

**Title of Research: PERFORMANCE EFFICIENCY OF DMMMSU
COLLEGES AND INSTITUTES: A DATA
ENVELOPMENT ANALYSIS (DEA) STUDY**

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ABSTRACT

This study determined the performance of the 16 colleges and institutes of the Don Mariano Marcos Memorial State University (DMMMSU), La Union, vis-à-vis their efficiency along the following performance indicators: Program Requirements, Instruction (Faculty and Students), Research, Extension and Others (Annual Budget) from 2010-2012. The study made use of documentary analysis. It utilized the descriptive evaluative research design and considered several entities for evaluation using a non-parametric approach and non-statistical method called Data Envelopment Analysis (DEA) in Decision Making Units (DMUs). It further employed the Input Oriented Multi - Stage DEA Constant Returns-to-Scale (CRS) Model. The means of the data for the three years, 2010-2012, was taken. The “best practice” in the frontier is the basis to calculate the adjustments necessary for inefficient colleges/ institutes. There is no single college or institute in the entire university which could serve as a model in efficiency in all the performance indicators considered but there are best practices from the “efficient” DMUs which could be adapted by the “weak efficient” and “inefficient” DMUs..

Keywords:

Performance efficiency, peers and weights, performance efficiency, slacks

Situation Analysis

The wave of the times and call on “quality” of higher education rose from the growing diversity of institutions and millennium students; the declining public support are always of positive development. This leads universities and colleges, be it private or public/state, to be conscious and aware of their academic and non-academic activities for quality and effectiveness in the delivery of education through their departments and staff, more sensitive to the ways of strengthening the programs and themselves and be more motivated to act towards the improvement of all their functions.

The strategic approach to quality assurance is based on developing the capacity of higher education institutions to design and deliver high quality programs to meet the needs of the country and which achieve standards comparable to those of universities in other countries with which the country competes with (Lagrada, 2010).

In the Philippines, the higher education system is a key player in the educational and integral formation of professionally competent, service-oriented, principled and productive citizens. It has a tri-fold function of teaching, research and extension services. Through these, it becomes a prime mover of the nation’s socio-economic growth and sustainable development.

In this regard, the Commission on Higher Education (CHED) is mandated and responsible for formulating and implementing policies, plans and programs for the efficient operation of the system of higher education in the country. It is attached to the Office of the President for Administrative purposes only. It covers both public and private institutions of higher education as well as degree-granting programs in all post-secondary public and private educational institutions.

To improve the quality of instruction delivered by the tertiary education institutions, CHED encourages institutions to seek accreditation and provide a number of incentives in the form of progressive deregulation, grants and subsidies to institutions with accredited programs.

As part of its mandate, CHED monitors and evaluates HEIs in the country through Republic Act 7722. Its purposes are: (a) to make judgment about the

effectiveness of the institution and (b) to ensure the quality of standards and programs.

There are different mechanisms of quality assurance. There are program-based like the authority to grant permit/recognition, standards setting, accreditation, international certifications, Center of Development/Excellence and international benchmarking. Institution-based mechanisms include Institutional Quality Assurance Monitoring and Evaluation (IQUAME), SUC leveling, Philippine Quality Award, Autonomous and Deregulated Status of HEIs, PSG for university status and Local Colleges and Universities ([http:// www.ched.gov.ph](http://www.ched.gov.ph)).

Assessing the performance of educational institutions, both private and public, vis-à-vis attainment of their stated objectives is fraught with difficulties. As an alternative measure, the performance of universities has been assessed using a systemic model (input-output processes) concentrating on the means of attaining the objectives through indicators as: outputs of the organization, administrative and technological processes, and the quality and quantity of inputs used. In general, universities are committed to the traditional goals of preserving and transmitting knowledge, extending the frontiers of knowledge and applying knowledge (Poblador, 2008)

The concepts of institutional performance are the embodying components on two dimensions: effectiveness - is the congruence between outputs and goals or other criteria; and on one hand, efficiency - links outputs with inputs. The efficiency dimension, has been relatively neglected to assess institutional performance, is further defined. Efficiency's relationship to the economic concepts of productivity is examined. The practical difficulties in assessment related to the conceptualization and measurement of inputs and outputs has to reflect in the educational institution's purposes and processes. Results are used as management information for action.

Some researches review the progress toward overcoming these difficulties and examine the ways that recent research addresses the analytical problems of assessing the input-output component of institutional performance. Studies of input-output relationships are classified into three categories: (1) input-output-

ratio studies, which include the use of cost-analysis techniques and "productivity" ratios; (2) regression studies, which use statistical procedures to estimate the typical relationships among the variables; and (3) production frontier or data envelopment techniques, which identify and explore the most desirable input-output combinations or estimate the feasible range of these combinations (Lindsay, 2002)

Since its existence, DMMMSU, a CHED-supervised state university, has been performing as one of the best state universities in the Philippines. This is reflected in the latest report on the leveling of universities with DMMMSU as one of the top ten (10) Level IV State Universities and Colleges (SUCs) and among the 107 state higher education institutions (Bacungan & Gapasin, 2007).

Recently, an institutional self-evaluation was conducted by a team of evaluators composed of administrators and senior faculty members in the university. It aimed to determine the performance level of the institution and the significant factors which affected its performance. Specifically, it looked into the performance level of the 16 colleges and institutes along 8 performance indicators namely: program requirements, planning, curriculum and instruction, student development and services, physical plant and facilities, research, extension and resource generation and utilization. The study further aimed to provide direction to planning and to serve as a basis for the improvement of the existing policies and practices of the institution.

The main tool of the study was an instrument developed by a team of evaluators and approved by the University Administrative Council through Resolution No. 35, s. 2007. It made use of 8 performance indicators with sub-indicators and their corresponding points. Secondary data were obtained through interviews, documents and reports of programs and projects. A combination of four designs was used namely: quantitative, descriptive, relational, correlational and cross sectional designs. Frequency counts and percentages, pair-wise regression and bivariate correlation analysis were utilized in the study (Ibid, 2007)

In the study on the performance of the 16 colleges and institutes of DMMMSU, the strengths and weaknesses of the colleges and institutes were uncovered. It revealed that the general performance level of the entire university was “barely performing” and that the five factors that significantly affected its performance were Resource Generation, Research, Extension, Program Requirements and Student Development and Services. The strongest, however, were Planning and Physical Facilities. In terms of the performance of the 16 colleges and institutes of the university mentioned, there were two “highly performing”, five “moderately performing”, seven “fairly performing,” and two “barely performing” with the College of Education of the South La Union Campus as the highest performing college.

The results have been considered by the researcher, thus, this paper regarding the performance vis-à-vis the efficiency of the 16 colleges and institutes of the same university has been conceptualized. Furthermore, the evaluation was done through Data Envelopment Analysis (DEA) along different performance indicators namely Program Requirements, Instruction, Research, Extension and Others (Annual Budget). It also analyzed the indicators and sub-indicators where the colleges and institutes performed efficiently and inefficiently.

