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Abstract

This paper aims to propose a systematic approach to evaluate the efficiency of academic research for Vietnam. Six criteria for measuring the performance of a research project are proposed to quantify its quality. The data of two sorts of research - fundamental and implemental - are employed to run the DEA BCC and BCC value efficiency models which are considered as numerical examples to illustrate how to approach the work.

Keywords*: Data envelopment analysis, Value efficiency, Academic research, Efficiency score.*

JEL Classification Numbers: C14, C44

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1. Introduction

Since the innovation of Charnes et al. (1978), studies in Data Envelopment Analysis (DEA) have been extensively employed in measuring the efficiency of Decision Making Units in many activities. Many fields of production, banking, insurance, etc. have been evaluated the efficiency from micro to macro levels by employing DEA models developed by many theorists. In Vietnam, these methodologies of DEA have been mainly employed by Nguyen Khac Minh et al from 2002 to far.

Even though the methodologies of DEA have been applied in many fields of practical activities, its applications on evaluating the efficiency of education and scientific research are very limited. To our best knowledge, only Korhonen et al (2001) proposed the so-called value efficiency model, which is basically based on DEA BCC model, to perform an efficiency evaluation for 18 research units at the Helsinki school of economics. Inheriting this idea and with the kind support of professor Korhonen, we conducted a research on value efficiency of academic research for Vietnam which is considered the first step for a further more comprehensive research in this field. Our research focuses on evaluating the efficiency of some academic research of Ministry of Education and Training and of some institutes.

This paper consists of five sections including introduction. In section 2, we present the way to develop the database for the performance analysis. Section 3 briefly reviews the traditional DEA and value efficiency analysis. Section 4 presents the research performance analysis for academic research. Section 5 gives some conclusion remarks.

2. Database and Indicators

In order to evaluate the performance of academic research, we address a set of evaluation criteria as outputs which cover these contents below:

- Quality of academic research;
- Research activity;
- Impact of academic research;
- Activities in educating young scientists;
- Activities in Scientific Community;
- Application of the research in practice.

Four of these six criteria are referenced from the research of Korhonen et al. (2001) which are rather close to the criteria applied in the quality assessment of academic research in the Netherlands. All evaluation criteria are multi-dimensional because it is extremely difficult to use a single dimension criterion to cover one aspect of a research project. These six criteria are derived from 19 sub-criteria. So, it requires finding a way to combine the sub-criteria into one criterion. The numerical information of all sub-criteria is derived from assessments of 41 experts who are professors and associate professors of many fields in disciplinary sciences.

The data for analysis are collected in two stages. Firstly, leaders of academic research are directly interviewed to get detail and necessary information of the research in respect to evaluation criteria above. Secondly, we conduct a survey to get ideas from experts for each sub-criterion. From the ideas of experts, we construct a set of weight for each sub-criterion of each kind research in respect to input. This is a necessary step to combine the sub-criteria into one criterion.

Each of the criteria are based on combined information

a. Quality of academic research (Criterion 1)

- Number of articles relating to the research published in the domestic and international journal by the research members.
- Number of books and chapters relating to the research edited by the research member are published domestically and internationally.
- Number of citations from the published reports and material of the research members.

b. Research activity (Criterion 2)

- Number of publications relating to the research are published in the non- refereed books or journal
- Papers in conference proceedings, national reports, reports in the non-refereed journal, working paper and other unpublished reports
- Number of reports of relating to the research are invited to present at National and International Conferences

c. Impact of research (Criterion 3)

- Number of citations by other researchers (in journal articles, books, published conference proceedings, and PhD dissertations)

- Number of foreign co-authors in journal articles
- Number of scientific research contract relating to the research sponsored from organization after publishing the results of the research
- Number of training courses designed relating to the methodology of the research

d. Activity in Educating Young Scientists (Criterion 4)

- Number of Doctoral degrees and Master degrees produced
- Number of Doctoral students supervised

e. Activities in Scientific Community (Criterion 5)

