

Technological Management Efficiency on Higher Educational Institutions towards Organizational Performance

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Abstract –*The study assessed the management efficiency of technology that links to the organizational performance of Higher Educational Institutions (HEIs). It employed Leavitt’s System Model to analyze how the utilization of IT resources in terms of people, process, and technology contributed to the organizational performance of the HEIs. The changes that may occur on the cited variables would influence the quality of instruction, research, and extension. The study utilized the descriptive type of research in determining the significance of the efficient utilization of Information Technology resources. The researcher surveyed 264 faculty members and 69 administrators of selected Higher Educational Institutions. It was found out that there is a significant relationship between technological management and organizational performance. It was revealed that there is a significantly higher level of management efficiency in terms of people and lower in technology. There is also a significantly high level of organizational in terms of Instruction/Learning Opportunities/Environment and significantly lower in terms of research performance. Based on the findings, a framework was proposed for Technological Management Efficiency towards competitive Organizational Performance.*

Keywords – *organizational performance, people, process, technology, technological management*

INTRODUCTION

The absence of efficient technology management among Higher Educational Institutions results in inefficient delivery of services and affects the quality of teaching. The problems encountered by the third world countries particularly the Philippines on the integration of technology in education are inadequate financial resources, lack of training for faculty and staff, and human capital to support and sustain the quality of teaching and learning process [1]. The cited challenges may affect the business operations as to poor technological management and decrease in enrollment that may affect the flow of income and profit for educational institutions.

The cited challenges are distinctive in every higher educational institution. The capabilities of technological resources are crucial in the smooth implementation of the different activities particularly in the learning environment.

In the modern education environment, most of the schools are adopting the concept of integrating IT in the teaching and learning process on the belief that it is the way of delivering effective and quality services to their stakeholders. The process of automation and adoption of

technological platforms covers some of the challenges faced by many of the higher educational institutions. The provisions of the Learning Management System, the office automation, the research repository, the online and distance education and the like are the innovations that need attention. The cited transformation in the educational era will impact on delivering the quality of education and organizational performance. This will also respond to the United Nation’s Sustainable Goal Number 4, which states that to ensure the quality of education for all and promote lifelong learning there is in need to address the proportionate numbers of youth and adults that have communication technology skills. Access to computers and the internet for pedagogic purposes are substantial [2]. With this, it is well-timed to adopt the best practices on technological innovations practices involving education processes.

The present study is anchored on the Leavitt’s Diamond Model also known as Leavitt’s System Model, which was designed by Harold J. Leavitt in 1965. This is a framework for understanding the connection between the key factors in an organization to build an integrated change strategy. The model is composed of components such as people, process, and technology. Any changes in

another component will affect the others. The right balance between all of them is necessary to achieve the implementation of change [3].

Moreover, Galup, Dattero, Quan and Conger [4] states that in deploying the IT services it is best to incorporate the core elements of operational efficiency that include people, process, and technology which mainly interact with the delivery of services. The latter is integrated into the Leavitt's Diamond Model, which utilized the in-depth analysis of the relationship between technology changes on the fundamental structures of an organization [5]. The said model was utilized to determine if the introduction of new technology may affect the organizational structure.

The educational institution is one of the areas that integrate the use of technology in providing quality services to its stakeholders. The integration of such technology entails support for infrastructures and other related requirements. This was supported by Moser's notion that if educational institutions promote the use of technology, the need to have a good technological infrastructure and satisfactorily technological framework arise [6]. Hence, the institution needs to intensify its technological capability to go beyond the mere transition of knowledge and to apply the technology-based pedagogical concept to enhance organizational performance.

Likewise, in the mission of the institution understudy on the pursuit of venturing into new frontiers of educational evolution and of entering in the era of the Industrial Revolution, it is timely to assess its technological management of the educational institutions. The previous are utilizing different technological platforms on student services and teaching and learning processes. The subjects make use of the Learning Management System, a system for enrolment, and provided with technological infrastructures. Moreover, based on the interview conducted, the IT managers are encountering difficulties in technological management, particularly on staffing, lack of staff training, and other related concerns on IT management.