Furthermore, in developing countries like the Philippines, regular assessments of state colleges and universities are being done by accrediting agencies to see to it that the courses/programs offered conform to standards to avoid mismatch between job opportunities and courses offered taken up by graduates. Global standards are also considered in cases of job opportunities overseas. In addition, the indicators where the different DMUs are inefficient will be considered, thus, taking the efficient colleges/institutes as their peers and weights and adopting their best practices in order to be in the efficient frontier.

Within this context, the university has embarked on improving the areas where the colleges and institutes did not perform efficiently, thus the need for this study.

RESEARCH PARADIGM

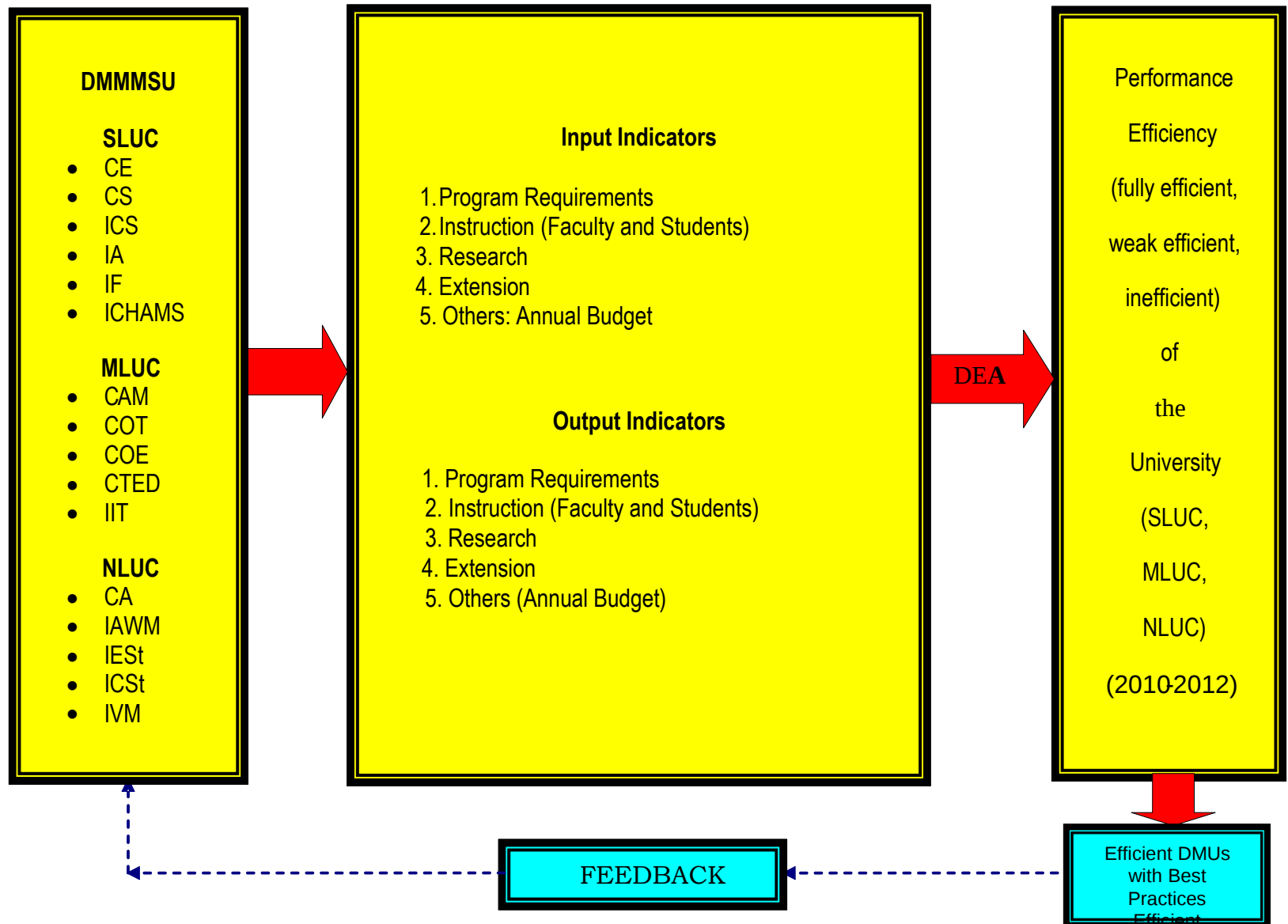


Figure 3 – The paradigm illustrates the interplay of the variables in the study

Statement of the Problem

The main objective of the study is to determine the performance of the 16 colleges and institutes of the Don Mariano Marcos Memorial State University vis-à-vis their efficiency along the performance indicators: Program Requirements, Instruction (Faculty and Students), Research, Extension and Others (Annual Budget).

Specifically, this study answered the following questions:

1. What are the efficient Colleges and Institutes in the different performance indicators based on the DEA analysis?
2. What are the peer groups and weights of the Colleges and Institutes?
3. What are the virtual inputs/outputs or improvements of the colleges/institutes to be in the efficient frontier? and
4. Based on the findings, whatfully efficient College/Institute of DMMMSU has the best practices in all theperformance indicators?

Methodology

This study used the descriptive evaluative research design. It is also a documentary analysis and it analyzed the performance of the 16 colleges and institutes of the Don Mariano Marcos Memorial State University, La Union in terms of their efficiencies using the different performance indicators for three years, 2010-2012.

The researcher considered several entities for evaluation using a non-parametric and non-statistical approach called Data Envelopment Analysis (DEA) in Decision Making Units (DMUs) on-line software to evaluate and compare the efficiency and performance of the different colleges and institutes in terms of their efficiency scores.

It employed the Input Oriented Multi - Stage Data Envelopment Analysis (DEA) Constant Returns-to-Scale (CRS) Model to find the most favorable weight and the efficiency of a DMU equivalent to improving the performance of this DMU by minimizing its inputs while producing at least the observed output levels.

Performance Indicators considered as Input and Output in the study were: Program Requirements, Instruction (Faculty and Students), Research, Extension and Others (Annual Budget). Under Program Requirements, the number of programs was considered as an input, while the Number of Accredited Programs, Accreditation Level, and IQAME Documentation were taken as outputs.

Moreover, faculty and students were the sub-indicators in Instruction. Faculty inputs were: number of faculty, highest educational attainment of faculty and number of faculty who graduated under the Faculty and Staff Development Program (FSDP) while Academic Rank of Faculty and number of faculty awardees were the outputs. Student indicators, on the other hand, were student enrolment, number of recognized student organizations. The output indicators included number of graduates, number of student activities, and number of student awardees.

