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Physical Resources of Civil Engineering Program among Government Universities in Eastern Visayas Region, Philippines

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ABSTRACT

Utilizing purposive sampling technique to identify the current status of civil engineering programs among government-owned universities in eastern Visayas region, the researcher identified 47 respondents where analyses of their perception on the physical plant and facilities are anchored. Five engineering fields served as major areas of appraisal to include Elementary and Higher Surveying, Soil Mechanics, Hydraulics, Fluid Mechanics and Material Testing and. A 5- point Likert scale was introduced to appraise the physical facilities of engineering programs among the identified universities with regards to the status of implementation. Findings revealed that VSU got the highest PS and MOOE having the facilities needed in this major subject having facilities being utilized in agricultural engineering. NSU has the latest equipment with regards to the major subjects. Notably, EVSU and UEP had the equipment, but need upgrading. On the other hand, in the implementation of Physical Facilities in the laboratories, under Elementary and Higher Surveying, VSU obtained Very Satisfactory. SSU had the updated facilities and equipment funded abroad likewise utilized for research. NSU showed to have a Very Satisfactory Fluid Mechanics, likewise for VSU, while EVSU yielded the least. In Hydraulics, VSU analyzed to have Very Satisfactory. SSU showed to be Excellent while UEP gave an opposite findings in Material Testing. In Soil Mechanics, SSU gained excellent as that compared to UEP which obtained the least. In determining on the status of implementation of the physical resources of Civil Engineering program and the difference among SUCs, Kruskal-Wallis One-Way Analysis of Variance was utilized.
Keywords: adequacy; implementation; significance; physical plant; physical facilities; physical resources management; specializations

INTRODUCTION

Background

Our country, as we are all aware of, has always been faced with a dilemma of producing technically trained human resources for industry due to lack or physical resources for training, development and upgrading. In times of disasters it is with criticisms that building designs are being panned due to poor quality of structures and somehow be blamed to the engineers who implemented the designs. In the Philippine setting, offering the course (BSCE) is a delicate process that needs assessment and evaluation of the Physical Resources present to bridge the gap between the industry and the academe. Physical plant and facilities as an important component of the total education program faces a continuing challenge, that of continually adopting its programs and activities to the changing needs of the times.

CHED Memorandum Order No.25 s. 2005 (CMO No. 25 s. 2005), provides rationalization of Engineering Education in the country and making it responsive to the demands for professionals in the business and industrial world, policies, standards and guidelines for engineering are hereby adopted and promulgated by the Commission. CHED Memorandum Order No. 29 series of 2007 (CMO No. 29 s. 2007) on PSG for the degree of BS Civil Engineering served as the standards and minimum requirements. The quality of education regained is conditioned by several factors that include: the ability to improve knowledge, availability of instructional materials, other instruments for learning, and the maintenance of the entire plant and facilities.

This paper argues that proper management of physical resources in government universities offering civil engineering program bring efficient implementation of physical plant and physical facilities. The quality of the engineers and the output produced, depend on the actual preparation and program implementation. Accordingly, government's standards, issuances, orders and regulations must be followed as basic compliance of the curriculum.

Study Objectives

The study examined the status of the physical resource management program of government universities Eastern Visayas region, Philippines offering civil engineering program for SY 2009-2010. Specifically, it determined the profile of the government universities with respect to budget allocation and faculty profile in the civil engineering program. It analyzed the profile of SUCs according to budget and manpower, status of

implementation of the physical facilities found in laboratories. Moreover, the study measured the extent of availability of laboratory facilities for the following major courses in the areas of elementary and higher surveying, fluid mechanics, hydraulics, material testing and soil mechanics.

This study was inspired by former Department of Science and Technology (DOST) Secretary, Follosco (1990) who called upon the tertiary education to produce the manpower needed for the country's vision to become newly industrialized country by the year 2000. He gave full thrust to education as a process of human capital formation and therefore, a factor in economic growth and productivity, a concept adopted by a technical-function theory.(1)

Based on the aforementioned theory, the framework of the study is centered on two important factors, the profile of the school and stable physical plant and facilities, responsible to make engineering education functional. It also endeavored to assess the physical resource management program of the different higher education institutions in the region to make and formulate intervention schemes beneficial for management utilization.

