA ENVELOPMENT ANALYSIS

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Special dedicated to

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ABSTRACT

The purpose of this study is to use Data Envelopment Analysis to measure the efficiency of practicum supervision of 20 units in Sarawak Teachers' Training Institute. The inputs considered are the total number of lecturers Grade DG44; the total number of lecturers Grade DG48; and the total number of lecturers Grade DG52 as the supervisor for the trainees in each departments in Sarawak Teachers' Training Institute and the outputs considered are the total number of trainees that are satisfied with the supervision of their supervisors on planning their teaching, the total number of trainees that are satisfied with the supervision of their supervisors on implementing their teaching, and the total number of trainees that are satisfied with the supervision of their supervisors on managing their classroom. Besides the overall performance model, six models are developed for the purpose of testing the sensitivity of the results, and hence identifying the strengths and weaknesses of the units. The findings show that eight units are technically-efficient. Among the efficient units, Special Education Unit, Malay Studies Unit and Moral Education Unit are the representative units. Data Envelopment Analysis helps in identifying the reference sets for the inefficient units and further determining the potential improvements. As such, it can be a valuable benchmarking tool for unit administrators.

ABSTRAK

Tujuan kajian ini adalah untuk menguji kecekapan penyeliaan praktikum bagi 20 unit di Institut Pendidikan Guru Malaysia Kampus Sarawak dengan menggunakan “Data Envelopment Analysis”. Input yang dipertimbangkan adalah jumlah pensyarah Gred DG44, jumlah pensyarah Gred DG48 dan jumlah pensyarah Gred DG52 sebagai penyelia untuk guru pelatih dalam setiap jabatan di Institut Pendidikan Guru Malaysia Kampus Sarawak dan output yang dipertimbangkan adalah jumlah bilangan guru pelatih yang berpuas hati dengan bimbingan penyelia mereka dalam merancang pengajaran mereka, jumlah guru pelatih yang berpuas hati dengan bimbingan penyelia mereka melaksanakan pengajaran mereka, dan jumlah guru pelatih yang berpuas hati dengan bimbingan penyelia mereka mengurus kelas mereka. Selain daripada model prestasi keseluruhan, enam model dibangunkan bertujuan menguji kepekaan keputusan, dan kemudian mengenal pasti kekuatan dan kelemahan unit. Dapatan kajian menunjukkan bahawa lapan unit teknikal yang cekap. Antara unit yang cekap adalah Unit Pendidikan Khas, Unit Pengajian Melayu dan Unit Pendidikan Moral merupakan unit contoh. “Data Envelopment Analysia” membantu dalam mengenali set rujukan untuk unit yang tidak cekap dan seterusnya menentukan potensi penambahbaikan. Oleh itu, ia boleh menjadi satu alat tanda aras untuk pentadbir unit.

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LIST OF ABBREVIATIONS

BCC	-	Banker-Charnes-Cooper
CCR	-	Charnes-Cooper-Rhodes
CRS	-	Constant returns to scale
DEA	-	Data Envelopment Analysis
DG44	-	Total number of lecturers Grade DG44
DG48	-	Total number of lecturers Grade DG48
DG52	-	Total number of lecturers Gradd DG52
DMU	-	Decision Making Unit
DRS	-	Decreasing returns to scale
IIT	-	Indian Institute of Technology
IRS	-	Increasing returns to scale
ITT	-	Total number of trainees that are satisfied with the supervision of their supervisors on implementing their teaching
IUG	-	Islamic University in Gaza
JB	-	Department of Languages
JB1	-	English Studies Unit
JB2	-	Chinese Studies Unit
JS	-	Department of Science
JS1	-	Science Unit
JS2	-	Environment Unit
JM	-	Department of Mathematics
JM1	-	Mathematics Unit

JPPP	-	Professionalism Development and Research Department
JPPP1	-	Professionalism Development and Research Unit
JIP	-	Department of Education
JIP1	-	Pre-school Education Unit
JIP2	-	Guidance and Counseling Unit
JIP3	-	Special Education Unit
JPJK	-	Department of Health and Physical Education
JPJK1	-	Physical Education Unit
JPJK2	-	Health Education Unit
JKS	-	Department of Social Studies
JKS1	-	Local Studies Unit
JKS2	-	Unit of Art Education
JKS3	-	Music Education Unit
JKS4	-	Civics and Citizenship Unit
JPM	-	Department of Malay Studies
JPM1	-	Malay Studies Unit
JTP	-	Department of Educational Technology
JTP1	-	Library of Science Unit
JTP2	-	Information and Communication Technology Unit
JPIM	-	Department Islamic and Moral Education
JPIM1	-	Islamic Education Unit
JPIM2	-	Moral Education Unit
MTC	-	Total number of trainees that are satisfied with the supervision of their supervisors on managing their classroom
NCKU	-	National Cheng Kung University

PTE - Pure technical efficiency

PTT - Total number of trainees that are satisfied with the supervision of their supervisors on planning their teaching

SE - Scale efficiency

TE - Technical efficiency

VRS - Variable returns to scale

LIST OF SYMBOLS

u_r	-	weights of the output item *r* (input-oriented)
y_{ro}	-	amount of the *r*th output produced by *o*th Decision Making Unit
v_i	-	weights of the input item i (input-oriented)
x_{io}	-	amount of the *i*th input used by *o*th Decision Making Unit
θ	-	efficiency score (input-oriented)
λ_j	-	proportion contributed by reference unit *j* (input- / output-oriented).
η	-	efficiency score (output-oriented)
μ_j	-	proportion contributed by reference unit j (output-oriented).
p_i	-	weights of the input item *i* (output-oriented)
q_r	-	weights of the output item *r* (output-oriented)
ω	-	free variable in BCC model.
s_i^-	-	input excesses (input-oriented)
s_r^+	-	output shortfalls (input-oriented)
θ^*	-	the optimal value of input-oriented DEA models.
t_i^-	-	input excesses (output-oriented)
t_r^+	-	output shortfalls (output-oriented)
η^*	-	the optimal value of output-oriented CCR model (envelopment form).
$\hat{x}_{io}$	-	adjusted *i*th input for *o*th Decision Making Unit under CCR Projection
$\hat{y}_{ro}$	-	adjusted *r*th output for *o*th Decision Making Unit under CCR Projection