- Memberships in editorial boards
- Number of research members are invited as experts for National Programmes and International Programmes
- Number of research members are invited to represent at scientific conferences or to be visiting professor for issues studied
- Number of research members are invited in National scientific organization and International organization as experts in research field

f. Application of the research in practice (Criterion 6)

- Number of organizations have applied the results of the research
- Number of results of the research have been being granted in terms of pattern, sample product, etc.
- The results of the research are background for establishing business unit

3. The methodology

3.1. Data Envelopment Analysis

Data Envelopment Analysis (DEA) developed by Charnes, Cooper and Rhodes (1978) has become one of the most widely used methods in evaluating the relative efficiency of Decision Making Units (DMUs). Assuming there are n DMUs each consuming m inputs and producing p outputs. Let $X \in \Re_+^{m\times n}$ and $Y \in \Re_+^{p\times n}$ be the matrices, consisting of nonnegative elements, including the observed inputs and outputs of DMUs. Let denote $\boldsymbol{x_j}$ (the jth column of $\boldsymbol{X}$) be the vector of inputs consumed by DMU_j, and x_{ij} be the quantity of input I consumed by DMU_j. A similar notation is used for outputs. Furthermore, let denote $1 = [1,\ldots,1]^T$.

In this paper, the so-called BCC models with variable returns to scale proposed by Banker, Charnes and Cooper (1984) are used to examine the relative efficiency among DMUs. In output oriented BCC models, the efficiency of a DMU is determined by maximizing outputs subject to given input levels. These models are presented in (3.1a) and (3.1b).

Output-Oriented BCC Primal ($BCC_P - O$)	**Output-Oriented BCC Dual ($BCC_D - O$)**
$Max \quad Z_o = \theta + \varepsilon(1^T s^+ + 1^T s^-)$ *s.t.* $Y\lambda - \theta y_0 - s^+ = 0,$ $X\lambda + s^- = x_0,$ (3.1a) $1^T\lambda + z = 1,$ $\lambda, s^-, s^+, z \geq 0,$ $\varepsilon > 0 \quad (Non - Archimedian)$	$Min \quad W_0 = v^T x_0 + u$ *s.t.* $\mu^T y_0 = 1,$ $-\mu^T Y + v^T X + u1^T \geq 0^T,$ (3.1b) $\mu, v \geq \varepsilon 1,$ $\varepsilon > 0.$

A DMU is efficient iff $\theta^* = 1$ and all slack variables s^-, s^+ equal to zero, otherwise it is called inefficient (Charnes et al., 1994).