Implementing the aims of tertiary education through of rationalizing Engineering Education in the country and making it responsive to the demands for professionals in the business and industrial world, the following policies, standards and guidelines for engineering are hereby adopted and promulgated by the Commission as promulgated in CMO 25 s.2005. If the school can couple quality students with quality engineering education, it would turn out graduates who are potential board passers and manpower of high technological skills. The school must be adequately equipped with instructional materials, equipment, machines and testing instruments to warrant the development of minimum skills needed by industries and that there is on-the-job training programs for students, apprenticeship and job placement graduates.

Elsaadany and Helmi (2018) develops that the shift towards a practical society, training sustainability is necessary to ensure sustainable environments and preserve the ecosystem. CE takers on fast-paced society is in demand and is actually taking place in any part of the world in most modern physical plants, facilities, faculties and learning institutions.(2)

The change in curriculum presupposes that there will be a major revisiting of implementation to answer some limitations, that can give an edge for students to hone their skills to face the new trend as part of the educative process in order to think logically and create advanced outputs competitive to the world of work. As pointed out by Simpson, et al. (2018) it introduced the proper selection of learning inputs, making an environment for new experiences, group and team activities with competitive contents where practicable applications.(3)

Labi (2014) stressed that another reason for incorporating systems concepts in civil engineering is the growing complexity of civil engineering infrastructure and facilities. Civil engineering has increasingly seen advances in all phases of project delivery—materials and design, construction processes, and facility operations and preservation. For example, there is increasing incorporation of psychology (human factors), finance and economics (life-cycle costing, financial programming), and other disciplines in civil engineering systems development. As such, engineers, planners, managers, and decision makers involved with the various phases of civil infrastructure development need to make decisions using a systems approach in order to reach a universally acceptable solution.(4)

The above-mentioned literatures are related to the present study because they provide relevant information on the present status of Higher Education which gave insight to the researcher for the urgency to conduct the present study. The proposals made by EDCOM and the technical panel could serve as guide in dealing with the findings for investigation. Various literatures were written by prominent educators about significant role of school facilities in the educational system. All the aims of the educational system and perception of authors emphasize that the school plant should provide facilities that will meet the instructional needs as a way of improving the curricular program. There is a need therefore for an educational development planning to achieve this goal. The Philippine educational system, however, has experienced in recent years serious problem and critical situations brought about by rapid changed and expansion of the said system. One of the persistent problems is the inadequacy of essential school facilities such as school site, buildings, and equipment. Such inadequacy has been felt not only in terms of quantity but also in terms of quality.

As reported in the study of Glynn (2017) and Sephania, et al. (2017) (as cited in Malto, 2018) that physical environment greatly affects not only on students' performance but also to teachers performance delivery of instructions. Classroom size, availability of learning support facilities impaired the competence of the teacher to teach effectively. Comfortable working and learning environment promote favorable organizational climate in the school. Appropriate actions in addressing the maintenance of school plant facilities are very important. As such, manual or development plan of the schools and universities is necessary. Management and monitoring could be tailored from various management models. Moreover, opened new opportunities to the learners to learn

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that is conducive to them and the teachers too. Quality of products and service is through conducive teaching, learning, and working environment.(4)

Generally, acceptable innovations in the curriculum be it the flexible or practical in its approach established by the framers is attained in whole by the students not in net parcels. Vemury, et al. (2018) states that as evidenced by the students response integrating different types assessment either individual or in groups, displays efficiency of evaluating learners knowledge, responsiveness, and perception of sustainability concerns.(5) It would reflect that it really requires consensus of the stakeholders from and among the administration, faculty and students for sustainability of the program.

In a study on the adequacy of school facilities in TESDA training centers conducted in Southern, Leyte, it was revealed that only thirty (30) percent of the schools have adequate school building facilities; 85 percent have adequate classroom facilities in all phases of instructional materials, and only 25 percent of the school have facilities and office equipment. He concluded that adequacy of school ground facilities is consistent with the curricular offerings in providing children with school activities geared towards physical and mental development.

The study of Guevarra (2009) is related to the present study for it gave a clear picture on the performance of engineers as teachers in the academe. The present study assessed the participation of engineer-teachers based on their profile. Guevarra's study gave insight on the standing potential of engineers as teachers in utilizing the state of he art facilities.