In the education sector, the measures of organizational success depend on tri-fold functions of the Higher Education that comprise instruction, research, and community extension aimed not only to generate knowledge but also applying it to the community.

Uzuegbu, Mbadiwe, and Anulobi [7] underscored that in delivery of instruction, instructional materials are necessary to learning and comprehension of knowledge of the 21st-century learners. It was revealed that only print and visual instructional materials are available in

the institutions and there is limited usage of instructional materials. The barrier encountered is poor funding, power supply issues, the lecturers are non-compliance with ICT and related technologies, and lack of media resources. The study suggested to adopt new technologies and have the lecturer to be trained in technology implementations. The institutions and the government are being encouraged to fund the resources to have instructional materials for teaching and learning. On contrary, Lausa [8] argued that there is no significant relationship between IT operational efficiency and instruction. He recommended that the higher educational institutions' administrator must formulate an ICT master plan that is anchored on the institution's vision-mission to promote effective integration of ICT in the teaching-learning process and other functions.

Furthermore, the integration of research in every firm particularly in a higher educational institution is vital, as it is the primary key for decision making of top-level management.

According to the National Higher Education Research Agenda 2 (NHERA-2), its primary concern is to support every HEI to develop a high level and competitive workforce that could generate and transfer knowledge and technology to enhance the productivity and quality of life. The objectives of the NHERA -2 is to improve the research capability of HEIs to generate knowledge towards international competitiveness, to enhance research productivity based on the areas of competence, to generate knowledge and technologies for the development of HEI, policy formulation, and developing innovative programs and to promote and facilitate dissemination and utilization of the research outputs [9].

Also, it was identified that research productivity is influenced by external and external factors. The external factors include institutional attributes and offered opportunities, while internal factors comprise of individual attributes and demographic variable. The external variables are the features of institutional structure such as type of institution, leadership characteristics, colleagues and work environment, and the institutional expectations to research. Moreover, the opportunities offered by the institution are the amount of university revenue for research, availability of equipment/ technological facilities, the number of books and journals in the library, the provision for research training, and networks between colleagues. Furthermore, on the internal variable, it is composed of demographic profiles such as gender, age academic rank, marital status, and the number of children. Whereas personal attributes are personal competence and confidence,

analytic capacity, creative thinking, the research are and the engagement and involvement to research [10].

Likewise, Aithal and Kumar [11] presented how research influences organizational performance. The process of ranking the higher educational institutions is based on the six postulates that comprised of pedagogy, placement, the output of research, faculty-student ratio, international linkages, and technology management. On research performance, productivity is being measured on the number of articles published in peered journals and the number of published books. The value of the research index is calculated to determine the research productivity of the institution.

Dotong and Laguador [12] articulated that the role of every higher educational institution is to promote quality instruction, student services, research outputs and community extension programs to its stakeholders'. The purpose is to establish an image in the community as a provider of quality education. As part of the tri-fold functions of the HEI's, research activities provide various opportunities on assurance mechanisms for accreditation purposes. The research process updated the faculty on the updates and new trends concerning their discipline by conducting investigation and experiments which promotes collaboration with foreign authors that lead to the acquisition of new ideas and perspectives in terms of educational practices.

Moreover, one of the mandated functions of the Higher Educational Institution is community extension services. This aims to conduct activities that would allow students, faculty, and research staff to apply the knowledge in uplifting the socio-economic problems of the community.

The performance of an organization is measure through performance indicators related to organizational performance. The areas of concern are effectiveness, productivity, quality, customer and stakeholder satisfaction, efficiency, innovation, and financial durability [13].

The organizational performance in terms of instruction, learning opportunities, and environment are some of the pedagogical aspects that contribute to the growth of the institutions. This imperative for the improvement of Higher Educational institutions.