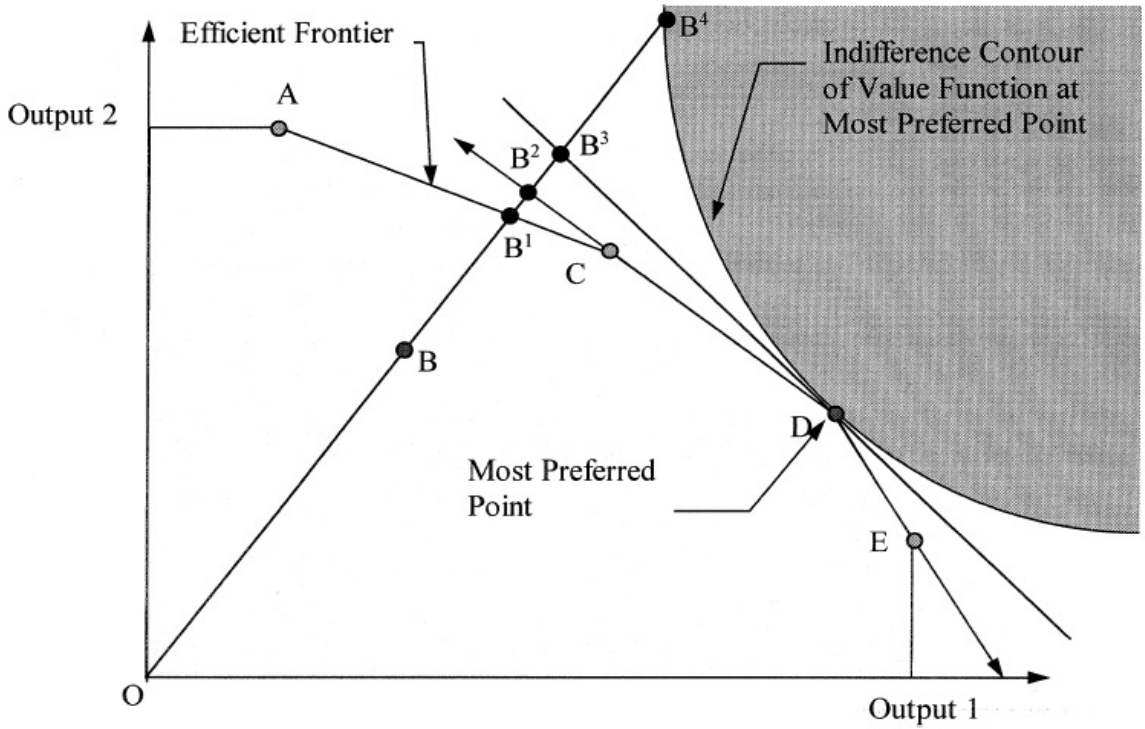
3.2. Value Efficiency Analysis

Halme et al. (1999) proposed the idea of Value Efficiency Analysis. This is contrast with traditional DEA which measure efficiency level of a DMU basing on its distance to the efficiency frontier. Theoretically, the DM is assumed to have a (unknown) pseudo-concave value function v(u), $u = \begin{bmatrix} y \\ -x \end{bmatrix} \in \Re^{n+p}$, which is strictly increasing (meaning strictly increasing in ***y*** and strictly decreasing in ***x*)** and with a (local) maximal value $v(u^*)$, $u^* = \begin{bmatrix} y^* \\ -x^* \end{bmatrix} \in T$ (where T is the feasible set), at the Most Preferred Solution (see Korhonen et al., 2001).

Value efficiency analysis allows evaluating efficiency of each DMU in relation to the indifference contour of that (unknown) value function crossing through the Most Prefererred Solution. However, generally it is not realistic to assume that the value function is known or

reliably estimated (Korhonen et al. 1999). That is why the indifference contour is approximated by using possible tangent hyperplanes. This basic idea of Value Efficiency Analysis is illustrated in Figure 2.

Figure 2: Value Efficiency Analysis



For simplicity, assuming there are five DMUs (A, B, C, D, E) which produce two outputs and use the same amount of one input. The efficiency measure in the traditional DEA is the ratio OB/OB^1. Our target is to measure the ratio OB/OB^4. Because, the value function is not known, we can not do it. So we have to approximate the indifference contour by a tangent, we could use the ratio OB/OB^3 instead of OB/OB^4. Because we do not assume that this is possible in practice, we have to consider all possible tangents of the contour. This leads to the use of the ratio: OB/OB^2 as the best approximation we can get to the (true) value efficiency score. This score is simply called *value efficiency score*.

Theoretically, value efficiency analysis can be carried out as easily as the traditional DEA using linear programming technique. A DMU is inefficient with respect to any strictly increasing pseudo-concave value function $v(u)$, $u = \begin{bmatrix} y_0 \\ -x_0 \end{bmatrix}$ with a maximum at point u^*, if the optimum value Z^* of the following problem is greater than one:

$$
\begin{aligned}
&\max \quad Z_0 = \theta + \varepsilon(1^T s^+ + 1^T s^-) \\
&s.t. \\
&Y\lambda - \theta y_0 - s^+ = 0, \\
&X\lambda + s^- = x_0, \\
&1'\lambda + z \le 1, \\
&s^-, s^+ \ge 0, \\
&\varepsilon > 0 \quad ("Non - Archimedean"), \\
&\lambda_j \ge 0 \quad if \quad \lambda_j^* = 0, \quad j = 1, 2, ..., n, \\
&z \ge 0 \quad if \quad z^* = 0.
\end{aligned}
\tag{3.2}
$$

where $\lambda^* \in \Lambda$, z^* correspond to the most preferred solution

$$
\begin{aligned}
&\boldsymbol{y}^* = \boldsymbol{Y}\boldsymbol{\lambda}^*, \\
&\boldsymbol{x}^* = \boldsymbol{X}\boldsymbol{\lambda}^*.
\end{aligned}
$$

