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Development of School Plant Facilities Maintenance Manual of State Universities and Colleges

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Abstract
The study aimed to create a school plant facility and maintenance manual that can be an advancement and useful by the key officials, professors/instructors, parents, and students of all state universities and colleges. Descriptive survey research was used in the study in investigating the profile of the respondents, and the perception of the respondent on the School Plant Facilities Maintenance in terms of policy, contingency plan and Disaster Risk Reduction activities. Test of significant difference among the respondents response in the survey questionnaire on the assessment of school plant facility maintenance management was also included in the scope of the study. The study was participated by one hundred twenty two (122) students as respondents who stayed in the campus. Participants were the fifty six (56) students stayed in the campus from year 1 to 5; five (5) maintenance personnel and Five (5) Maintenance Planning Development Officers. Data gathered was statistically analysed. Based on the analysis of data, the researcher concluded that the School Plant Facility Maintenance Manual must be implemented in state universities and colleges in Leyte.

Keywords: maintenance model, school plant facility evaluation, school building, descriptive survey. Leyte, Philippines.

Introduction

University Facilities are indispensable resources of an institution that needs to be prioritized. Challenges surfaced in preserving our education amenities at a point that supports our educators to meet the necessity of today's students and this is called the Global educational buildings age, where facility issues raise at all educational levels, and all its sites, from classrooms and laboratories to administrative offices (Smith, 2017). Challenges arise in different types of concern to new and old facilities. Since University Educational Facilities are valuable assets of the school, its establishment, procurement and development plan, improvement and maintenance must be recorded and have its proper accountabilities.

Infrastructures' and amenities are the main backbone of the school to heighten the education aptitudes of the learners, for the all-out optimization of their potentials, skills, and talents and to be God-cantered, upright, and productive populaces.

Educational institutions and organizations should develop physical plant maintenance to prepare any development and maintain the efficiency of the facilities. (Volovski, Murillo, Saeed, & Labi, 2017; Sharma, Cui, He, Mohammadi, & Li, 2018). A comprehensive physical plant

manual is necessary to safeguard the quality and efficacy of school facilities to its service delivery. Disregarding the maintenance of facilities could results additional problems and add burdens to the financial budget of the institutions.

The quality of school facilities such as classrooms, laboratory, offices, fixtures, and any academic support facilities foster effective teaching and learning of the school. Dziabenko, Colinas, & Garcia, 2017; Cirino, Emberts, Joseph, Allen, Lopatto, & Miller, (2017) mentioned that state-of-the-art school faculties are properly maintained. Moreover, it provides more opportunities to the students to learn that is conducive to them and the teachers as well. Conducive teaching, learning, and working environment promote quality of service and quality of products. It also adds more research grant considering the school can provide appropriate facilities for any research and development.

The School Plant Facilities and Maintenance Manual of the State Universities and Colleges in Leyte and Biliran Provinces serves as guide to all university stakeholder in taking care of the school facilities development and maintenance. It also helps the university officials to prepare the school for possible expansions and addition of school plant facilities and regulate appropriate repair and preservation techniques (Andrew, Shields, Tolk, & Simonton, 2017; Gould, 2017).

In any development budget is indispensable. Budgetary constraints are the most common problem face by any educational institution to upgrade and maintain their school plant facilities. However, if school plant facilities manual is made available by its institution, projection and budgetary allocation are already plan ahead. Proper budget appropriation needed to improve the quality of service of the university needs careful planning and implementation. Studies suggested that the condition of facilities affected attitudes and behaviors of the students and the employees. Research showed that the quality of the facilities affects the working and learning environment of the employees and students. The condition and availability of school facilities affect students' attitudes and academic performance. Students exposed to learning environment that is very conducive and makes students more comfortable to learn reported to have high achievement in terms of their academic performance. Furthermore, students are more competitive and brings prestige to the school (Lavy, & Nixon, 2017; Altamimi, 2017).

Glynn, 2017; Sephania, Too, & Kipng'etich (2017) reported that physical environment greatly affect 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. Maintenance of school facilities has great impact to employees and students' performance and school climate. 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. Figure 1 below is a model of school plant facilities maintenance.

Figure 1: Cyclical Sequence of School Plant Facilities and Maintenance Management Model

Figure 1 above is the maintenance management model of Meador (1995). In his model, he state five (5) well-defined elements of an effective O&M namely: 1. Training, 2. Operations and Maintenance Integration, 3. Administration, 4. Operation, and 5. Engineering Support. In this model, training ensure effective implementation and control of training activities, certify that plant personnel have a basic understanding of their responsibilities and safe work practices and have the knowledge and practical abilities necessary to operate the plant safely and reliably, make sure the training facilities, equipment, and materials effectively support training activities. Develop and improve the knowledge and skills necessary to perform assigned job functions and the knowledge and skills necessary to perform assigned job functions.

Operation and Maintenance Integration is necessary since it is the most critical component of the overall program is the O&M management. Its function is to bind the distinct parts of the program into a unified entity. The overall program contains five different functions that made up the organization: Operations, Maintenance, Engineering, Training, and Administration—OMETA. Beyond establishing and facilitating the OMETA links, O&M managers have the responsibility of interfacing with other department managers and making their case for ever-shrinking budgets. Their roles also include project implementation functions as well as the need to maintain persistence of the program and its goals.