METHODS

The descriptive survey research design was employed utilizing the survey questionnaire as instrument in gathering data on the physical resource management program. The said questionnaire was adopted from CMO No. 29 s. 2007 which focuses on the five (5) major areas in civil engineering program. Further, the tool was distributed to the six (6) government universities in the region; Eastern Samar State Universities (ESSU); Easter Visayas State University (EVSU) ; Naval State University (NSU); Samar State University (SSU); University of Eastern Philippines (UEP) and Visayas State University (VSU) for school year 2009-2010. The tool observed a 3-point scoring system to appraise the physical facility of engineering programs among the identified universities. With regards to the adequacy of the physical facilities, the researcher assigned 3 *(being the highest possible score),* to facilities which met the above set CHED standard ,2 *,to facilities that obtained the minimum requirements* and 1 *(the lowest possible score),*to insufficient facilities. Moreover, the tool was composed of two parts. Profile of the SUCs constitute the first part on Budget and Manpower while the second part focused on the major areas in civil engineering program such as Elementary and Higher Surveying, Fluid Mechanics, Hydraulics, Materials Testing, Soil Mechanics. On the other hand, the 5-point Likert scale was used to determine the status of implementation of the physical facilities.

It examined the faculty members, heads and deans in the College of Engineering of the six (6) government universities in Eastern Visayas region, Philippines with the following distribution : six (6) civil engineers for ESSU ; fifteen civil engineers (15) -EVSU; ten (10) civil engineers for NSU ; eight (8) civil engineers for SSU; six (6) civil engineers for UEP and two (2) civil engineers for VSU.

A written permission were made from the Presidents of each University. The retrieval of the questionnaires were done after a week . To gain accuracy on the data with regards to the budget and manpower of each department, a primary data were gathered from the respective budget offices and human resource management offices to support the concreteness of the data, with requests signed by the respective Presidents.

The dry-run was conducted at the Eastern Visayas State University – Tanauan campus with the faculty members in the civil engineering department.

In determining on the status of implementation of the physical resources of Civil Engineering program and the difference among SUC's, Kruskal-Wallis One-Way Analysis of Variance was utilized

RESULTS

Part I. Manpower and Budget Profile of State Universities with Civil Engineering Program

This presents the analysis and interpretation of data gathered. Each set of data was analyzed and interpreted to shed light on the problem under investigation. The determined the profile of the six state universities in Eastern Visayas region, Philippines namely VSU, UEP, SSU, NSU, ESSU and EVSU in terms of Budget and Manpower.

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Table 1. Budget and manpower for civil engineering program

University	Manpower Ce-faculty	University budget		Engineering dept MOOE and lab fee
		Personal Services	MOOE	
VSU	2	244,380,852.00	39,172,000.00	126,400.00
UEP	6	176,513,000.00	15,403,000.00	Gen, MOOE
SSU	6	85,944,000.00	11,075,000.00	Gen. MOOE
NSU	10	58,097,000.00	10,388,000.00	Gen. MOOE
ESSU	10	141,741,000.00	12,258,000.00	Gen. MOOE
EVSU	15	147,571,000.00	24,447,000.00	4,450,827.40

The data revealed that VSU got the highest PS and MOOE respectively, followed by UEP and EVSU. However, of the six universities included in the study, NSU got the lowest budget with a PS of Php 58,097,000.00 and MOOE of Php 10,388,000.00. The table also revealed that only EVSU has been identified to have laboratory fees and a percentage from the MOOE taken from the general fund for the Engineering Department. VSU has a separate budget for the Civil Engineering Department taken from the laboratory and tuition fees of the students enrolled under Civil Engineering program amounting to 126,400.00.

Results showed that EVSU have a great number of CE faculty which is 15, this was followed by ESSU and NSU with 10 CE faculty each. Moreover, VSU revealed that there were only two (2) CE faculty who is handling their program.

Part II. Status of Implementation of the Physical Facilities in Civil Engineering Program

Table 2. Status of Implementation of physical facilities among SUCs

Five major area of specialization	Vsu		Uep		Ssu		Nsu		Essu		Evsu	
	Mean	Int.	Mean	Int.	Mean	Int.	Mean	Int.	Mean	Int.	Mean	Int.
Elementary and higher surveying	4.50	Vs	2.03	Fs	3.83	Vs	3.76	Vs	3.31	S	1.49	P
Mechanics of fluid	3.58	Vs	1.40	P	3.67	Vs	3.74	Vs	2.75	S	1.30	P
Hydraulics	4.24	Vs	1.28	P	3.06	S	3.34	S	2.16	Fs	1.09	P
Materials testing	3.59	Vs	1.07	P	4.56	e	3.33	S	2.62	S	1.81	Fs
Soil mechanics	2.84	S	1.00	P	4.66	e	3.22	S	2.43	Fs	1.96	Fs
Overall mean	3.75	Vs	1.36	P	3.96	Vs	3.48	S	2.65	S	1.53	Fs

