

**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, 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 2006-2008. 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, 2006-2008, 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..*

## **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
DEA	Data Envelopment Analysis
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
IO	Input-Output
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

## **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.

Institutional autonomy is a necessary measure for a sufficient and effective condition to develop a “culture of excellence”. Culture of excellence embodies a wide range of quality control mechanisms, including internal reviews, through which academic excellence is achieved and sustained. Thus, quality assurance is instituted.

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, 2007).

The criteria used to assess the quality of work in colleges and universities are closely linked to their varying missions. Institutional missions become more diverse as mass higher education develops. The culture of excellence in a prime teacher education college or university needs not be keyed to the same criteria of quality used to assess work in leading research universities, and it may be supported by different procedures and mechanisms.

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.

The role of a tertiary education institution are varied and viewed in different perspective such as: (1) preservation and transmission of knowledge; (2) operating as a

service enterprise that provides instruction, training and services in response to consumer demands; (3) a producer in human resources to satisfy the trained manpower needs of the community; and (4) as an institution that provides instruction, research and public services to its consumers (Lagrada, 2007).

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.

Missions of the higher educational system are to educate and train Filipinos for enhanced labor productivity and responsible citizenship. This is to institute an environment where educational access is equitable and to inculcate nationalism and patriotism in the hearts and minds of the students and graduates.

Furthermore, the Commission on Higher Education is mandated to accelerate the development of high-level professionals ready to meet international competition and to serve as Centers for Research and Development. The CHED recognizes the enormous contribution of higher education institutions in the growth and prominence of tertiary education in the country and in the Asia- Pacific.

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.

In addition, it has a renewed push for quality assurance particularly: (a) movement to mass higher education; (b) emerging new challenges; (c) workforce has become global and geographically fluid and (d) development of advanced information and communication technologies

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)).

At the institutional level, CHED has developed the following mechanisms: for State Universities and Colleges Leveling. This has been set to determine the overall performance of the HEIs in different aspects for classification or categorization of institutions accordingly based on the various levels of quality (Defensor, 2007).

Assessing the performance of educational institutions 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, 1998)

Private and public institutions like colleges and universities need to be assessed. Performance indicators have often been criticized for being inadequate and not conducive to analyzing efficiency. The measurement of organizational performance and efficiency is an essential part of the reform for the general welfare of all groups as well as the country. The measure of efficiency is the possible evaluation of the performance of an organization by comparing it with the standards of international best practice (Castano and Cabanda, 2007).

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)

One of the known CHED supervised state university in the Philippines is the Don Mariano Marcos Memorial State University (DMMMSU) in La Union.

### **The Don Mariano Marcos Memorial State University: A Background on Quality**

Since its existence, DMMMSU 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. The study conducted 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.

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.

## **Situation Analysis**

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It has three campuses: North La Union Campus (NLUC), Mid La Union Campus (MLUC) and South La Union Campus (SLUC) with different program offerings per campus. (please refer to the paradigm)