Administration also plays crucial role to establish and ensure effective implementation of policies and the planning and control of equipment activities. Formulation and utilization of formal management objectives to improve equipment performance. Monitoring and assessing station activities in improving all aspects of equipment performance. Ensure that positions are filled with highly qualified individuals to achieve a high degree of personnel and public safety.

Operation is essential to ensure effective implementation and control of operation activities, efficient, safe, and reliable process operations. To be cognizant of status of all equipment and make certain that operator knowledge and performance will support safe and reliable plant operation. The last step is the Engineering Support**.** This step will ensure effective implementation and to have a guaranteed control of technical support proper design, review, control, implementation, and documentation of equipment design changes in a timely manner. Perform monitoring activities that optimizes equipment reliability and efficiency and ensure that

engineer support procedures and documents provide appropriate direction and that they support the efficiency and safe operations of the equipment.

On the other hand, the different CMO and House Bill also regulate State Universities and Colleges (SUCs) in the Philippines. CMO and House Bills emphasized the importance of the school plant facilities manual. Figure two (2), shows the theoretical and conceptual framework of study anchored to the CMOs and House Bill.

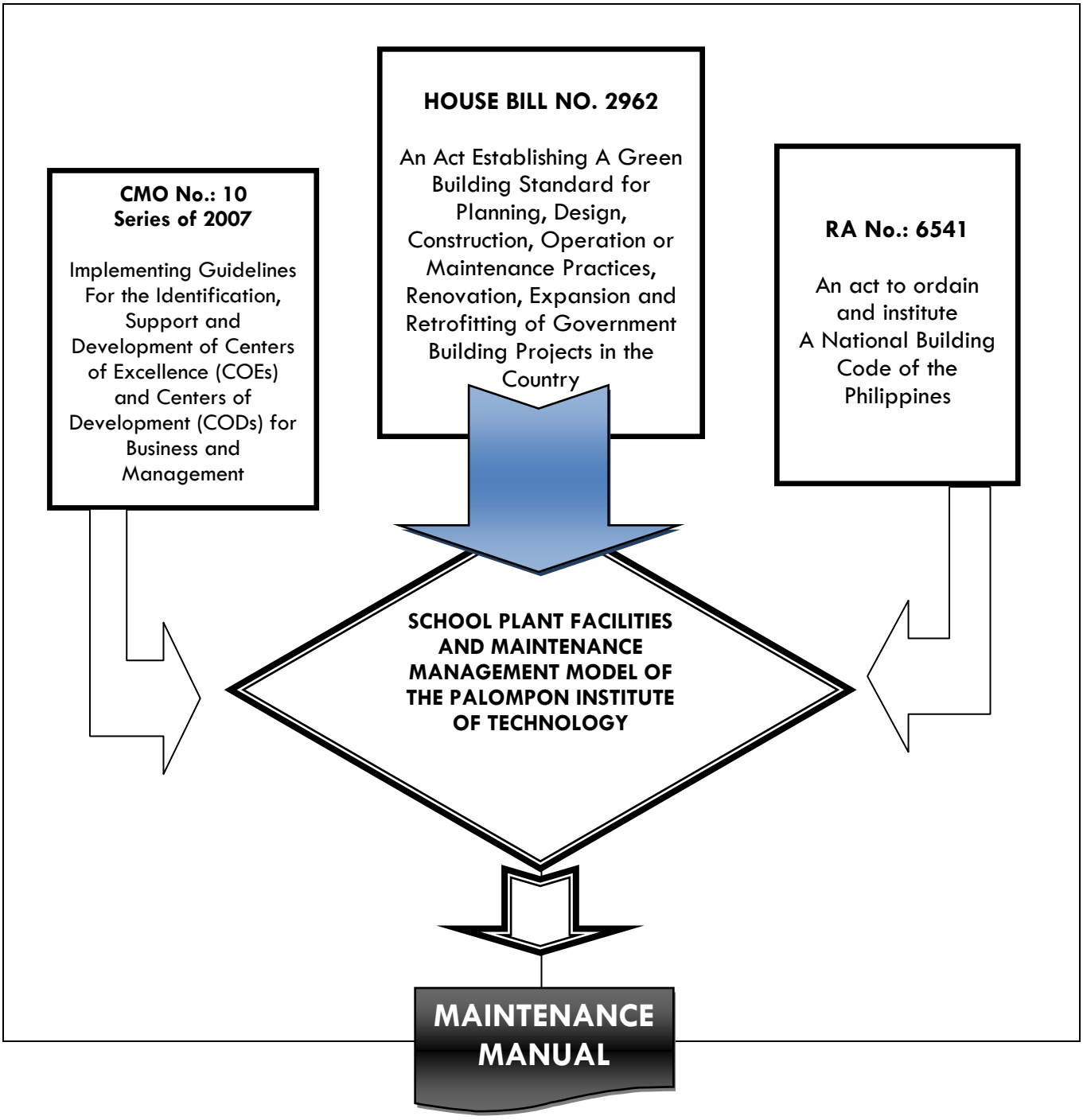

Figure 2: Theoretical and Conceptual Framework

Statement of the Problem

This study assesses the School Plant Facilities and Maintenance Manual of State Universities and Colleges during the Academic Year 2016 – 2017 as basis for enhancement model. Specifically, it answers the following.