Lausa [8] presented findings that the operational efficiency of information technology has a significant relationship on the organizational performance of SUCs. The core elements of operational efficiency such as people, process, and technology should be aligned to develop organizational performance. The extent of

implementation of the IT system about the IT components was taken also into considerations.

In employing Leavitt's System Model, it analyzed how the utilization of IT resources in terms of people, process and technology contribute to the organization performance of the HEI. The changes that may occur on the cited variables would influence the quality of instruction, research, and extension. The result of the analysis would be the basis of the development of a technology management model that tends to affect the parameters to improve the efficiency of the technology management of the HEI.

The study conducted addressed the difficulties of the educational institutions on the management efficiency of technology to have a competitive organizational performance. This assessed the current performance of the schools and how technology affects the latter.

OBJECTIVES OF THE STUDY

This research aimed to determine the level of efficiency in managing the IT resources and services of selected HEIs in relation to their organizational performance, and intend to develop a framework that would enhance the Technological Management Efficiency of educational institutions.

Specifically, this study measured the management efficiency of Technology in Educational Institutions as observed by faculty members and administrative personnel involving parameters such as people, process, and technology. In terms of people, it analyzed how the utilization of IT resources affects governance, organization, and leadership as well as on staffing, human resource management, and training. Hence, on process management, this entailed to determine the influence on identity/access management, on disaster recovery/business continuity (DR/ BC), on teaching and learning with technology, the agility, adaptability, and responsiveness on strategic planning and how it contributed to the administrative and resource planning. Moreover, on technology management, this examined the management efficiency of security, on funding IT systems, and on IT infrastructure.

Consequently, the study assessed the organizational performance of the Higher Educational Institution/s as observed by the two groups of respondents in terms of Instruction/ Learning Opportunities/ Environment, research, and community extension services. Furthermore, it tested a significant difference in the management efficiency of Information Technology resources and the organizational performance between faculty members and administrative personnel. It also

tested the significant relationship between technology management efficiency and organizational performance. Likewise, it also tested the significant differences in the Management Efficiency and Organizational performance when grouped according to variables and proposed a framework for technological management efficiency toward competitive organizational performance.

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faculty members and administrative personnel. It also tested the significant relationship between technology management efficiency and organizational performance. Likewise, it also tested the significant differences in the Management Efficiency and Organizational performance when grouped according to variables and proposed a framework for technological management efficiency toward competitive organizational performance.

METHODS

This study utilized the descriptive type of research in determining the significance of the efficient utilization of Information Technology resources in selected Higher Educational Institution. Waltz, Strickland, and Lenz [14] define that this type of research design uses mathematical and statistical data to determine and analyze the output of the research. This technique will also allow exploring the relationship and differences of the variables under study.

Participants

The respondents of the study were the faculty and administrator of the selected schools in Luzon managed by the Association of Schools of the Augustinian Sisters of Our Lady of Consolation (ASAS). Among the twenty-three schools, five were chosen to be the subjects of the study who were from Batangas, Bulacan, Calocan, Laguna, and Manila. Table 1 shows the allocation of the respondents.

Table 1 displays the total population of administrator and faculty, the sample for each HEI, and the percentages of questionnaires retrieval. The retrieval percentage for admin was 69.97 percent while on faculty was 57.63 percent. The respondents were selected using the following criteria: a regular employee with three or more years in the institution, and have engaged in the utilization of technological resources.