For Research, input variables included the number of on-going researches, number of research staff/personnel, and number of linkages. Output variables were the number of completed researches, number of published researches and number of researches presented in local/regional/international fora. The quantity of researches included the researches of faculty and students.

In Extension, the input variables were the number of on-going extension projects, number of extension staff/personnel, and number of linkages while the outputs were number of completed extension projects and number of clients served in the Extension Programs.

The Others, as indicator, included the inputs: Annual Budget as allotted to Personnel Services (PS) and Maintenance and Other Operating Expenses (MOOE) while Income Generated was the output. This performance indicator is entirely different from the previous studies since it is done by campus not as per college/institute. This was due to the unavailability of data at the accounting office of campuses particularly MLUC. All these variables were subjected to Data Envelopment Analysis for efficiency measures.

The primary source of data was the vital documents requested and gathered by the researcher from the different Colleges and Institutes of the three campuses of the University. These were also available at the Office of the Vice President for Academic Affairs. Meanwhile, the data on the annual budget were obtained from the accounting offices of the three campuses. Secondary data were sourced- out from researches conducted in the internet/data bases, refereed journals, annual reports and other working papers.

Salient Findings

1.The following Colleges/Institutes/Campuses have efficiency scores of 1.00 indicating that they are “fully efficient” in the following performance indicators: A. **Program Requirements:** College of Education (CE), College of Sciences (CS), Institute of Fisheries(IF), Institute of Information Technology (IIT), College of Agriculture (CA) and Institute of Agronomy and Watershed Management (IAWM) B. **Instruction (Faculty):** College of Education(CE), College of Sciences(CS),Institute of Computer Science(ICS), Institute of Agriculture(IA), Institute of Fisheries(IF), Institute of Community Health and Allied Medical Sciences(ICHAMS), College of Technological Education(CTED), College of Agriculture(CA), Institute of Agronomy and Watershed Management (IAWM), Institute of Environmental Studies(IESt), Institute of Computer Studies(ICST) and Institute of Veterinary Medicine(IVM). C. **Instruction (Students):**College of Education(CE), College of Sciences(CS), Institute of Computer Science(ICS), Institute of Agriculture(IA), Institute of Fisheries(IF),Institute of Community Health and Allied Medical Sciences(ICHAMS), College of Technological Education(CTED), Institute of Information Technology(IIT), College of Agriculture(CA), Institute of Agronomy and Watershed Management(IAWM), Institute of Environmental Studies(IESt), Institute of Computer Studies(ICST). D. **Research:** all Colleges and Institutes except College of Arts and Management (CAM) E. **Extension:** College of Sciences (CS), Institute of Agriculture (IA), College of Technological Education(CTED), College of Agriculture(CA), Institute of Environmental Studies(IESt), Institute of Computer Studies(ICST) and Institute

of Veterinary Medicine(IVM)F. Others (Annual Budget – Personnel Services(PS), Maintenance and Other Operating Expenses(MOOE)): Mid La Union Campus(MLUC) and North La Union Campus(NLUC). The Over-all efficient colleges are: College of Sciences and College of Agriculture (CA).

Graphs of the Efficiency of the Colleges/Institutes In the Different Performance Indicators

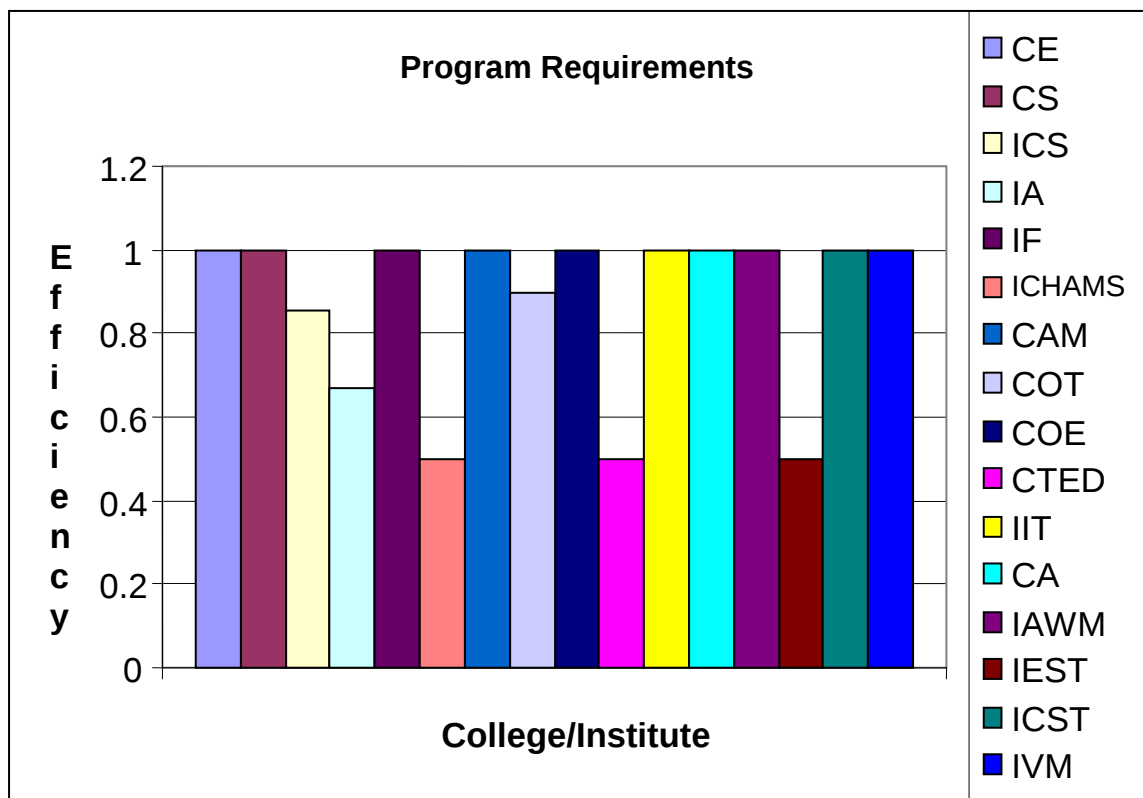


Figure 1 – graph of the performance efficiency of the colleges and institutes under Program Requirements