1. The profile of the respondent groups as to: gender and age, number of year stay in the college, number of incidence of accidents inside the campus;
2. The perception of the respondent groups in the School Plant Facilities maintenance: procedures policies; annual maintenance plan; preventive maintenance plan; maintenance call out slip; maintenance card; maintenance organizational chart; maintenance accomplishment report; and maintenance work order; on the contingency Plan of the university in preparation for both man-made and natural calamities; and
3. The test the significant difference between the perceptions of the respondent groups on the assessment of School Plant Facility Maintenance Management Model, (4) Identify the issues concerns encountered related to the school plant facilities Maintenance, (5) developed enhanced model school plant facilities Maintenance.

Research Design of the Study

The research study utilizes a mixed-method approach to gain a more complete understanding of the problem area. This approach consists of a combination of both quantitative and qualitative research. The Quantitative research explain and predict concepts that generalized to other people and places that objectively measures the variable(s) of interest, which are identified, developed and standardized with attention to validity and reliability. Qualitative research design, gives a better understanding from peoples' experiences. Using both of these research design allows triangulation of information and in-depth investigation. Primarily the purpose of the research was to examine and evaluate existing maintenance guide currently in place and investigate the extent of the conflict and effective maintenance measures in the State Universities and Colleges.

Significance of the Study

The core objective of this research is the designing of school plant facility maintenance manual that can be used in State Universities and Colleges (SUC) particularly in the Philippine setting. The manual is considered as guide and it will then benefit for the university maintenance personnel and administrators where the study is conducted. The university maintenance team to conduct maintenance inspection and evaluation can use the facility maintenance manual. In addition, manual is open in the vicinity for the utilization of the next and incoming maintenance personnel and administrator. With this, scarcity and lack of maintenance facilities partly answered. This will also lessen the budget while maximizing the resources of the University. This School Plant Facility Maintenance Manual will contribute knowledge to the maintenance personnel in creating new concepts in their own field of specialization leading them to do further studies and improvements. With this, they will be using the standard facility maintenance checklist and procedures. Lastly, this study will guide them in making their own similar university facility maintenance manual and at the same will inspire them to do more improvement for the benefit of the school.

Methods of Procedure

Figure 3 shows the methods of procedure in conducting the study. This followed the system approach of input-process-output flow**.**

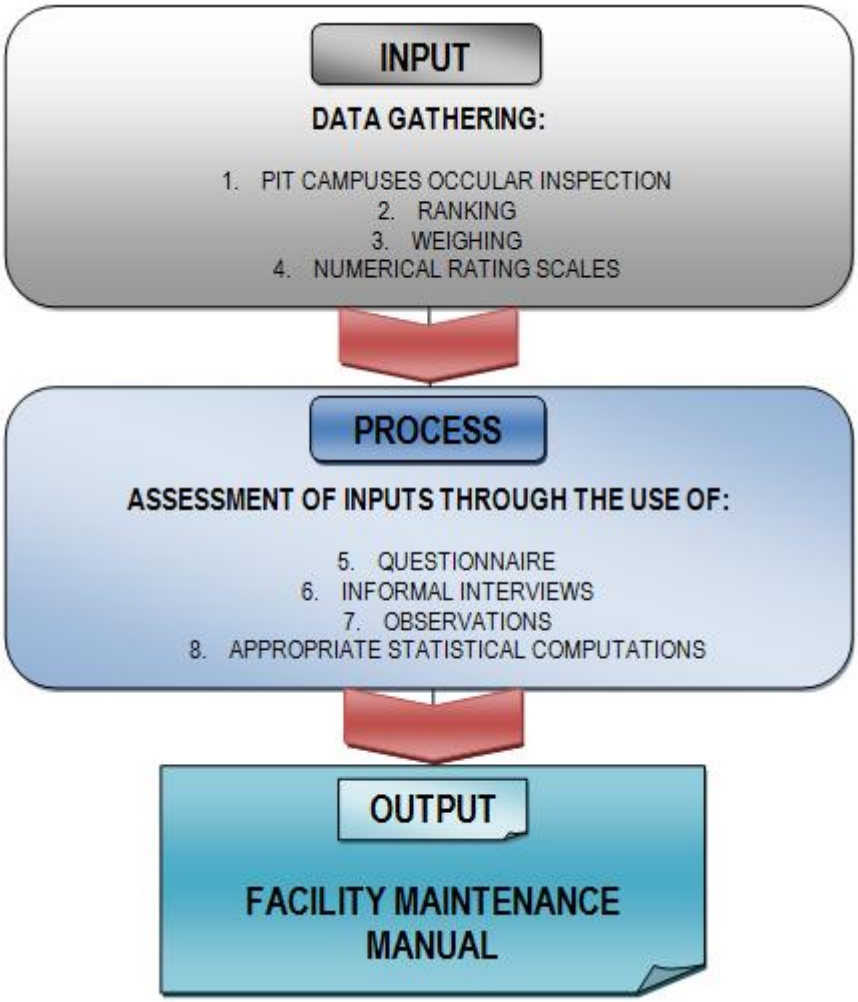

Figure 3. Flow of the Methods of Procedure

Collection of Data

The researcher followed entry protocol in the conduct of the study. Permits were secured from the President of Palompon Institute of Technology. Upon obtaining the necessary permits and approval, the researcher distributes the questionnaire personally to the students, the maintenance personnel, Maintenance Planning Development Officers and Administrator. Before filling up the survey questionnaire an explanation on the purpose of the study and the school plant facility maintenance manual was discussed by the researcher. After the respondents answered the questionnaire, the researcher collected it immediately.