Legend: E-Excellent; VS-Very Satisfactory; S-Satisfactory; FS-Fairly Satisfactory; P-Poor

The status of implementation of physical facilities in SUCs in region VIII is presented on Table II which is composed of the five major areas of specializations as mentioned in CMO 29 s. 2007, the respective average means for every area and their corresponding interpretations based on the 5-point Likert scale as Excellent, Very Satisfactory, Satisfactory, Fairly Satisfactory and Poor.

The data above-reflected is based on the actual inventory of the laboratory equipment and instruments in each institution as S.Y. 2009-2010 specifically the engineering department based on the minimum requirements set forth by CHED as the regulating agency of SUCs.

DISCUSSIONS

Budget and Manpower Profile

The factual data on the profile of the government universities in the area of manpower and budget connotes that the SUCs identified differs much when it comes to the actual budget to consider the personal services(PS) and the maintenance and other operating expense (MOOE) . The manpower or the number of faculty members employed relies on the available item dependent on the PS available and the ratio of the number of students enrolled. It is very imperative that the acquisition of the physical facilities would vary on the priorities of every university considering that NSU, SSU, ESSU and UEP depend its acquisition on the general fund for MOOE released for the whole year. Based on the interview with the Head of the Civil Engineering program of VSU, their budget may be less compared to other colleges in the university but they are compensated with the

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facilities used by other engineering programs which are closely related to their program, they did not consider the budget for the Civil Engineering Department a hindrance in the purchase of facilities and equipment. SUCs as higher education institution can emulate the procedure deployed and applied by VSU through the proper utilization of facilities across programs.

Warsame (2017)[6] explained that enrollees in CE program entering the industry often find it difficult to meet the learning competencies of their managers. Constructivism, applies the purpose of understanding wide range of training in engineering education, scarcities in practical applications, and the self-learning methods that employed advancements.

Hiring new practitioners is an inevitable demand in the engineering preparation and skills of various fields in daily activities in the use of the various facilities. With the correct education learners of high-needs schools can provide to meet the demand for a competent, educated and skilled manpower through appropriate utilization of equipment in laboratory exercises. Researchers have assumed the compensation in the need of engineers in the actual field and has not been met due to failures and uncertainties on the delivery of practical skills needed by the industry. Vessel (2011)[7] discussed that, external factors contribute to the incompetence of institutions to meet the increasing need for the engineering workforce. Hence, it goes to show the need to visualize the degree to which instructors use technology and are monitored properly in implementing elements of engineering design in the curriculum incorporating the training and introduction of the state of the art facility.

It is very evident that the six (6) state universities and colleges eastern visayas region, Philippines under study had a different flagships as to the course offering is concerned. VSU give more priority to engineering courses in relation to agriculture (agricultural engineering) but the facilities are of the same treatment and functions. EVSU is technological education institution where the emphasis is in the Engineering Programs and considered to be the flagship course of the university same with SSU. UEP and NSU are universities where medical courses are being offered and the priority of these universities may vary on the need of the training considering that medical equipment are more expensive than engineering equipment, so as in the case of UEP. ESSU offered courses in relevance to fishery and maritime, so to speak the need of the university is to purchase equipment significant to their training and flag ship programs.

Status of Implementation of Physical Facilities Among SUCs

Elementary and Higher Surveying

It revealed that of the six schools included in the study, VSU obtained the highest mean of 4.50 and interpreted as Very Satisfactory. This only means that the university had acquired the facility considering that they offer other engineering programs such as agricultural engineering. However, EVSU respondents obtained the least mean of 1.49 and interpreted as Poor.

It inferred that VSU had acquired the necessary facilities with respect to Elementary and Higher surveying as a major subject that conforms with the minimum standards set by CHED in relation to the offering of related courses that utilizes the same instrument. SSU and NSU also complied the required number of facilities needed as compliance for their accreditation visits. The Eastern Visayas State University do not have the sufficient number of facilities in elementary and higher surveying due to some factors such as the number of students enrolled in the department using the same equipment at the same time, and somehow the lack of funding in the purchase of the needed facilities.