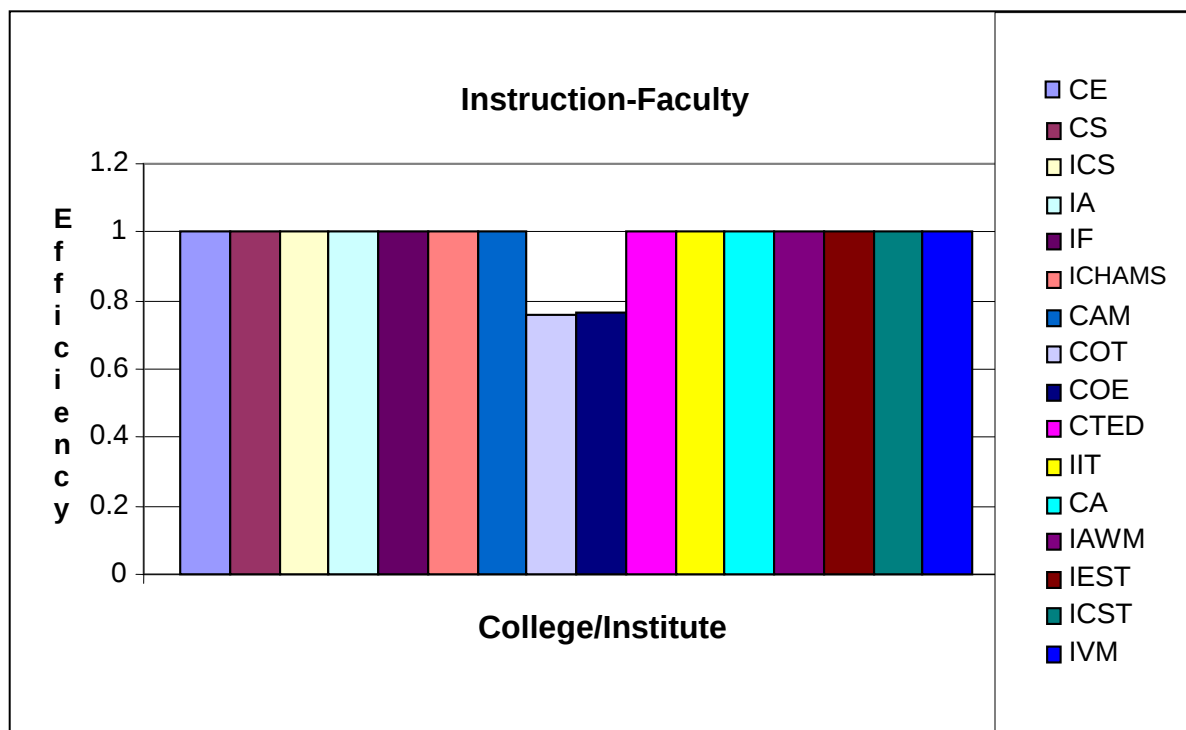


Figure 2 – graph of the performance efficiency of the colleges and institutes under Instruction (Faculty)

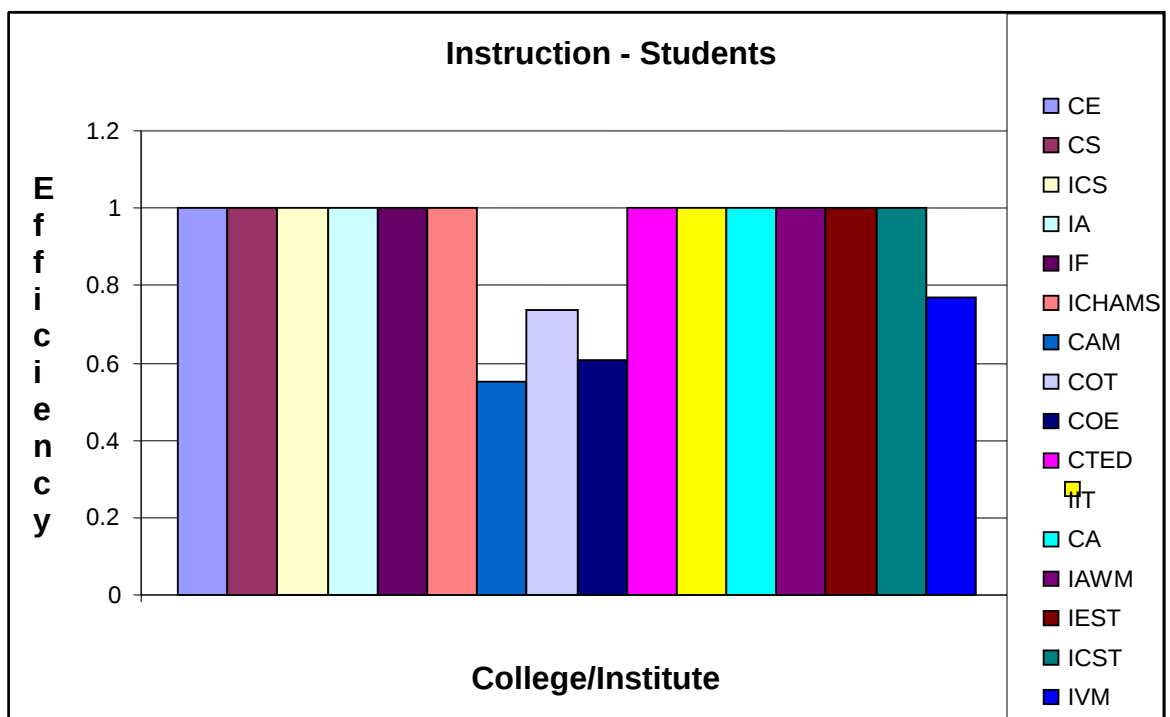


Figure 3 – graph of the performance efficiency of the colleges and institutes under Instruction (Students)