4. Analysis of Research Performance

In order to perform efficiency analysis, six output measures and one input are chosen. We divided the academic research into two groups: fundamental research and implemental research. For each kind of research, we then classify the research in terms of input. Three levels of input are considered as ones less than 100 million Vietnam Dong (VND), from 100 million VND to 300 million VND, and greater than 300 million VND. We first perform a standard output oriented BCC DEA (Banker et al., 1984) using DEA solver provided by Cooper et al. (2007) and then perform BCC value efficiency model using value analysis program provided by Korhonen (1999) to make a comparison.

The six outputs were calculated by combining detailed information provided by researchers and the ideas of experts. In the survey questionnaire, we required researchers to provide both numerical information and transcript ones. i.e, for the publication information of a research project, we need the number of publications and the names of articles and journals in which the research was published.

4.1. Fundamental Research

Table 4.1a: Criteria value as the weighted sums of scaled indicators and resources of Fundamental Academic Research

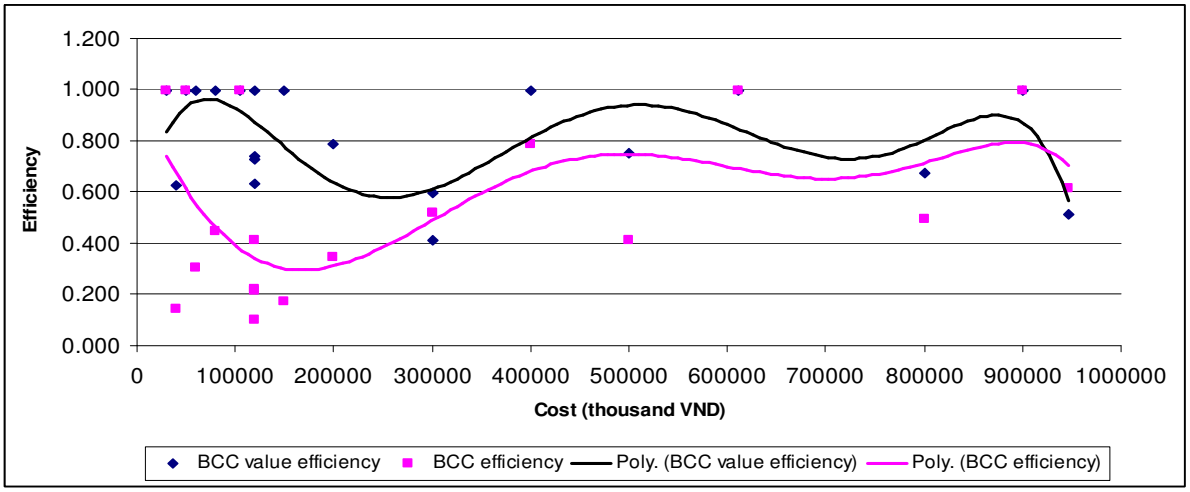
Code	Cost	C1	q2011	q2012	q2013	C2	q2021	Q2022	Q2023	C3	q2031	q2032	q2033	q2034	C4	q2041	q2042	C5	q2051	q2052	q2053	q2054	C6	q2061	q2062	q2063
		w_{1i}	0.361	0.333	0.306	w_{2i}	0.315	0.339	0.346	w_{3i}	0.259	0.245	0.245	0.251	w_{4i}	0.488	0.512	w_{5i}	0.220	0.254	0.279	0.247	w_{6i}	0.363	0.317	0.320
R95	30,000	9.894	2	0	30	5.125	2	1	12	5.180	20	0	0	0	2.976	4	2	4.050	4	2	6	4	1.003	1	0	2
R45	40,000	1.444	4	0	0	0.000	0	0	0	0.000	0	0	0	0	0.000	0	0	0.000	0	0	0	0	0.000	0	0	0
R110	50,000	0.694	1	1	0	0.693	0	0	2	0.000	0	0	0	0	8.809	17	1	2.759	3	4	3	1	1.320	1	1	2
R112	60,000	1.055	2	1	0	0.346	0	0	1	0.000	0	0	0	0	1.952	4	0	0.780	0	1	1	1	0.640	0	0	2
R59	80,000	1.444	4	0	0	0.693	0	0	2	0.000	0	0	0	0	0.488	1	0	1.538	7	0	0	0	1.089	3	0	0