Fluid Mechanics

Results confirmed that NSU showed to have a Very Satisfactory Fluid Mechanics laboratory which obtained a mean of 3.74. The same interpretation was obtained for VSU which got a mean of 3.58. The least mean was obtained by EVSU respondents which yielded a mean of 1.30 and interpreted as Poor.

The data confirmed that NSU and VSU had the equipment which are functional and operational for laboratory exercises and experiments purposes used in Fluid Mechanics. However, these equipment are of high maintenance and repair is costly based on the actual maintenance reports .reflective on its claim as the most sensitive major area among the five specializations. EVSU has the equipment for this major subject but the facility is not functional compared to other institutions where the facilities are properly maintained.

Hydraulics

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It can be gleaned that VSU obtained the highest mean of 4.24 and interpreted as Very Satisfactory. This was followed by NSU which obtained a mean of 3.34 and interpreted as Satisfactory. However, UEP and EVSU got the least mean of 1.28 and 1.09, respectively. Both means are interpreted as Poor.

The implication of the compliance of VSU in this major area in CE is that, it has an established hydraulics facility in place because the facility is being utilized by the students in related courses such as agricultural engineering which has long been established by the university as its flag ship course. NSU has the latest equipment with regards to the major subject in preparation for their accreditation for the civil program, sad to note that EVSU and UEP had the equipment, but has to be upgraded (new model) and must be included in the development plan of the university reflective on its claim as the most sensitive equipment / facility among the five specializations.

Materials Testing

SSU showed to be Excellent on this aspect which obtained a mean of 4.56. However, UEP gave an opposite findings.

Samar State University is provided with updated facilities and equipment for Material Testing due to the linkages under research. The equipment are also being utilized in the research programs of the university to cater the demands of the finding agencies. On the other hand, UEP had not acquired additional facilities for the major subject but it is being prioritized by the institution as part of the supplemental budget.

Soil Mechanics

SSU obtained an excellent findings with a mean of 4.66 likewise in Materials Testing, UEP obtained the least.

It is implied that SSU had the facility and the equipment in this field of specialization. This is parallel to material testing as major area were funding for the purchase of the equipment is from foreign aids for the purpose of research which the university is known for .UEP has the facility but it is still in the process of upgrading the facilities needed. It took a period of time to purchase such facility and instruments that sometimes considered hard to find.

CONCLUSION

Based on the factual findings of the study, it is concluded that the MOOEs of the government universities in eastern Visayas region vary in their actual budget utilization. The acquisition of the physical facilities also diverged according to set priorities by each university while dependent the annual releases of MOOE under the general fund.

It is very evident that the implementation of the physical plant relies on the acquisition of lot established through valid land titles or during the establishment of the school which may be executed through donation or land purchase from a legal owner of the same. Acquired lots speaks of the future expansions for the needed physical structures such as laboratories and learning centers. Some of the government institutions have acquired lots on the later part causing delay to some infrastructure projects which are least prioritized.

Availability of existing Physical laboratory facilities in relation to other laboratory subjects in other disciplines contributed in the fulfillment of necessary facilities in Hydraulics as required in the physical facilities that conforms to the minimum standards set by CHED. Complied the required number of facilities considered to be shared facility helped in the acquisition of the required number of facilities.

Equipment which are properly maintained and calibrated are all functional and serviceable for laboratory exercises and experiments purposes. However, these equipment are of high maintenance and the repair is costly. Relative to this, equipment for the major subjects does not work well without proper calibration and maintenance as required in the manual of operations.

State Universities and Colleges in Region VIII that offers Civil Engineering, should properly implement the minimum standards set by CHED through prioritization and utilization of the Budget for the purchase of facilities needed and required by the industry. It will bridge the gap between the training and the industry. SUC managers should also look into the teaching capabilities if the instructors and be well-equipped and well-versed on the manipulation and utilization of the various facilities and instruments as Manpower is concerned during hiring through thorough interview setting higher qualification standards. SUCs offering engineering programs should give emphasis in producing quality students through worthwhile and productive laboratory experiments compliant with the standards imposed by CMO no.29.s2007. SUC's should desire to maintain development education, by introducing viable improvements in their profile by at least meeting the minimum requirements, to

produce acceptable competent engineers. The engineering education can be acquired through extramural education, learning through correspondence and practical exercises, thus immersion and On the-Job (OJT) activities must be properly programmed. It should be strengthened through accreditation and other equivalency programs here and abroad. Proper linkages with the best engineering schools be considered.

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