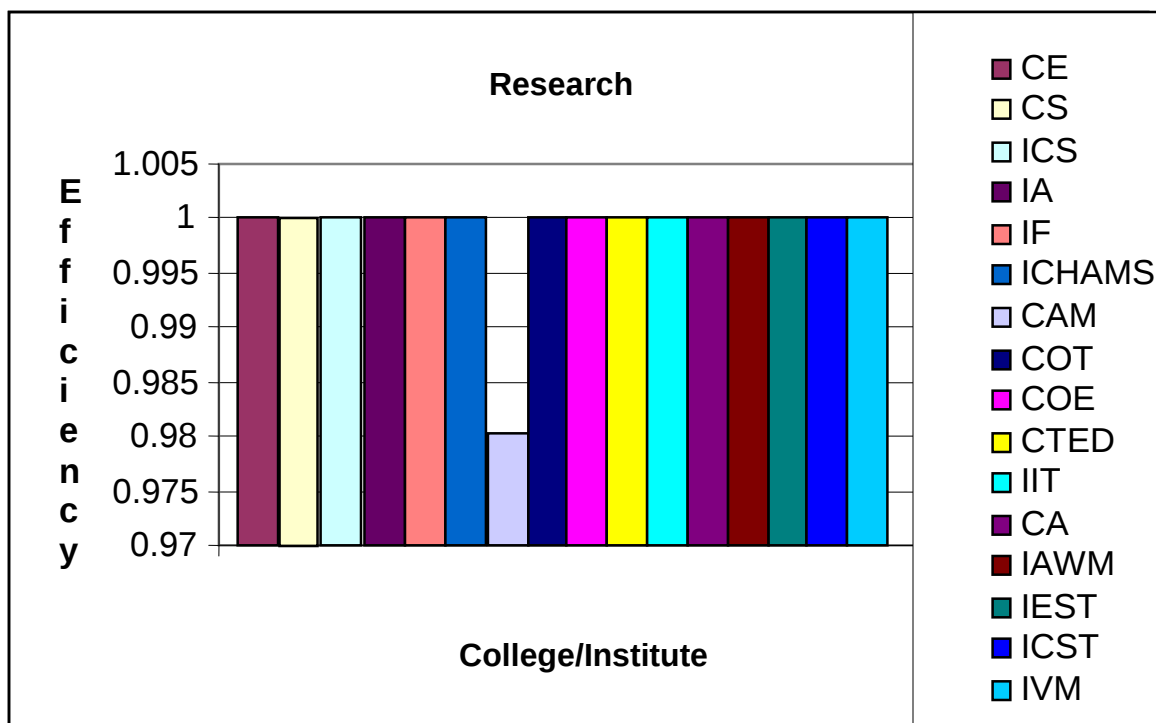


Figure 4 – graph of the performance efficiency of the colleges and institutes under Research

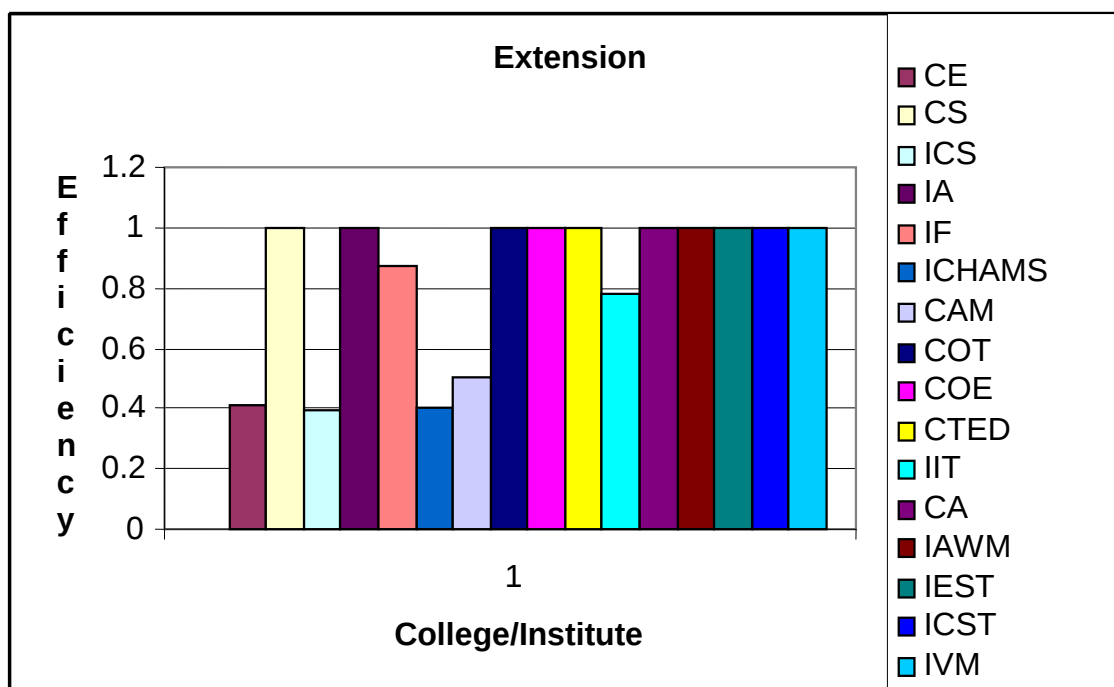


Figure 5 – graph of the performance efficiency of the colleges and institutes under Extension

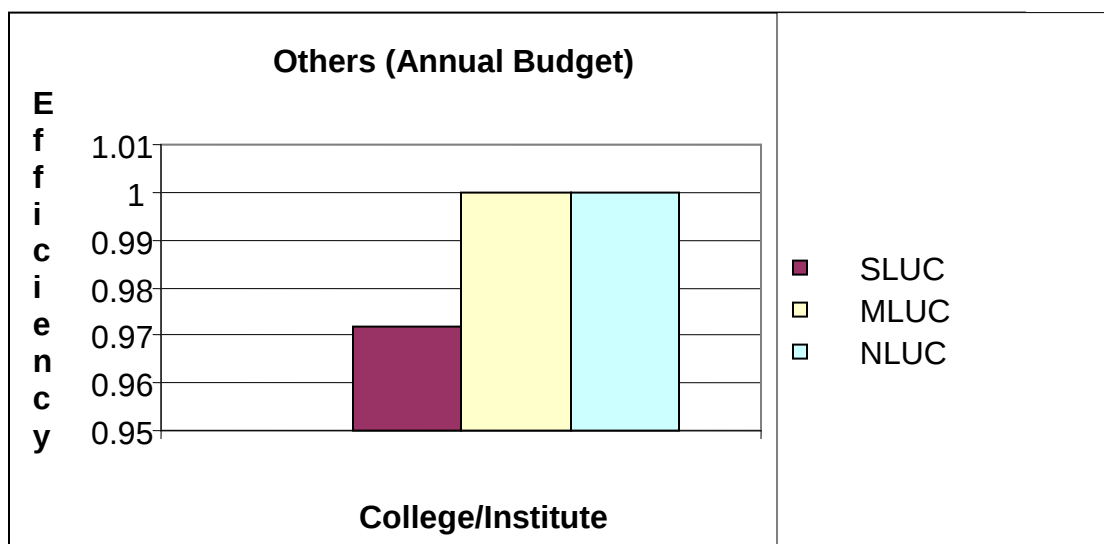


Figure 6 – graph of the performance efficiency of the colleges and institutes under Others (Annual Budget)