		w_{1i}	0.354	0.341	0.304	w_{2i}	0.288	0.336	0.376	w_{3i}	0.247	0.242	0.263	0.248	w_{4i}	0.515	0.485	w_{5i}	0.220	0.250	0.278	0.252	w_{6i}	0.366	0.328	0.306
R44	105,000	1.621	2	0	3	0	0	0	0	0.000	0	0	0	0	0.515	1	0	0.000	0	0	0	0	10.481	27	0	2
R19	120,000	1.050	2	1	0	0	0	0	0	0.000	0	0	0	0	0.000	0	0	0.000	0	0	0	0	0.000	0	0	0
R40	120,000	0.708	2	0	0	1	1	1	1	0.742	1	0	0	2	1.000	1	1	0.252	0	0	0	1	0.000	0	0	0
R58	120,000	0.000	0	0	0	0	0	0	0	0.743	0	0	0	3	0.970	0	2	1.660	4	1	1	1	0.000	0	0	0
R97	120,000	0.000	0	0	0	0.376	0	0	1	0.000	0	0	0	0	0.000	0	0	0.252	0	0	0	1	1.634	1	2	2
R52	150,000	0.354	1	0	0	1.128	0	0	3	0.000	0	0	0	0	0.485	0	1	0.440	2	0	0	0	0.000	0	0	0
R42	200,000	3.846	10	0	1	1.424	0	2	2	0.485	0	2	0	0	0.000	0	0	0.278	0	0	1	0	0.000	0	0	0
		w_{1i}	0.355	0.338	0.307	w_{2i}	0.284	0.333	0.383	w_{3i}	0.249	0.237	0.260	0.253	w_{4i}	0.528	0.472	w_{5i}	0.220	0.250	0.2781	0.252	w_{6i}	0.359	0.332	0.309
R26	300,000	1.355	2	1	1	1.434	1	0	3	0.000	0	0	0	0	3.698	7	0	0.000	0	0	0	0	0.977	1	0	2
R15	300,000	0.710	2	0	0	0.333	0	1	0	1.013	0	0	0	4	3.472	3	4	0.934	2	2	0	0	0.950	0	1	2
R20	500,000	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0	0.000	0	0	0.000	0	0	0	0	0.000	0	0	0
R93	400,000	1.421	4	0	0	1.150	0	0	3	4.088	0	2	10	4	2.057	3	1	1.327	0	1	1	3	0.618	0	0	2
R5	500,000	2.842	8	0	0	1.902	4	0	2	0.760	0	0	0	3	2.057	3	1	0.000	0	0	0	0	0.618	0	0	2
R82	611,291	2.969	3	2	4	2.667	3	2	3	3.977	11	2	0	3	4.585	6	3	2.500	3	1	2	4	2.773	6	0	2
R28	800,000	2.114	5	1	0	1.534	0	0	4	0.000	0	0	0	0	3.472	3	4	0.526	0	0	2	0	0.618	0	0	2
R94	900,000	15.915	5	1	45	14.453	4	2	33	0.997	4	0	0	0	1.528	2	1	3.224	4	5	4	0	0.618	0	0	2
R76	946,500	1.937	2	0	4	0.767	0	0	2	2.255	8	0	1	0	0.528	1	0	0.751	0	1	1	1	2.332	2	3	2

The data of fundamental academic research is synthesized in table 4.1a. Six output measures are described in columns C1, C2, C3, C4, C5 and C6. The unique input as cost for research is described in the "**cost**" column. The results of running standard BCC efficiency model and BCC value efficiency model are described in table 4.1b.