Treatment of Data

Gathered data's from the survey questionnaire was collated, tallied, tabled and subjected to the following statistical treatments.

1. Weighted Mean. This was used to determine the respondents' perception in the Effectiveness of the School Plant Facilities and Maintenance Manual of the State University and Colleges in Leyte and Biliran Province.
2. The t-test was in determining the significance difference between the mean validation on the use of the Effectiveness of the School Plant Facilities and Maintenance Manual of Palompon Institute of Technology.

Scoring Procedure

The average weighted point of the weighted categories was used in evaluating the mean of the data gathered using the parametric scale to provide equal chances for each response category. For effectiveness of the School Plant Facilities and Maintenance Manual of the Palompon Institute of Technology, Leyte the following parametric scale was used:

Weight	Scale	Category	Verbal Description
3	2.34-3.00	Very Aware (VA)	When School Plant Facility Maintenance Manual are more than the standard requirements based on HOUSE BILL NO. 2962.
2	1.67-2.33	Aware (A)	When School Plant Facility Maintenance Manual are more than the standard requirements based on HOUSE BILL NO. 2962.
1	1.00-1.66	Less Aware (LA)	When School Plant Facility Maintenance Manual are more than the standard requirements based on HOUSE BILL NO. 2962.

Findings and Discussions

The information was collected by means of questionnaires completed by both students, faculty, Maintenance Personnel, Maintenance Planning Development Officers and Administrators. Respondents from students sixty(60), Faculty Thirty(30), Maintenance Personnel Ten(10), Maintenance Planning Development Officers Twelve(12) and Administrator Ten(10) selected were used, with a sample size of one hundred twenty two(122) respondents in the campus. One hundred twenty two (122) students and educators also completed the questionnaire. The biographical findings were discussed first, followed by school facility maintenance procedures, contingency Plan, Disaster Risk Reduction and recommendations by the students and educators.

The following is a representation of the biographical information of all the students sixty(60), Faculty Thirty(30), Maintenance Personnel Ten(10), Maintenance Planning Development Officers Twelve(12) and Administrator Ten(10) selected were used, with a sample size of one hundred and two(122) respondents in the campus.

Profile of Respondents

A. Gender

Table 1. Distribution of Respondents as to their Gender

Respondents	Male	Female	Total
Students	40	20	60
Faculty	10	20	30
Maintenance Personnel	8	2	10
Maintenance Planning Development Officers	10	2	12
Administrators	7	3	10
Total	**75**	**49**	**122**

As indicated in Table 1, it shows that out of one hundred twenty two (122) respondents a total of 75 were male and 49 were female. In details, ten(10) male for faculty and twenty(20) female for faculty; eight(8) male for maintenance personnel and two(2) female for maintenance personnel; ten(10)male for maintenance planning development officers and two(2) female for maintenance planning development officers and seven(7) male administrator and three(3) female for administrator.

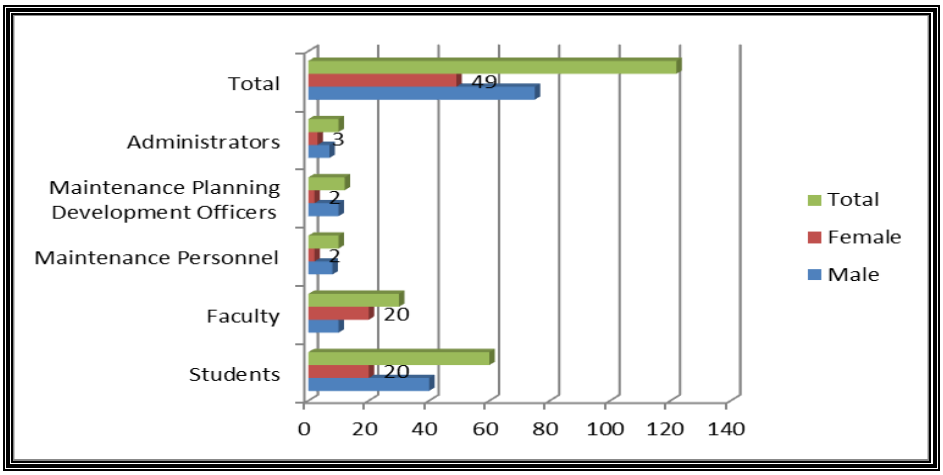

Figure 4. Bar Graph indicating the gender percentages of the students.

B. Age

Table 2. Age of Respondent Groups

Respondents	16 Years or Younger		17 Years Old		18 Years Old		19 Years Old		20 years Old or above		Total	
	M	F	M	F	M	F	M	F	M	F	M	F
Students	20	10	10	5	6	3	4	2	0	0	40	20
Faculty	0	0	0	0	0	0	0	0	10	20	10	20
Maintenance Personnel	0	0	0	0	0	0	0	0	8	2	8	2
Maintenance Planning Development Officers	0	0	0	0	0	0	0	0	10	2	10	2
Administrators	0	0	0	0	0	0	0	0	7	3	7	3
Total	**20**	**10**	**10**	**5**	**6**	**3**	**4**	**2**	**35**	**27**	**75**	**47**