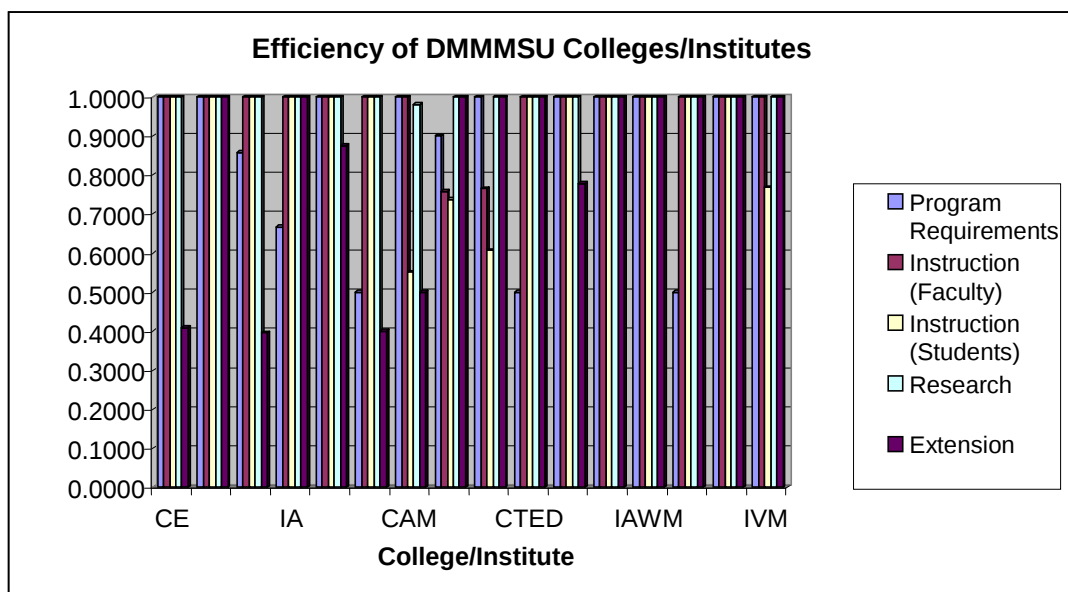


Figure 7 – graph of the performance efficiency of the colleges and institutes in all the performance indicators

2. The “fully efficient” Colleges and Institutes with efficiency scores of 1.00 have their own colleges/institutes as their peers and weights in the different performance indicators. They are the references or peers of the “weak efficient” and “inefficient” colleges and institutes. Under **Program Requirements**, they are: for ICS-CE & IF, for COT-IF & IIT, for IESSt – CE & IAWM, and for ICSt – CS & CA. Under **Instruction(Faculty)** they are: CS and IA for CAM, COT & COE, and IA & ICHAMS for IIT. Under **Instruction (Students)**, they are: for CAM - ICHAMS, CTED & IIT, for COT - CE, ICHAMS & CTED, for COE-CE, ICHAMS, CTED & IIT, while for IVM – IAWM, IESSt and ICSt. Under **Research**, only CAM is inefficient, its peers and weights are CE, COE & CA. Under **Extension**: for CE-IA, CTED and CA, For ICS, CTED and CA and for ICHAMS, IA and CTED. Under **Others(Annual Budget)**, for SLUC – MLUC & NLUC.

EFFICIENT PEERS AND WEIGHTS

Efficient Peers and Weights (Program Requirements)						
College/Institute	CE	CS	IF	IIT	CA	IAWM
CE	1.0000					
CS		1.0000				
ICS	0.7143		0.2857			
IA	1.0000					
IF			1.0000			
ICHAMS			1.0000			
CAM					1.0000	
COT			0.2000	0.8000		
COE	1.0000					
CTED	1.0000					
IIT				1.0000		
CA					1.0000	
IAWM						1.0000
IESSt	0.5000					0.5000
ICSt		0.4000			0.6000	
IVM						1.0000

Figure 8 – the peers and weights of the colleges and institutes under Program Requirements

Efficient Peers and Weights (Instruction – Faculty)												
College/Institute	COE	CS	ICS	IA	IF	ICHAMS	CTED	CA	IAWM	UEST	ICST	IVM
CE	1.0000											
CS		1.0000										
ICS			1.0000									
IA				1.0000								
IF					1.0000							
ICHAMS						1.0000						
CAM		0.3556		0.6444								
COT		0.5251		0.4749								
COE		0.1728		0.8272								
CTED							1.0000					
IIT				0.2143		0.7857						
CA								1.0000				
IAWM									1.0000			
UEST										1.0000		
ICST											1.0000	
IVM												1.0000

Figure 9 – the peers and weights of the colleges and institutes under Instruction (Faculty)

Efficient Peers and Weights (Instruction – Students)												
College/Institute	CE	CS	ICS	IA	IF	ICHAMS	CTED	IIT	CA	IAWM	UEST	ICST
CE	1.0000											
CS		1.0000										
ICS			1.0000									
IA				1.0000								
IF					1.0000							
ICHAMS						1.0000						
CAM						0.5842	0.3328	0.0830				
COT	0.0524					0.8269	0.1206					
COE	0.0029					0.0537	0.4373	0.5061				
CTED							1.0000					
IIT								1.0000				
CA									1.0000			
IAWM										1.0000		
UEST											1.0000	
ICST												1.0000
IVM										0.5355	0.2719	0.1924

Figure 10 – the peers and weights of the colleges and institutes under Instruction (Students)

Efficient Peers and Weights (Research)															
College/ Institute	CE	CS	ICS	IA	IF	ICHAMS	COT	COE	CTED	IIT	CA	IAWM	IENT	ICST	IVM
CE	1.0000														
CS		1.0000													
ICS			1.0000												
IA				1.0000											
IF					1.0000										
ICHAMS						1.0000									
CAM	0.1821							0.6730			0.1448				
COT							1.0000								
COE								1.0000							
CTED									1.0000						
IIT										1.0000					
CA											1.0000				
IAWM												1.000			
IENT													1.000		
ICST														1.000	
IVM															1.000

Figure 11 – the peers and weights of the colleges and institutes under Research

Efficient Peers and Weights (Extension)							
College/Institute	CS	IA	CTED	CA	UEST	ICST	IVM
CE		0.6152	0.1308	0.2541			
CS	1.0000						
ICS			0.8809	0.1191			
IA		1.0000					
IF			1.0000				
ICHAMS		0.6667	0.3333				
CAM			1.0000				
COT		1.0000					
COE			1.0000				
CTED			1.0000				
IIIT			1.0000				
CA				1.0000			
IAWM						1.0000	
UEST					1.0000		
ICST						1.0000	
IVM							1.0000

Figure 12 – the peers and weights of the colleges and institutes under Extension

Efficient Peers and Weights (Others)		
Campus	MLUC	NLUC
SLUC	0.6048	0.3952
MLUC	1.0000	
NLUC		1.0000

Figure 13 – the peers and weights of the three campuses under Others (Annual Budget)