Table 4.1b: Value efficiency analysis with output-oriented model

DMUs	Cost	BCC efficiency		BCC value efficiency									
				Reference DMUs									
		Efficiency	Ranking	R95	R110	R112	R59	R44	R97	R52	R93	R82	R94
R95	30,000	1.000	1	1.000									
R45	40,000	0.145	19						0.625				
R110	50,000	1.000	1		1.000								
R112	60,000	0.306	15			1.000							
R59	80,000	0.447	11				1.000						
R44	105,000	1.000	1					1.000					
R19	120,000	0.100	20						0.727				
R40	120,000	0.220	16			0.166			0.008	0.632	0.180		
R58	120,000	0.410	13		0.017		0.740				0.162		0.080
R97	120,000	0.213	17						1.000				
R52	150,000	0.176	18							1.000			
R42	200,000	0.347	14	0.065		0.786							0.149
R26	300,000	0.521	8		0.353	0.155		0.037		0.409			0.047
R15	300,000	0.517	9	0.196	0.195	0.599		0.011					
R93	400,000	0.789	6								1.000		
R5	500,000	0.411	12	0.053	0.011	0.752					0.097		0.086
R20	500,000	0.000	21										
R82	611,291	1.000	1									1.000	
R28	800,000	0.495	10	0.053	0.230	0.676				0.016			0.078
R94	900,000	1.000	1										1.000
R76	946,500	0.616	7					0.192			0.512		

Figure 4.1: Fitted lines of relationship between efficiency scores and cost



From the results of both models, we can see that the efficiency per unit cost of the fundamental research is low in the interval of around 100 million to 350 million VND. This implies that in this interval the research seem to be decreasing return of scale. The research seems to be efficient in terms of per unit cost in the interval of 350 to 600 million VND. However, there is still the particular case of research R20, the efficiency score is zero for both models (the traditional BCC DEA model and BCC value efficiency model); this one is considered as an outliner and is excluded from our analysis. After the interval of cost of 350 to 600 million, the marginal efficiency decreases, meaning the research may not get economies of scale, until the cost reaches to around 750 million VND. The marginal efficiency of the research increases again after this point, and so on which are represented in figure 4.1. This result sheds light for the implication that, for fundamental research, we should focus in investing the medium research with cost of 350 to 600 million VND. The research with low cost of interval from 100 to 300 million VND should not be encouraged since they are not economies of scale. The research with high costs of greater than 700 million VND should be more closely monitored by the leader as well as different monitoring levels.

4.2. Implemental research

Similar to fundamental research, six outputs and one input above are also chosen to evaluate the efficiency of research. The data is represented in table 4.2a. The efficiency scores of research are represented in table 4.2b by both models as DEA BCC and BCC value efficiency. Actually, implemental research usually has greater costs compared to fundamental research. This is rather understandable since an implemental research project usually requires more practical activities, which are costly than a fundamental one does.