CHAPTER 1

INTRODUCTION

1.1 Introduction

All organizations have an interest in evaluating the performances of their operations. One of the performance measurement criteria is efficiency that evaluate relationship between inputs that is what is used in the production process and outputs that is production. Among the major challenge for today's organization is incomplete knowledge on organizational productivity efficiency. Some of the reasons to count for internal performance evaluation in every organization are as follows. Using criteria that is suitable, organizations must evaluate their unit's presentation to gain control and supervise their performance. Apart from that, the performance evaluation will result in determining appropriate criteria for budget and available resources allocatiom among the department (Fathi *et al.*, 2010). Lack of information on the efficiency of organizational units will result in management inability to make decision on direction of organization and its progress path.

Higher education is the backbone of development and economic growth in any country. Therefore, it is a necessity to assess the educational institutions efficiency, to know whether the high costs spent on them are worth. To do that, a scientific method considering the inputs and outputs of the educational institutions is necessary.

1.2 Background of the Problem

Many literatures have discussed the performance evaluation using Data Envelopment Analysis (DEA) at the university and schools. Research on performance of different colleges or universities, and research comparing the performance of teaching and research in a university department has been made. But as of today, there is no research on performance appraisal using Data Envelopment Analysis at the Teachers' Training Institute.

Teaching practice or practicum is an important component in teachers' training courses. The main function is to provide trainees with the opportunity to develop teaching competencies in classrooms under the guidance and supervision of co-operating teachers and teachers' training institute lecturers. During the teaching practice, trainees have the opportunities to use the knowledge, skills and theory they study and practice in schools.

Sarawak Teachers' Training Institute have ten departments and 20 units. There are no study on the efficiency of practicum supervision in Sarawak Teachers' Training Institute. Thus, some questions arise such as how many units in Sarawak Teachers' Training Institute are considered efficient on practicum supervision, and which departments are inefficient. A study comparing the units in Sarawak Teachers' Training Institute is needed, because the performance evaluation of units will provide useful managerial guidelines to all the lecturers.

1.3 Statement of the Problem

In this study, the non-parametric technique that is DEA is used to examine the efficiency of practicum supervision at each units in Sarawak Teachers' Training Institute by evaluating the technical and scale efficiencies of units.

1.4 Objectives of the Study

The objectives of this study are:

1. To measure the efficiency of practicum supervision of units in Sarawak Teachers' Training Institute.
2. To determine the units' returns to scale nature.
3. To identify the areas of inefficiency for inefficient units.
4. To suggest the potential improvements for the inefficient units.

1.5 Scope of the Study

The study discusses the basic concepts of DEA, the constant and variable returns to scale assumptions, input and output oriented models and also applications of DEA to each units in Sarawak Teachers' Training Institute. The main tools for evaluating the performance of units in Sarawak Teachers' Training Institute are Charnes-Cooper-Rhodes (CCR) and Banker-Charnes-Cooper (BCC) models. In this study, the inputs considered are the total number of Grade DG44 lecturers; the total number of Grade

DG48 lecturers; and the total number of Grade DG52 lecturers as the supervisor for the trainees in each departments in Sarawak Teachers' Training Institute and the outputs considered are the total number of trainees that are satisfied with the supervision of their supervisors on planning their teaching, the total number of trainees that are satisfied with the supervision of their supervisors on implementing their teaching, and the total number of trainees that are satisfied with the supervision of their supervisors on managing their classroom.

1.6 Significance of the Study

The Charnes-Cooper-Rhodes model used will demonstrate whether the technical units tested are efficient or not. If the test shows the technical unit is efficient, then the unit can be treated effectively in the process of changing inputs into outputs. If the unit does not demonstrate effectiveness when tested, the areas of inefficiency can be identified.

By using Charnes-Cooper-Rhodes (CCR) and Banker-Charnes-Cooper (BCC) models efficiency score, the scale efficiency and the returns to scale's nature of the units can also be determined. This result is useful to the head of department because scale efficiency can determine which aspects of the unit are inefficient. By using the information of returns to scale, the unit can be more focused on aspects that are inefficient in the future.

CCR model is also used to provide some suggestion on targets of improvement to the department that is not efficient in performance. In addition to help in identifying the reference sets that is peer group for inefficient departments and determines productivity

improvements, DEA can also be a useful benchmarking tool for head of department to determine more efficient allocation of scarce resources.

1.7 Outline of the Thesis

Chapter 1 consists an introduction to background of this research study, statement of the problem, objective of the study, scope of the study and also the significance of the study.

Chapter 2 concentrates on the literature review of Data Envelopment Analysis, which includes introduction of Data Envelopment Analysis, Charnes-Cooper-Rhodes Model, Banker-Charnes-Cooper Model and related works on DEA.

Chapter 3 presents the methodology and resarch design for this research. The input and output measures that are used to evaluate departments, the developed performance models and analysis options chosen in this research.

Chapter 4 reported the analysis of the results. In this chapter, technical and scale efficiency measures are presented for eight units in Sarawak Teachers' Training Institute. The results obtained by each performance model are also interpreted in this section of Chapter 4.

Chapter 5 consists of conclusions and suggestions for further research.

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