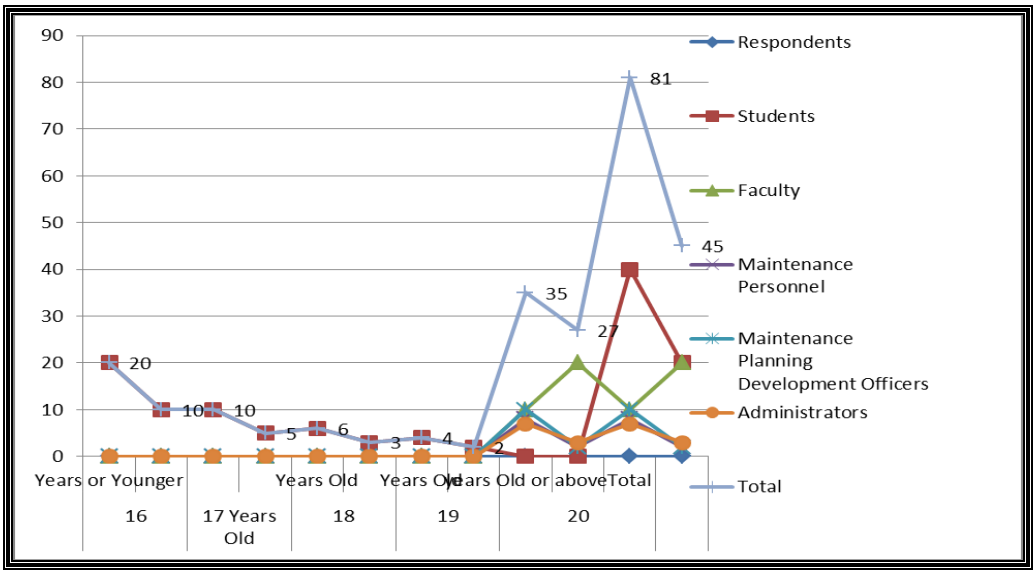

Figure 5. Profile of Respondents In Terms Of Age

As indicated in Table 2 and Figure 5, it shows that the student's age is mostly sixteen (16) years old or younger. The faculty, maintenance personnel, maintenance planning officer and administrators are mostly twenty (20) years old or above.

C. Number of Years in the Campus

Table 3. Number of Years Stayed in the Campus

YEARS STAYED IN THE CAMPUS						
Respondents	1-5 Years	6-10 Years	11-15 Years	16-20 Years	21-30 Years	TOTAL
Students	56	4	0	0	0	60
Faculty	5	5	5	10	5	30
Maintenance Personnel	5	3	1	1	0	10
Maintenance Planning	4	2	4	2	0	12

Development Officers						
Administrators	0	0	6	4	0	10
Total	**70**	**14**	**16**	**17**	**5**	**122**

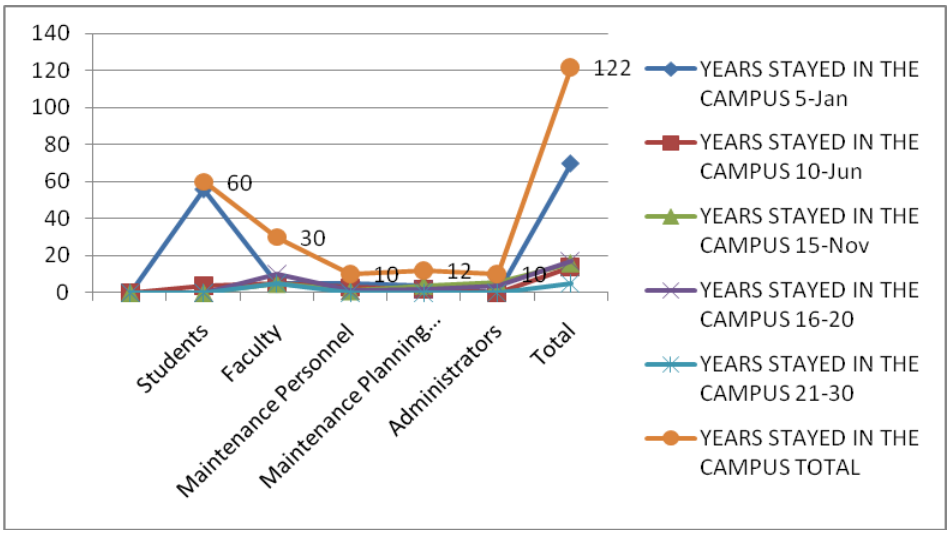

Figure 6. Line Graph of the Number of Years of the Respondents Stay in the Campus

As indicated in Table 3 and Figure 6, there were one hundred twenty two (122) respondents stayed in the campus. In details, fifty six (56) students stayed in the campus from year 1 to 5; five (5) maintenance personnel and five (5) Maintenance Planning Development Officers. As indicated in column 3, only four (4) students stayed in the campus; five (5) faculty stayed in the campus; three (3) Maintenance Personnel; and two (2) Maintenance Planning Development Officers stayed from 6-10 years in the campus.

Table 3 and Figure 6 also deduced that six (6) administrators stayed in the campus; five (5) Faculty stayed in the campus; Four (4) Maintenance Planning Development Officers in the campus; one (1) Maintenance Personnel stayed in the campus for about 16 to 20 years. Furthermore, ten (10) faculty stayed in the campus; four (4) Administrators stayed in the campus; two (2) Maintenance Planning Development Officers stayed in the campus; One (1) Maintenance Personnel stayed in the campus; and in column 6, only five (5) faculty stayed in the campus for about 21 to 30 years. The data implied that the respondents stayed in the campus for a quite long time enough for them to determine the school plant facilities in the campus.