Table 1. Frequency Distribution of the Respondents

Higher Educational Institutions	Total Population Admin	Sample Size	Retrieval %	Total Population Faculty	Sample Size	Retrieval %
HEI 1	12	12	100%	80	62	77.5%
HEI 2	11	11	100%	43	27	62.79%
HEI 3	9	4	44.44%	66	57	86.36%
HEI 4	35	24	68.57%	186	64	34.41%
HEI 5	32	18	56.25%	97	64	65.98%
TOTAL	99	69	69.67%	472	274	57.63%

Instrument

The research instrument was adopted by the survey questionnaire of Lausa [8]. The researcher communicated the author through email and asked permission if the survey questionnaire is used in this study. The instrument was consisting of two (2) parts that contain factors relating to operational efficiency and items focusing on the organizational performance of the SUCs. The questionnaire was validated by experts particularly in the field of information technology systems. The validity was examined through the utilization of the Good and Scates validation test and Calderon Criteria for Questionnaire Evaluation. It was rated using the scale: 4 – Very Good; 3- Good; 2- Fair, and 1 – Poor. After further evaluation, a validity index of 3.59 showed that the questionnaire was valid.

The validated questionnaire was then evaluated using the Reliability Test, which resulted in a Cronbach’s Alpha of 0.976, which showed that it indicates a very high correlation value.

Procedure

The researcher asked permission from the College president of each institution to survey its personnel. The questionnaires were distributed to the respondents to gather the relevant data, then, retrieved. The researcher tallied the answers using Microsoft Excel. The email addresses and contact information of the persons involved in technological management were obtained and proper protocols in Data Privacy of their information will be strictly observed. The interpretation and analysis of data were formulated and processed using SPSS. During the distribution and retrieval of questionnaires, there were challenges encountered such as the distance of the location of the subjects’ understudy and the retrieval of questionnaires on due time because the personnel is on vacation. The data gathering and retrieval consumed thirty days and the retrieval of rating

Data Analysis

Weighted Mean is the statistical tool used to describe the result of the survey in terms of management

efficiency and organizational performance. Meanwhile, the Mann Whitney U test was used to test the significant difference between faculty members and admin personnel, and the Kruskal Wallis test was used to test the differences among the variables. Spearman rho was used to test the significant relationship between management efficiency and organizational performance. A non-parametric test was used as a statistical tool because the nature of the data is not normal. The scale used to interpret the results of the study in determining the level of management efficiency were: 3.50-4.00 (Very High), 2.50-3.49 (High), 1.50-2.49 (Low), and 1.00-1.49 (Very Low).

Whereas, on interpreting the level of organizational performance the scales employed were 3.50-4.00 (Very Satisfactory), 2.50-3.49 (Satisfactory), 1.50-2.49 (Fair), and 1.00-1.49 (Needs Improvement).

Ethical Considerations

The respondents of the study-oriented that the data provided on the survey were used solely for the research study. The given information treated on the utmost confidentiality and the identity of the particular person who answered the questionnaire would not be divulged on any part of the study. The participants of the study were given free will in deciding if they want to participate in the conduct of the research.

RESULTS AND DISCUSSION

Technology deployment in educational institutions contributes to the efficient teaching-learning process and its management. The process of providing the optimum technology infrastructure could enhance the quality of teaching and provides information for decision making. The ways of evaluating the existing plan can be the guide for crafting an enhanced technological management plan. The steadfast technological changes require an apt response to the requirements. This section provides a discussion on the assessment of the technological management efficiency of technology of the HEI and how it affects organizational performance.

Table 2. Technological Management Efficiency

	VL%	L%	H%	VH%	Faculty WM	Admin WM	Total WM	VI	R
People									
On Governance, Organization and Leadership	1.95	16.7	48.78	32.58	3.14	3.06	3.12	H	2
On Staffing / HR Management / Hiring	0.68	14.23	46.38	38.80	3.24	3.18	3.23	H	1
Mean	1.32	15.465	47.58	35.69	3.19	3.12	3.18	H	