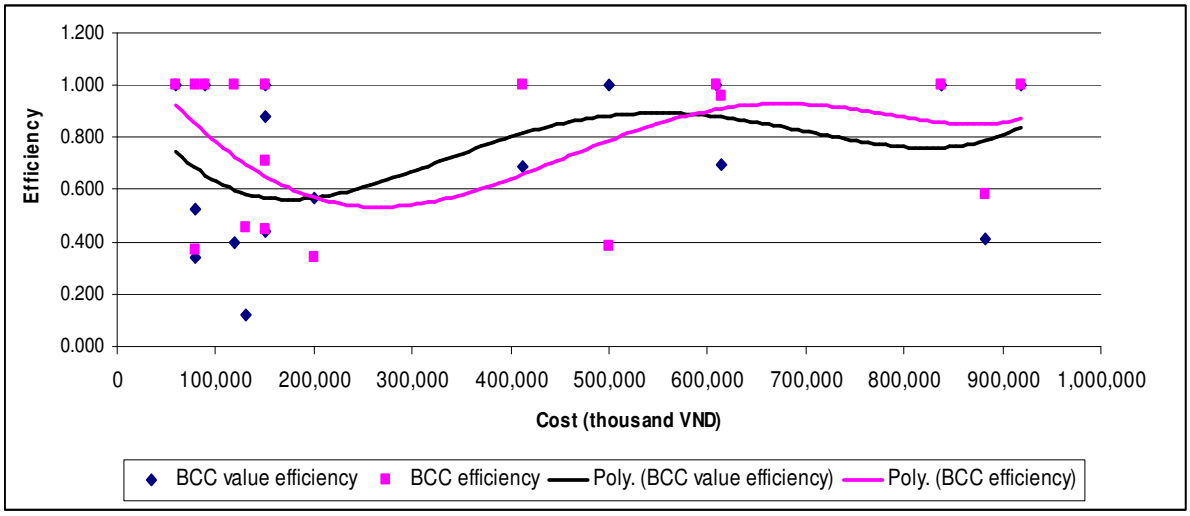
Table 4.2a. Criteria value as the weighted sums of scaled indicators and resources of Implemental Academic Research

hoso	Costs	C1	q2011	q2012	q2013	C2	q202	q2022	q2014	C3	q2031	q2032	q2033	q2034	C4	q2041	q2042	C5	q2051	q2052	q2053	q2054	C6	q2061	q2062	q2063
		w_{1i}	0.361	0.333	0.306	w_{2i}	0.315	0.339	0.346	w_{3i}	0.259	0.2453	0.2451	0.2506	w_{4i}	0.488	0.512	w_{5i}	0.220	0.254	0.279	0.247	w_{6i}	0.363	0.317	0.320
R8	60,000	0.972	1	0	2	0.000	0	0	0	0.000	0	0	0	0	0.000	0	0	0.495	0	0	0	2	1.729	3	0	2
R16	80,000	1.083	3	0	0	0.000	0	0	0	0.000	0	0	0	0	0.000	0	0	0.000	0	0	0	0	0.640	0	0	2
R36	80,000	6.892	2	2	18	0.339	0	1	0	0.501	0	0	0	2	1.024	0	2	1.066	0	2	2	0	1.320	1	1	2
R13	90,000	0.722	2	0	0	0.654	1	1	0	0.000	0	0	0	0	1.976	3	1	0.000	0	0	0	0	1.366	2	0	2
R65	90,000	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0	0.000	0	0	0.000	0	0	0	0	0.000	0	0	0
		w_{1i}	0.354	0.341	0.304	w_{2i}	0.288	0.336	0.376	w_{3i}	0.247	0.242	0.263	0.248	w_{4i}	0.515	0.485	w_{5i}	0.220	0.250	0.278	0.252	w_{6i}	0.366	0.328	0.306
R33	120,000	4.460	4	0	10	0.376	0	0	1	0.000	0	0	0	0	4.515	5	4	1.505	1	1	1	3	0.000	0	0	0
R35	130,000	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0	0.000	0	0	0.720	1	2	0	0	0.000	0	0	0
R111	150,000	0.708	2	0	0	0.288	1	0	0	0.000	0	0	0	0	1.515	2	1	0.000	0	0	0	0	0.612	0	0	2
R54	150,000	2.621	3	1	4	0.000	0	0	0	0.743	0	0	0	3	6.119	10	2	0.000	0	0	0	0	0.000	0	0	0
R23	150,000	0.354	1	0	0	1.048	0	2	1	0.000	0	0	0	0	1.000	1	1	0.000	0	0	0	0	1.306	1	1	2
R1	200,000	0.000	0	0	0	0.000	0	0	0	0.000	0	0	0	0	0.000	0	0	0.000	0	0	0	0	0.978	1	0	2
		w_{1i}	0.355	0.338	0.307	w_{2i}	0.284	0.333	0.383	w_{3i}	0.249	0.237	0.260	0.253	w_{4i}	0.528	0.472	w_{5i}	0.220	0.250	0.278	0.252	w_{6i}	0.359	0.332	0.309
R86	412,000	4.502	3	2	9	5.051	5	4	6	9.839	17	2	9	11	3.528	4	3	2.282	1	3	2	3	4.569	11	0	2
R10	500,000	0.000	0	0	0	0.000	0	0	0	0.780	0	0	3	0	2.000	2	2	0.000	0	0	0	0	1.696	3	0	2
R74	610,000	5.294	1	1	15	0.716	0	1	1	4.488	18	0	0	0	11.924	19	4	5.881	7	11	3	3	1.696	3	0	2
R81	614,000	4.502	3	2	9	3.284	4	3	3	2.719	9	2	0	0	0.000	0	0	3.874	0	5	4	6	4.708	4	8	2
R75	836,927	8.053	6	3	16	6.966	4	6	10	15.009	21	3	29	6	7.698	11	4	5.525	5	7	6	4	6.005	15	0	2
R87	882,000	1.628	0	3	2	2.199	0	2	4	4.504	11	2	3	2	4.113	6	2	2.636	1	3	6	0	3.491	8	0	2
R83	918,163	25.470	12	21	46	7.478	2	15	5	4.809	11	0	6	2	2.585	4	1	5.963	11	7	1	6	1.696	3	0	2
∑		49.448				25.694				42.149					31.848			26.161					23.860			