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## RESEARCH PARADIGM

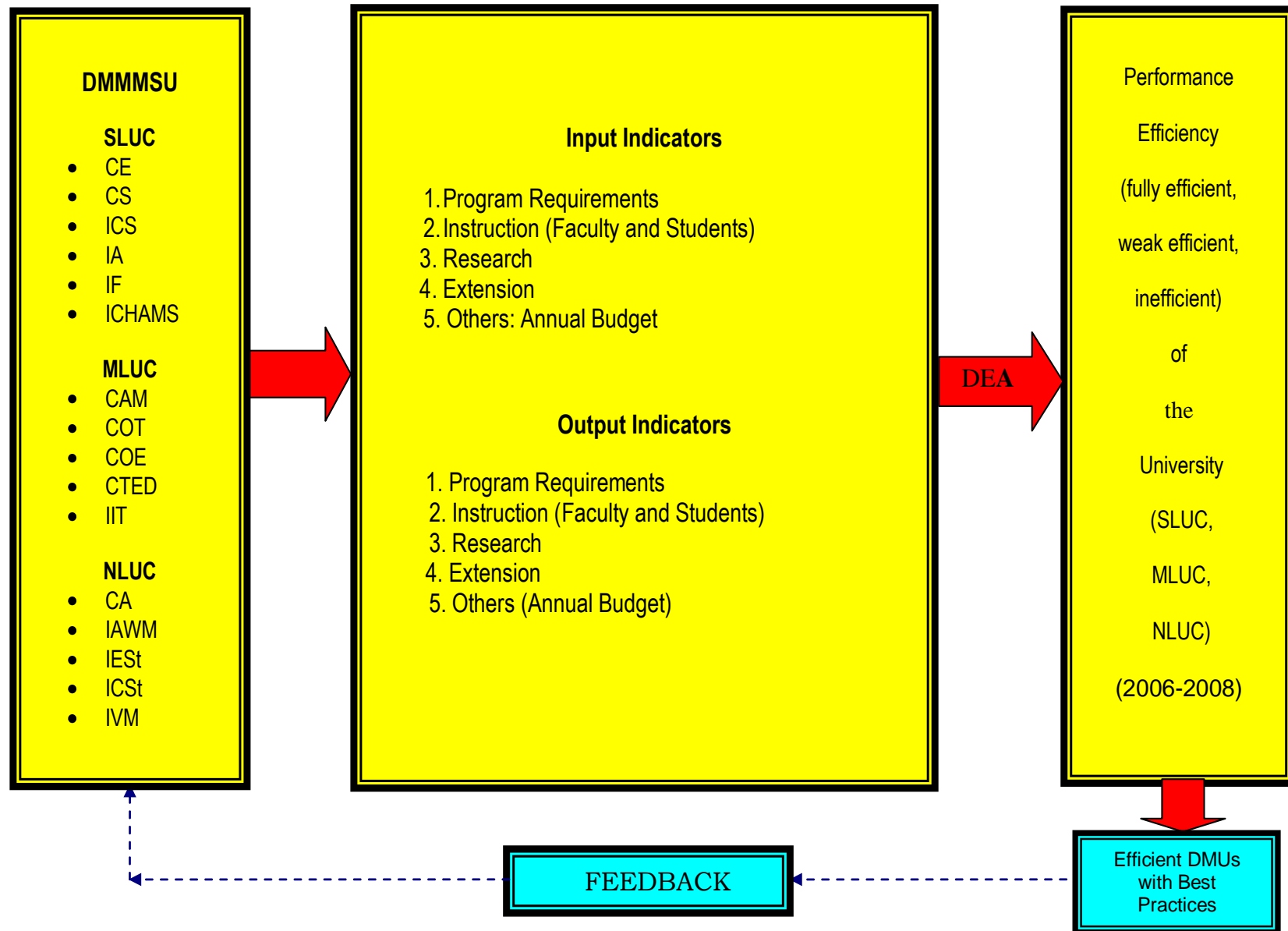


Figure 3 – The paradigm illustrates the interplay of the variables in the study

## **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 Program Requirements, Instruction (Faculty and Students), Research, Extension and Others (Annual Budget).

Specifically, based on the different performance indicators, this study answered the following questions:

1. What is the efficiency of the different 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, what are the fully efficient Colleges/Institutes of DMMMSU with best practices?

## **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 namely Program Requirements, Instruction, Research, Extension and Others (Annual Budget) for three years, 2006-2008.

The researcher considered several entities for evaluation using a non-parametric approach called Data Envelopment Analysis (DEA) in Decision Making Units (DMUs) to



evaluate and compare the efficiency and performance of the different colleges and institutes of DMMMSU.

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.

However, in this study, the researcher used the Data Envelopment Analysis On-Line Software to evaluate the performance of the different colleges and institutes in terms of their efficiency scores.

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 IQUAME 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 the Mid La Union Campus (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.

## Conclusions

The following Colleges/Institutes/Campuses were “fully efficient” in the following performance indicators: A. **Program Requirements:** College of Education, College of Sciences, Institute of Fisheries, Institute of Information Technology, College of Agriculture and Institute of Agroforestry and Watershed Management B. **Instruction (Faculty):** College

of Education, College of Sciences, Institute of Computers Science, Institute of Agriculture, Institute of Fisheries, Institute of Community Health and Allied Medical Sciences, College of Technical Education, College of Agriculture, Institute of Agroforestry and Watershed Management, Institute of Environmental Studies, Institute of Computer Studies and Institute of Veterinary Medicine. C. **Instruction (Students):** College of Education, College of Sciences, Institute of Computers Science, Institute of Agriculture, Institute of Fisheries, Institute of Community Health and Allied Medical Sciences, College of Technical Education, Institute of Information Technology, College of Agriculture, Institute of Agroforestry and Watershed Management, Institute of Environmental Studies, Institute of Computer Studies. D. **Research:** all Colleges and Institutes except College of Arts and Management. E. **Extension:** College of Sciences, Institute of Agriculture, College of Technical Education, College of Agriculture, Institute of Environmental Studies, Institute of Computer Studies and Institute of Veterinary Medicine. F. **Others (Annual Budget – PS, MOOE)):** Mid La Union Campus and North La Union Campus. The Over-all efficient colleges are: College of Sciences and College of Agriculture. 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. 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. 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: 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. The efficient institution should share their best practices for an optimal operation of a model University. 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. All colleges/institutes of the University should work towards becoming a model of efficiency and for one to be in the efficient frontier. 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.

Lastly, 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.

## **References**

- Bacungan, Amelia O. and Ernesto R. Gapasin (2007). Performance Evaluation of Colleges and Institutes at the Don Mariano Marcos Memorial State University: An Institutional Self –Evaluation, DMMMSU, La Union
- Castano, Mary Caroline N. and Emilyn Cabanda. (2007) Sources of Efficiency And Productivity Growth In The Philippine State Universities And Colleges: A Non-Parametric Approach, Graduate School, University of Santo Tomas, Philippines

Defensor, Nenalyn P. (2007) Challenges and Issues in RP Higher Education, Manila Bulletin, June 3, 2007

Lindsay AW. (2002) Institutional performance in higher education: the efficiency dimension. *Review of Educational Research*, 52 (2):175-199.

Poblador, Niceto S. (1998) Measuring and Enhancing the Performance of Educational Institutions. *Philippine Journal of Public Administration*. Volume 42, 96-121

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