Table 2 (cont.) Technological Management Efficiency

	VL%	L%	H%	VH%	Faculty WM	Admin WM	Total WM	VI	R
Process									
On Identity / Access Management	1.13	17.63	51.48	29.80	3.12	3.01	3.10	H	2.5
On Disaster Recovery / Business Continuity (D/ BC)	3.13	18.45	52.50	25.93	3.05	2.86	3.01	H	6
On Teaching and Learning with Technology	1.45	17.35	47.53	33.68	3.15	3.09	3.13	H	1
On Agility, Adaptability, and Responsiveness	1.43	16.78	52.78	29.08	3.12	2.98	3.10	H	2.5
On Strategic Planning	0.90	21.43	47.10	30.53	3.09	2.99	3.07	H	4
On Administrative / Enterprise Resource Planning / IS	1.28	22.15	48.40	28.23	3.07	2.91	3.04	H	5
Mean	1.55	18.97	49.97	29.54	3.10	2.97	3.08	H	
Technology									
On Security	1.53	21.80	42.30	34.40	3.13	2.94	3.10	H	1
On Funding IT Systems	1.58	22.10	49.43	26.88	3.05	2.88	3.02	H	3
On IT Infrastructure	1.20	21.38	47.90	29.58	3.09	2.95	3.06	H	2
Mean	1.44	21.76	46.54	30.29	3.09	2.92	3.06	H	
Overall Mean	1.44	18.73	48.03	31.84	3.13	3.01	3.10	H	

Scale: 3.50-4.00: Very High (VH); 2.50-3.49: High (H); 1.50-2.49: Low (L); 1.00-1.49: Very Low (VL)

Table 2 displays a summary of the management efficiency of technology as perceived by the faculty members and administrative personnel.

The management efficiency is measured in terms of three variables such as people, process, and technology. The results revealed that there is a high level of management efficiency on the cited variable with a composite mean of 3.10. It was evident in the responses on which 48.03 percent of the respondents believed that there is a high level of efficiency, while 31.84 percent agreed that there is a very high level of efficiency and 20.17 percent rated very low and low.

Furthermore, among the three variables, people got the highest composite mean of 3.18, followed by the process, which is 3.08, and the least is the technology that obtained 3.06

In terms of management efficiency of technology with regards to people, it was revealed that almost half of the respondents or 47.58 percent believed that there is a high level of management, while 35.69 percent of them viewed it as very high and 16.79 percent of them answered low and very low. The variable focused on the assessments on governance, organization, and leadership and also on staffing, human resources management, and training.

It was found out that there is a high level of management with regards to staffing / HR Management and Hiring as evident on the total weighted mean of 3.23.

From the assessment, it was revealed that there is a high level of efficiency in having a faculty development plan, program, and implementation of innovative methods, trends, and technologies on teaching and learning.

The needs of the faculty to access the current trends on technology-related activities on teaching and learning must be given priority of every HEI. The proper management of IT development and capacitating practices need to be evident in every educational institution as they uplift the standard of the teaching process and introduces innovative ways of instruction.

As Keengwe and Kyei [15] proved, to apply technology efficiency, the faculty must understand the proper use of it and how to integrate it in the learning process which can be achieved through faculty training and technology leadership.

Moreover, there is also a high level of efficiency in having faculty members and support personnel's attendance in workshops, training, conferences, symposium, and others about Information Technology.

By participation of faculty in training and workshops, they become aware of the current trends in IT. The knowledge that they acquired can contribute to the development of their skills and how to integrate the principle of technology into the teaching process.

The study of Asar [16] stated that the competencies of a teacher must need to go beyond the skills in IT, but

merely in contextual knowledge about technology, pedagogy, and content.

On the other hand, the involvement of the school president and communication on IT staffing challenges and attention to the problems at the institutional level was also on a high level of management efficiency.

The active participation of the institutional leaders in the decision-making process related to Information Technology is crucial in an organization. Thus, a thorough understanding of the changes that might happen on the business operations in an institution particularly on the staffing challenges which was brought about by technology must be identified by the leader of the institution.

In this present generation wherein the access of information is just a tap of the fingertips, the technology integration in the process of dissemination of information to the faculty and staff is essential. The use of social media or other messaging applications can transform how the human resource department reaches out to personnel. The schools have resources that can be applied in this particular undertakings, but there is a lack of training and updates on how this technology can be fully implemented to enhance the management of people within an educational institution.