Table 4.2b. Value efficiency analysis with output-oriented model

DMUs	Cost	BCC efficiency		BCC value efficiency						
				Reference DMUs						
		Efficiency	Ranking	R8	R13	R54	R10	R74	R75	R83
R8	60,000	1.000	1	1.000						
R16	80,000	0.373	16	0.341						0.029
R36	80,000	1.000	1	0.524		0.064				0.244
R13	90,000	1.000	1		1.000					
R65	90,000	0.000	18							
R33	120,000	1.000	1			0.399		0.152		0.103
R35	130,000	0.452	13					0.122		
R111	150,000	0.444	14		0.443	0.103				0.005
R54	150,000	1.000	1			1.000				
R23	150,000	0.711	11		0.878					0.063
R1	200,000	0.342	17	0.566						
R86	412,000	1.000	1	0.067					0.688	
R10	500,000	0.384	15				1.000			
R74	610,000	1.000	1					1.000		
R81	614,000	0.960	10				0.299	0.002	0.699	
R75	836,927	1.000	1						1.000	
R87	882,000	0.581	12	0.293			0.258	0.034	0.414	
R83	918,163	1.000	1							1.000

Figure 4.2: Fitted line of relationship between efficiency score and cost.



For implemental research, the research with cost in the interval of 100 to around 400 million VND seem to be less efficient than others whose costs are in other intervals. In fact the

activities of research in this interval are very poor (see table 4.2a), particularly the activities in educating young scientists. The research with cost greater than 400 to 700 million VND performs increasing return and constant return to scales and gets efficiency score average to around 0.8 and 0.9. It can be interpreted that implemental research, in reality, requires high cost to cover all its own activities which are intrinsically complicated. It is clear that, for research with low cost, it is hard to cover all activities of research; and for one with very high cost, it requires a large amount of activities which may limit the efficiency of research. So, an implication can be derived that we should design suitable research with cost in the interval of 400 to 700 million VND, should not focus on the research with low cost because of poor activities.

5. Conclusion remarks

In this paper, we propose an effort to standardize the criteria and use methodologies of efficiency analysis for assessing the efficiency of academic research. Both fundamental and implemental research are used to make assessments by employing the traditional BCC DEA model and BCC value efficiency model and using the survey data. The results of two models are rather consistent in terms of tendency of the relationship between efficiency score and cost of the academic research. This partially demonstrates how well the models can work and enrich the literature in using methodologies of efficiency analysis.

However, we need to apply these methodologies to make an efficiency assessment for all research institutes in Vietnam. To do this work, we need a very rich database which can provide precise information of research. We do believe that with the supports of Ministry of Science & Technology and Ministry of Education and Training as well as other qualified institutes and individuals, we will be able to perform further research on this interesting field for academic research.

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