D. Number of Accidents inside the Campus

Table 4. Number of Accidents inside the Campus

Calamities	1	2	3	4	5 or more	TOTAL
Earthquake	1	5	10	15	89	120
Fire	1	1	2	5	50	59
Typhoon	2	6	7	9	98	122
Building Damage	5	4	15	2	35	61
Falling Object	3	2	5	8	57	75
Total	**12**	**18**	**39**	**39**	**329**	**437**

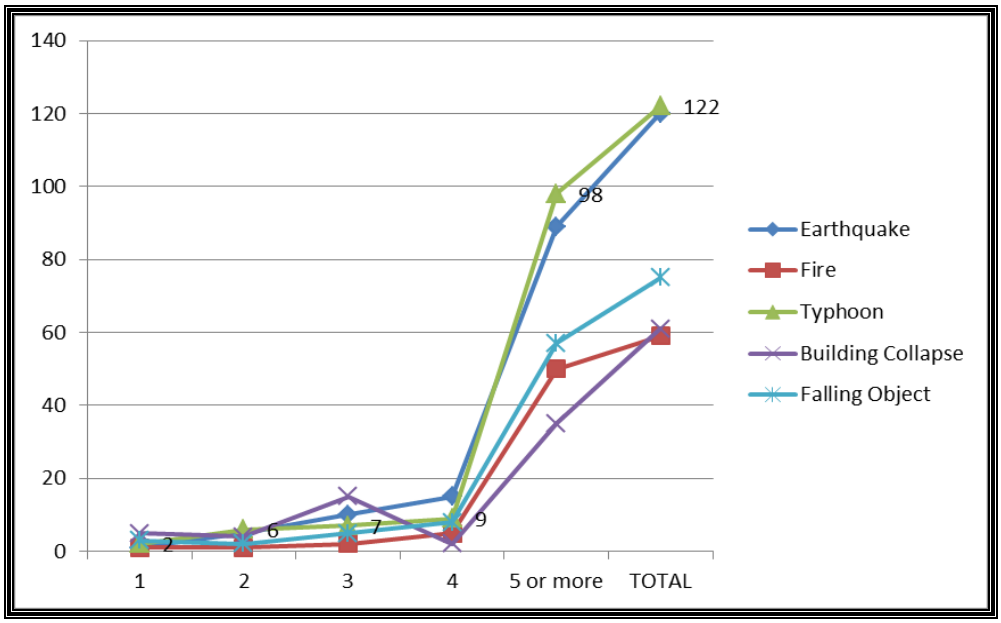

Figure 7. Line Graph of Campus Accidents/Incidents

As indicated in Table 4 and Figure 7, only ninety eight (98) respondents answer for "5 or more calamities" with respect to typhoon happen inside the school campus; eighty nine (89) for Earthquake; Sixty one (61) for Building damage and fifty nine (59) for fire inside the school campus. Based on the data gathered, most of the incidents occurred in the campus is more on natural calamities, only few are due to building collapsed.

E. School Plant Facilities Maintenance Policy

Table 5. School Plant Facilities Maintenance Policy

Item/s	Yes	No	Unsure	Total
Annual Maintenance Plan	2	70	32	104
Preventive Maintenance Plan	7	86	25	118
Maintenance Call out Slip	12	40	67	119
Maintenance Card	16	62	44	122
Maintenance Organizational Chart	15	57	50	122
Maintenance Accomplishment Report	5	80	37	122
Maintenance Work Order	2	65	35	102
Maintenance Checklist	5	77	40	122
Total	64	537	330	931