Rohilla [17] revealed that the management efficiency of technology in people management influences the human resources functions particularly on the recruitment process, training, performance management, and human resource management.

Furthermore, it revealed that half of the respondents at about 49.97 percent believed that there is a high level of management efficiency of technology with regards to process, 29.54 percent perceived it as very high and 20.52 percent rated it low and very low.

Among the factors measured were the process on identity/access management, on disaster recovery/business continuity (DR/ BC), on teaching and learning with technology, on agility, adaptability, and responsiveness on strategic planning and on administrative and resource planning.

The data shows that on responses on management efficiency of technology about process in terms of teaching and learning with technology got the highest weighted mean of 3.13 which pertains to a high level of management. It was followed by the process on identity /access management and on agility, adaptability, and responsiveness with a composite mean of 3.10. The process on strategic planning, on administrative/ enterprise resource planning, and on discovery recovery/ Business Continuity perceived also in a high level of

management with composite mean of 3.07, 3.04, and 3.01 respectively.

The integration of technology in the teaching and learning process is vital with the rapid changes and shifting paradigms in education. The faculty development plan that incorporates the importance of technology is valuable to train and prepare the educators on the latest innovations and practices on technology integration. The strength of educational institutions understudy is the incorporation of the needs of the institution on the technological resources and the enhancement of the curricula that address the needs of the students on the learning opportunities that apply technology. The utilization of the different technological platforms is evident particularly the Learning Management System such as Schoology, Edmodo, Moodle, business tools, and other software that is intended for a particular subject. There are also provisions of seminars to the faculty members that uplift their skills and competency on technology and the familiarization on the usage of the Learning Management System is also incorporated in instruction. The willingness of the faculty is evident as they willingly attend the different symposiums and training on technology updates that focus on teaching and learning.

The findings are directly in line with the notion of Afshari, Bakar, Luan, Samah, and Fooi [18] that ongoing professional development is an effective tool for teachers to embrace the new concept and tools for the teaching and learning process. The skills and understanding of the faculty on the IT activities are significant in the successful implementation of the technological development plan.

Generally, the composite mean of 3.10 or the responses of the 81.86 percent of the respondents implies that the level of management with regard to process in terms of agility, adaptability, and responsiveness of technology is from high to very high.

Agility affects the effectiveness of an organization. This was supported by the findings of Roberts & Grover [19] that knowledge creation and processes lead to the competitive activity of a firm and agility alignment affects the efficacy of the organizational work.

The results demonstrate that the perception of MIS leadership is considered as strategic partners rather than a service provider, wherein it is right that the IT leaders contribute to the effective implementation of the IT system and assets. If an educational institution wants to leverage its technological capabilities, close coordination with the MIS department must be imposed from the planning stage up to project implementation. The

department is the heart of the organization in promoting efficient utilization of technology and on predicting the future of technologies.

These results go beyond on previous reports by Grajek [20], that the role of the IT leaders must be known as strategic partners of the institution in achieving the organizational goal. The stakeholders must engage deeply in the MIS department to understand how information directly impacts institutional objectives.

Moreover, there is a high level of management efficiency of technology with regards to technology with the factors on security, on funding IT systems, and on IT infrastructure which is evident in the total weighted mean of 3.06. The 46.54 percent of the respondents agreed that there is a high level of management efficiency, 30.29 percent rated it very high, while 23.2 percent agreed to it a low and very low.

The factor in having security policies on privacy and security was rank first on the perception of the respondents in terms of technology management in security. The result shows that the institutions are compliant with the mandate of the National Privacy Commission with the cooperation of the Commission on Higher Education on the implementation of the Data Privacy Law. Since the educational institutions are entrusted by the stakeholders to use their personal information, it must be processed safely and lawfully. Most of the institutions are processing data through the integration of technology. The utilization of system or platforms in data management incorporates policies which ensure that the information is properly safeguarded. With that available written policies, these serve as guidelines on the system users on how to access, share, and protect the information stored in the database. Almost all of the institutions surveyed have written privacy and security policies which were known by the faculty and administrators as evident on the result of the survey.