3. For the input/output slacks of the inefficient DMUs, they need the following to become efficient. Under **Program Requirements**: ICS & ICHAMS need to increase their number of programs & accreditation status by 0.71 and 1.86 & 1.00 and 6.00 respectively, while IA, CAM, COE & CTED need to increase their accreditation status & IQUAME documentation by 4.00 and 0.10 & 3.50 and 1.00, 4.00 and 2.50 & 4.00 and 3.50 respectively. COT also needs to increase its IQUAME documentation by 1.76. Also, ICSt, ICSt and IVM need to improve their number of accredited programs and accreditation status by 1.00 and 5.00, 1.00 and 4.00 & 1.00 and 5.00 respectively. For **Instruction (Faculty)**, CAM needs to increase its number of faculty, academic rank of faculty and number of faculty awardees by 10.47, 5.33 & 1.07 respectively, COT and COE in their number of faculty and number of faculty awardees by 1.52 and 2.15 & 6.70 and 0.90 respectively and IIT in its number of faculty, academic rank of faculty and number of faculty awardees by 0.36, 4.29 & 0.21 respectively. Under **Instruction (Students)**, CAM has to improve in its number of student activities and number of student awardees by 0.92 and 0.33 respectively, COT by 705.58 in its enrolment and 2.76 in its number of student activities, COE and IVM by 0.60 and 2.11 in their student activities respectively. For **Research**, only CAM is inefficient so it needs to improve its number of linkages, number of published researches and number of researches presented by 2.61, 3.38 & 0.59 respectively. Under **Extension**, CE needs to improve in its number of linkages and number of completed extension programs by 1.09 and 4.85 respectively, ICS in its number of ongoing extension programs, number of linkages and number of completed extension programs by 0.17, 20.69 & 0.83 respectively, IF and IIT in

its number of ongoing extension programs, number of linkages and number of clients served by 3.25, 13.13 and 28.00 & 3.44, 0.78 and 33.00 respectively. ICHAMS and COE also need to improve in their number of extension personnel, number of completed extension programs and number of clients served by 4.07, 3.33 and 272.33 & 4.00, 2.00 and 127.00 respectively. CAM also needs to increase its number of ongoing extension programs, number of linkages, number of completed extension programs and number of clients served by 2.00, 4.50, 1.00 and 26.00 respectively. COT has to improve in its, number of linkages, number of completed extension programs and number of clients served by 2.00, 4.00 and 350.00 respectively. Finally, IAWM has to improve in its number of linkages, number of completed extension programs and number of clients served by 11.00, 3.00 & 307.00 respectively. Lastly, for **Others**, SLUC needs to increase its budget for Personnel Services by 18, 849, 274. 00.

INPUT/OUTPUT SLACKS

Input/ Output Slacks (Program Requirements)				
College/Inst	Number of Programs	Number of Accredited Programs	Accreditation Status	IQUAME Documentation
CE	0.00	0.00	0.00	0.00
CS	0.00	0.00	0.00	0.00
ICS	0.00	0.71	1.86	0.00
IA	0.00	0.00	4.00	0.10
IF	0.00	0.00	0.00	0.00
ICHAMS	0.00	1.00	6.00	0.00
CAM	0.00	0.00	3.50	1.00
COT	0.00	0.00	0.00	1.76
COE	0.00	0.00	4.00	2.50
CTED	0.00	0.00	4.00	3.50
IIT	0.00	0.00	0.00	0.00
CA	0.00	0.00	0.00	0.00
IAWM	0.00	0.00	0.00	0.00
IEST	0.00	1.00	5.00	0.00
ICST	0.00	1.00	4.00	0.00
IVM	0.00	1.00	5.00	0.00

Figure 14 – the input/output slacks of the colleges and institutes under Program Requirements

Input/ Output Slacks (Instruction – Faculty)					
College/Institute	No. of Faculty	HEA of Faculty	No. of Faculty who graduated under FSDP	Academic Rank of Faculty	Number of Faculty Awardees
CE	0.00	0.00	0.00	0.00	0.00
CS	0.00	0.00	0.00	0.00	0.00
ICS	0.00	0.00	0.00	0.00	0.00
IA	0.00	0.00	0.00	0.00	0.00
IF	0.00	0.00	0.00	0.00	0.00
ICHAMS	0.00	0.00	0.00	0.00	0.00
CAM	10.47	0.00	0.00	5.33	1.07
COT	1.52	0.00	0.00	0.00	2.15
COE	6.70	0.00	0.00	0.00	0.90
CTED	0.00	0.00	0.00	0.00	0.00
IIT	0.36	0.00	0.00	4.29	0.21
CA	0.00	0.00	0.00	0.00	0.00
IAWM	0.00	0.00	0.00	0.00	0.00
UEST	0.00	0.00	0.00	0.00	0.00
ICST	0.00	0.00	0.00	0.00	0.00
IVM	0.00	0.00	0.00	0.00	0.00

Figure 15 – the input/output slacks of the colleges and institutes under Instruction (Faculty)

Input/ Output Slacks (Instruction-Students)					
<u>College/ Institute</u>	Student Enrolment	No. of Recognized Student Org.	No. of Graduates	No. of Student Activities	No. of Student Awardees
CE	0.00	0.00	0.00	0.00	0.00
CS	0.00	0.00	0.00	0.00	0.00
ICS	0.00	0.00	0.00	0.00	0.00
IA	0.00	0.00	0.00	0.00	0.00
IF	0.00	0.00	0.00	0.00	0.00
ICHAMS	0.00	0.00	0.00	0.00	0.00
CAM	0.00	0.00	0.00	0.92	0.33
COT	705.58	0.00	0.00	2.76	0.00
COE	0.00	0.00	0.00	0.60	0.00
CTED	0.00	0.00	0.00	0.00	0.00
IIT	0.00	0.00	0.00	0.00	0.00
CA	0.00	0.00	0.00	0.00	0.00
IAWM	0.00	0.00	0.00	0.00	0.00
IEST	0.00	0.00	0.00	0.00	0.00
ICST	0.00	0.00	0.00	0.00	0.00
IVM	0.00	0.00	0.00	2.11	0.00

Figure 16 – the input/output slacks of the colleges and institutes
under (Instruction (Faculty)

Input/ Output Slacks (Research)						
College/ Institute	No. of Ongoing Researches	No. of Research Personnel	No. of Linkages	No. of Completed Researches	No. of Published Researches	No. of Researches Presented
CE	0.00	0.00	0.00	0.00	0.00	0.00
CS	0.00	0.00	0.00	0.00	0.00	0.00
ICS	0.00	0.00	0.00	0.00	0.00	0.00
IA	0.00	0.00	0.00	0.00	0.00	0.00
IF	0.00	0.00	0.00	0.00	0.00	0.00
ICHAMS	0.00	0.00	0.00	0.00	0.00	0.00
CAM	0.00	0.00	2.61	0.00	3.38	0.59
COT	0.00	0.00	0.00	0.00	0.00	0.00
COE	0.00	0.00	0.00	0.00	0.00	0.00
CTED	0.00	0.00	0.00	0.00	0.00	0.00
IIT	0.00	0.00	0.00	0.00	0.00	0.00
CA	0.00	0.00	0.00	0.00	0.00	0.00
IAWM	0.00	0.00	0.00	0.00	0.00	0.00
IEST	0.00	0.00	0.00	0.00	0.00	0.00
ICST	0.00	0.00	0.00	0.00	0.00	0.00
IVM	0.00	0.00	0.00	0.00	0.00	0.00

Figure 17 – the input/output slacks of the colleges and institutes under Research