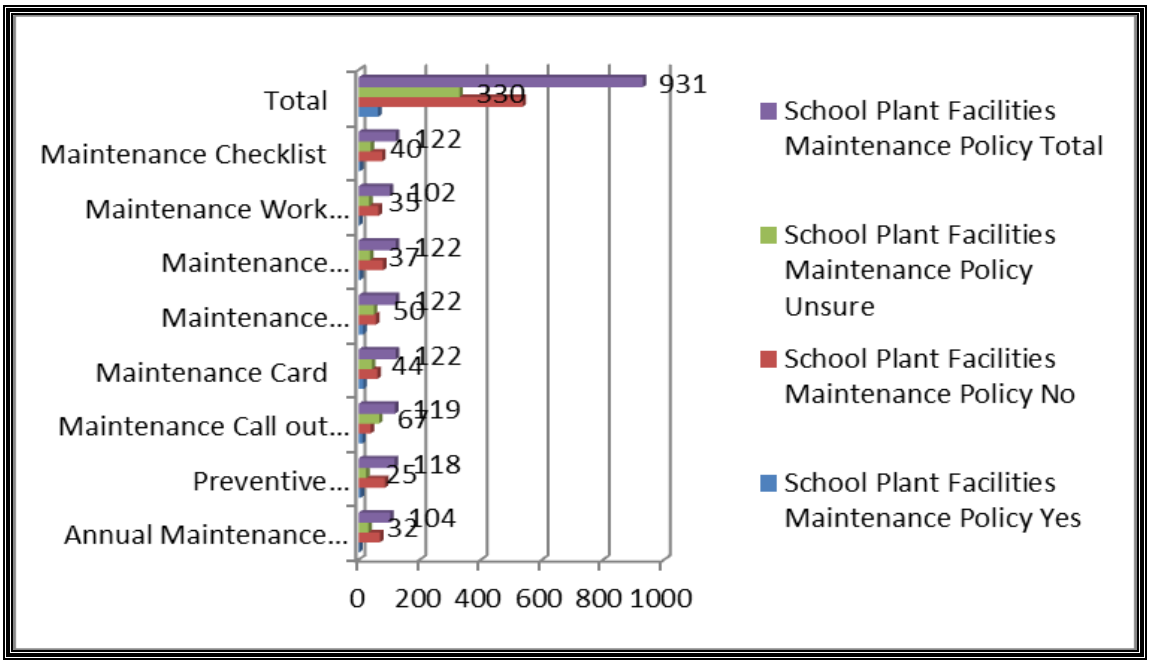

Figure 8. School Plant Facilities Maintenance Policy

As indicated in Table 5 and Figure 8, sixty four (64) respondents answer for "yes" with respect to School Plant Facilities Maintenance Policy; Five Hundred Thirty Seven (537) respondents answer for "No" with respect to School Plant Facilities Maintenance Policy; and Three Hundred Thirty (330) respondents answer for "Unsure" with respect to School Plant Facilities Maintenance Policy. The results implied that the university has poor school plant maintenance policy and implementation. This poor maintenance might due to the absence of school plant maintenance manual or development plan that guide the stakeholders to the proper improvements, maintenance and monitoring activities.

F. Contingency Plan

Table 6. Effectiveness of Contingency Plan

Item/s	Yes	No	Unsure	Total
Emergency assessment	2	30	14	46
Continuity of operations during an emergency	4	79	34	117
Rescue and first aid	6	80	24	110
Health services	10	87	22	119
Water, sanitation and hygiene promotion	7	74	32	113
Food and nutrition	4	54	56	114
Relief	2	78	42	122
Shelter	5	68	49	122
Restoring family links	2	75	45	122
Protection, safety and security	3	53	47	103
Logistics and transport	1	42	67	110
IT and telecommunications	7	58	56	121
Communication and reporting	7	78	36	121
Monitoring and evaluation	2	68	43	113
Total	62	924	567	1553

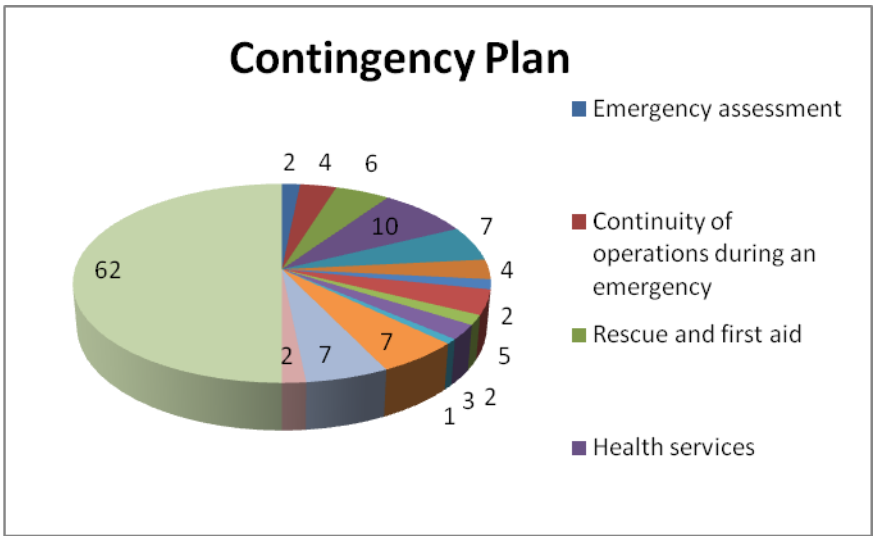

Figure 9. Contingency Plan of the Campus

As indicated in Table 6 and Figure 9, only one sixty two (62) of the respondents answered questions "yes" with respect to effectiveness of school plant contingency plan. Majority (924) answered "no" on the different items with respect to the effectiveness of the school plant contingency plan, while many (567) of the respondents indicated that they are unsure if there is a contingency plan or implementation of the contingency plan is made available in the campus.

G. Disaster Risk Reduction Activities

Table 7. Disaster Risk Reduction Activities

Item/s	Yes	No	Unsure	Total
Disaster Prevention and Mitigation	1	98	21	120
Disaster Preparedness	2	102	12	116
Disaster Response	1	98	15	114
Disaster Rehabilitation and Recovery	3	79	16	98
Total	7	377	64	448

Table 7 depict that only seven (7) said "yes" on the aspect of campus disaster rick reduction activities. It is very alarming that 377 of the respondents answered "no" and 64 said "unsure". This results implied that the university poorly implement disaster risk reduction activities in the campus particularly on the aspect of prevention and mitigation; disaster preparedness, disaster response, and disaster rehabilitation and recovery. It is sad to note that the university failed to implement the necessary risk reduction activities despite the fact that the location of the university is prone to natural calamities specifically typhoon and earthquakes. Figure 10 shows the graphical presentation of the respondents' responses on the disaster risk reduction activities of the campus.