McKelvey [21] supports that the policy on data protection in Higher Educational Institutions must be revised to meet the requirements of the institutions. The privacy policy explained the purpose of the Data Protection Act. It should be committed to transparency, security, and purpose. It also revealed that data policy on technology management improved efficiency and reduced the costs of implementing HEI.

The placement of IT security staff entails a proper understanding of his role in protecting the information assets of the academic institutions. A series of training must be prioritized to ensure that the data are secure while the productivity of every department is evident.

The HEI must invest in the training program on security awareness to protect the organization from the possible threats that may occur. If proper security is implemented the operational ability of the institution will be maintained.

In addition, the management efficiency of technology with regard to technology in terms of funding IT systems revealed that there is a high level of management which was agreed by 76.31 percent of respondents and who rated the component from high to very high.

Technology in education transformed the system on the process of teaching and learning and the delivery of services. But the said transformation required a lot of investment and proper budgeting. The common problem of the educational institutions in IT budgeting, for the reason that the persons involved are not aware of the process and priority activities. Hence, it is beneficial for the finance team and IT leaders to work collaboratively in allocating the budget for technology improvement. The investment in IT must be aligned with the strategic plan of the HEI. The proper coordination between each cluster must be considered to make sure that the plan of activities is congruent with the IT budget plan. The alignment of the budget to the strategic contributes to the competitive advantage of the institution. Most of the interviews conducted on the HEI's have struggled on the budget allocation, the priority on the infrastructure, systems, and investment on people are some of the struggles that are being faced by the HEI's.

Mithas, Bandhan, and Goh [22] proved that IT investment has a positive impact on profitability. The organization must prioritize IT investment that contributes to the growth potential of the organization rather than focuses on cost savings.

On having policies and procedures on revenue streaming that are better aligned with the current drivers of IT costs, the respondents believed that there is a high level of efficiency which is evident in the response of the 46.6 percent of respondents (2.98), whereas 26.8 percent agreed that it has a very high-level efficiency and 26.5 rated very and low.

The least among the factors on funding IT systems are on having policies and procedures on revenue streaming. The method of earning money from selling goods and services is good for an organization. From this process, the organization is getting more profitable. The respondents HEI's have no existing policies and procedures for revenue streaming. The organization is non-profit, non-stock on which they are only relying on the profit from fees collected to the stakeholders.

Moreover, almost 77.48 percent of respondents believed that the level of management efficiency of technology with regard to technology in terms of IT Infrastructure is high to a very high level. The composite mean of 3.06 was evident that there is a high level of efficiency.

Technology policies are the guidelines followed by the users of technology in an organization. In an educational setting, the main goal of the policies is for the successful integration of technology in teaching, learning, and school management. The policies and procedures on methods measuring student satisfaction in IT infrastructures are useful in identifying the strength and weaknesses of the technology plan. Evaluating the extent of implementation and satisfaction particularly the students' as the main users of the IT infrastructures will provide insights to the administrators on the progress and impact of the technology plan. This will be the provisions for revising and improving the existing plan. The HEI understudy has a mechanism for evaluating student satisfaction. As part of the student services program, they are measuring the effectiveness of the computer laboratories on the services it provides. But the evaluation focuses on the computer laboratories which need to expand on the available IT resources on the entire institutions.

The study conducted by Alsabawy, Cater-Steel and Soar [23] confirmed that evaluating IT infrastructure contributes to determining the success of e-learning implementation through its significant impact on its observed usefulness, user satisfaction, and customer /organizational value.