Input/ Output Slacks (Extension)					
College/ Institute	No. of Ongoing Ext Prog	No. of Ext Personnel	No. of Linkages	No. of Completed Ext Prog	No. of Clients Served
CE	0.00	0.00	1.09	4.85	0.00
CS	0.00	0.00	0.00	0.00	0.00
ICS	0.17	0.00	20.69	0.83	0.00
IA	0.00	0.00	0.00	0.00	0.00
IF	3.25	0.00	13.13	0.00	28.00
ICHAMS	0.00	4.07	0.00	3.33	272.33
CAM	2.00	0.00	4.50	1.00	26.00
COT	0.00	0.00	2.00	4.00	350.00
COE	0.00	4.00	0.00	2.00	127.00
CTED	0.00	0.00	0.00	0.00	0.00
IIT	3.44	0.00	0.78	0.00	33.00
CA	0.00	0.00	0.00	0.00	0.00
IAWM	0.00	0.00	11.00	3.00	307.00
UEST	0.00	0.00	0.00	0.00	0.00
ICST	0.00	0.00	0.00	0.00	0.00
IVM	0.00	0.00	0.00	0.00	0.00

Figure 18 – the input/output slacks of the colleges and institutes under Extension

Input/ Output Slacks (Others)			
Campus	PS	MOOE	Inc Gen
SLUC	18,849,274.00	0.00	0.00
MLUC	0.00	0.00	0.00
NLUC	0.00	0.00	0.00

Figure 19 – the input/output slacks of the colleges and institutes under Others (Annual Budget)

4. There is no single college or institute in the entire university which could serve as a model in efficiency in all of the performance indicators considered.

Conclusions

1.The following Colleges/Institutes/Campuses are “fully efficient” in the following performance indicators: A. **Program Requirements:** College of Education (CE), College of Sciences (CS), Institute of Fisheries(IF), Institute of Information Technology (IIT), College of Agriculture (CA) and Institute of Agronomy and Watershed Management (IAWM) B. **Instruction (Faculty):** College of Education(CE), College of Sciences(CS),Institute of Computer Science(ICS), Institute of Agriculture(IA), Institute of Fisheries(IF), Institute of Community Health and Allied Medical Sciences(ICHAMS), College of Technological Education(CTED), College of Agriculture(CA), Institute of Agronomy and Watershed Management (IAWM), Institute of Environmental Studies(IESt), Institute of Computer Studies(ICST) and Institute of Veterinary Medicine(IVM). C. **Instruction (Students):**College of Education(CE), College of Sciences(CS), Institute of Computer Science(ICS), Institute of Agriculture(IA), Institute of Fisheries(IF),Institute of Community Health and Allied Medical Sciences(ICHAMS), College of Technological Education(CTED), Institute of Information Technology(IIT), College of Agriculture(CA), Institute of Agronomy

and Watershed Management(IAWM), Institute of Environmental Studies(IESt), Institute of Computer Studies(ICST). D. **Research**: all Colleges and Institutes except College of Arts and Management (CAM) E. **Extension**: College of Sciences (CS), Institute of Agriculture (IA), College of Technological Education(CTED), College of Agriculture(CA), Institute of Environmental Studies(IESt), Institute of Computer Studies(ICST) and Institute of Veterinary Medicine(IVM)F. **Others (Annual Budget – Personnel Services(PS), Maintenance and Other Operating Expenses(MOOE))**: Mid La Union Campus(MLUC) and North La Union Campus(NLUC). The Over-all efficient colleges are: College of Sciences and College of Agriculture (CA).The Over-all efficient colleges are: College of Sciences and College of Agriculture.

2. The “fully efficient” Colleges and Institutes have their own colleges/institutes as their peers and weights in the different performance indicators. They are the references or peers of the “weak efficient” and “inefficient” colleges and institutes. Different “weak efficient” and “inefficient” DMUs have different peers and weights.

3. Different “weak efficient” and “inefficient” DMUs have different virtual IOs in their respective inputs/outputs in all the performance indicators. “Fully efficient” DMUs do not need virtual IOs.

4. There is no single college or institute in the entire university which could serve as a model in efficiency in all of the performance indicators considered.

Recommendations

The findings in the study may give impetus to the Commission on Higher Education (CHED), lawmakers or legislators, and the University administrators to adopt measures that would be beneficial to the improvement of DMMMSU from its inefficiency. In the light of the findings, the following are recommended by the researcher:

1. For efficiency, the deans and directors of the 16 Colleges and Institutes should be encouraged to submit their programs for higher accreditation status/level. The faculty and students have to work hard for awards in their fields

of specialization. Design and plan programs of completed researches to be presented in research fora for information dissemination. A broader perspective of Extension for a greater number of clients is highly recommended. Design and plans for Income Generating Projects in SLUC to increase the income generated to maintain/sustain the PS and MOOE funds. This is to prevent diversion of budget from PS and MOOE.

2. The efficient institution should share their best practices for an optimal operation of a model University.

3. The colleges/institutes are advised to re-assess their virtual IOs particularly on the performance indicators to determine targets and percentages of IOs, increase/decrease in the different performance indicators to become efficient in its functions.

4. All colleges/institutes of the University should work towards becoming a model of efficiency. Virtual IOs should be considered and they should adapt the best practices of their peers/references in the different performance indicators to catch up the aimed efficiency frontier of 1.000.

5. Future studies may venture on other factors/variables/indicators to test the efficiency of the programs, industries and also the performance of their institutions/organizations.

6. Lastly, the different colleges/institutes should try their best to become efficient in all the performance indicators in order to be globally competent.

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Acronyms

AACCUP	Accreditation Agency of Chartered Colleges and Universities of the Philippines
CA	College of Agriculture
CAM	College of Arts and Management
CCR	Constant Returns to Scale
CE	College of Education
CHED	Commission on Higher Education
COE	College of Engineering
COT	College of Technology
CS	College of Sciences
CTED	College of Technical Education
DMMMSU	Don Mariano Marcos Memorial State University
DMU	Decision Making Units
FSDP	Faculty and Staff Development Program
HEI	Higher Education Institutions
IA	Institute of Agriculture
IAWM	Institute of Agroforestry and Watershed Management
ICHAMS	Institute of Community Health and Allied Medical Sciences
ICS	Institute of Computer Science
ICSt	Institute of Computer Studies
IESt	Institute of Environmental Studies
IF	Institute of Fisheries
IIT	Institute of Information Technology
IQUAME	Institutional Quality Assurance Monitoring and Evaluation
IVM	Institute of Veterinary Medicine
PS	Personal Services
MOOE	Maintenance and Other Operating Expenses
MLUC	Mid La Union Campus
NLUC	North La Union Campus
SLUC	South La Union Campus
SUC	State Universities and Colleges
VMGO	Vision Mission Goals and Objectives