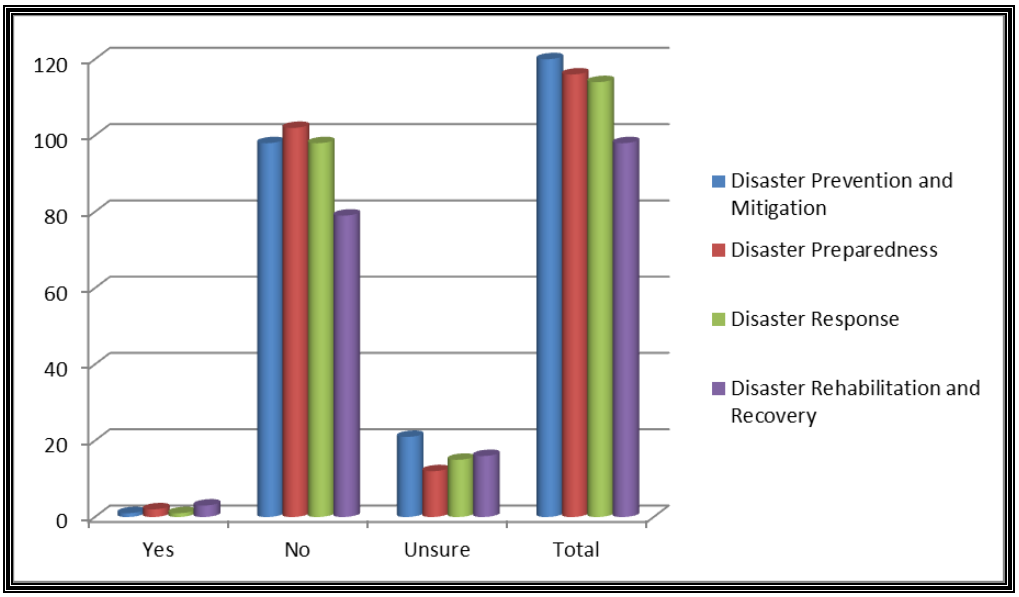

Figure 10. Respondents Response of the Disaster Risk Reduction Activities of the Campus

H. Issues Concern Encountered to the School Plant Facility Maintenance

Table 8. Issues Concern Encountered to the School Plant Facility Maintenance

Issues Concern	Yes	No	Unsure	Total
Standard sizes and dimensions of the classrooms, laboratories and offices	2	98	12	112
Standards format for Annual maintenance Plan, Preventive Maintenance Plan, Work Request, Call Out Slip, Purchase Request, Maintenance checklist and Maintenance charts	1	76	7	84
Standard drawing plans and templates	1	89	26	116
Standard maintenance organizational charts and functions	1	60	22	83
Total	5	323	67	395

As indicated in the Table 8 and Figure 11, there are three hundred twenty thee (323) respondents responded "NO" about issues and concerned encountered to the School Plant Facility Maintenance. Only five (5) respondents responded "YES" about issues concerned encountered to the School Plant Facility Maintenance and sixty seven (67) respondents responded "UNSURE" about issues concerned encountered to the School Plant Facility Maintenance. The results implied that only limited issues and concerned aroused in the campus.

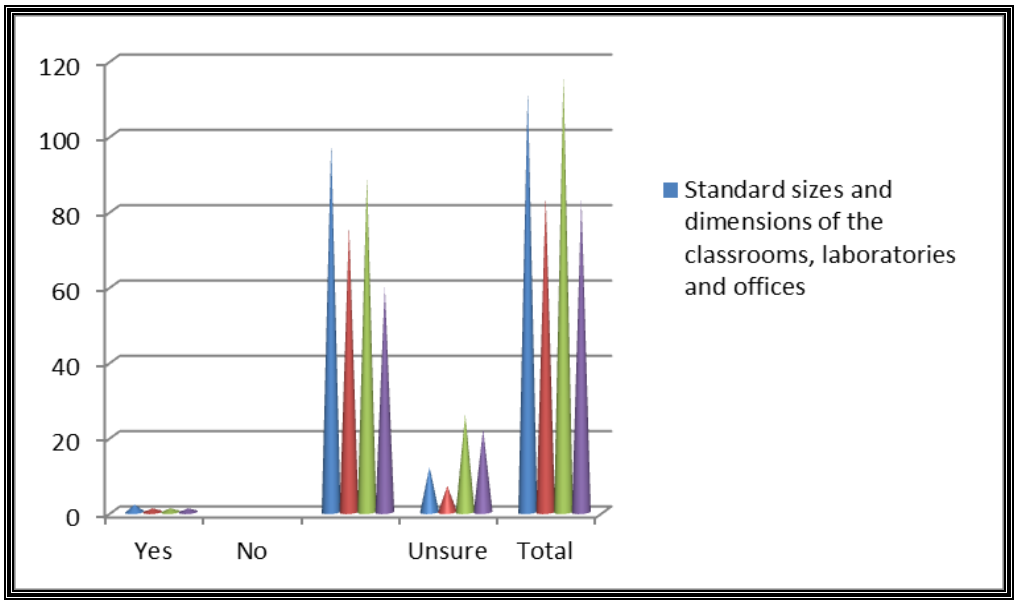

Figure 11. Issues and Concerned on the School Plant Facility Maintenance

Conclusion and Implication of the Study

The School Plant Facility and Maintenance Manual is very important in any educational institution. This will guide the school stakeholders in the implementing rules and regulations of the Palompon Institute of Technology, Palompon, Leyte, Philippines.

School Plant Facility and Maintenance Manual in any educational institution and organization is a manifestation that the school comply the law prescribed by the Philippines Government RA No.: 6541, House Bill No. 2962, and CMO No. 10 Series of 2007. These laws and regulations are the implementing guidelines for the identification, support and development of Centers of Excellence (COEs) and Centers of Development (CODs) for Business and Management.

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