Also, every organization must have an extensive drive in the formulation of an adequate plan for staff, infrastructure, and resources. Normally, those are

exhibited on the strategic plan of an institution. It incorporates the leadership agenda, structures, and processes. The planning for IT will ensure that the strategic goals and objectives of institutions are achieved. The activities for IT infrastructures should support all areas of technology implementations such as support for staff, operations and management, and all other processes that pertain to technology implementation. Almost all the HEIs measured have their way of formulation of the operational plan. Some are focused on the infrastructure but low on human capital investment and vice versa. The inequity among the factors results in struggles in the smooth implementation of IT projects. The benchmarking activities for IT are not yet fully implemented, which need to be prioritized to have self-assessment on the extent of implementation of IT infrastructure.

Figure 1 summarizes the percentage distribution of the responses in management efficiency. Among the variables, the process got the highest percentage which was rated by 49.97 percent of the respondents as a high level of efficiency and 29.54 percent believed that there is a very high level of efficiency while 20.52 percent of them rated the factors very low and low.

Furthermore, people rank second, wherein 47.58 percent of the respondents believed that there is a high level of management efficiency while 35.69 percent rated it with a very high level of efficiency and 16.78 percent rated very low and low.

Moreover, technology management got the lowest percentage of perception, it was revealed that 46.54 percent of respondents agreed that there is a high level of efficiency, 30.29 percent rated the variable with a very high-efficiency level and 23.2 percent rated it very low and low.

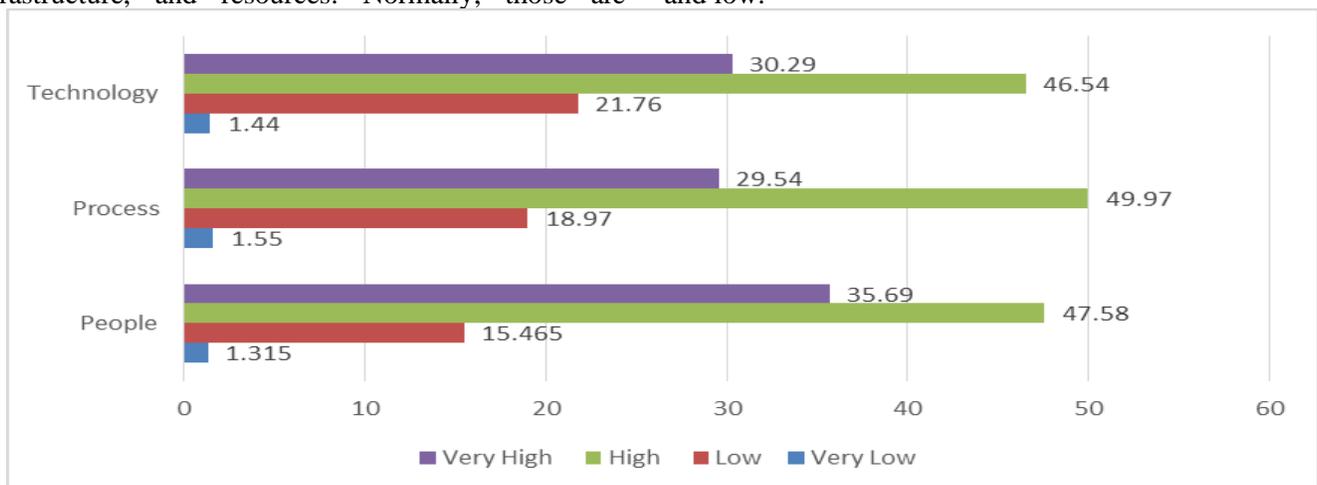


Figure 1. Summary of the Percentage Distribution of the Responses in Management Efficiency

Technology management efficiency is composed of people, process, and technology. A balance among factors is necessary to achieve organizational transformation and efficient management. If the people are ineffective it could affect the processes that could lead to the failure of technology implementation. Based on the findings of the study, there is an imbalance among the three factors. The technology has a low implementation that could affect the performance of the educational institution under study.

Lausa [8] proved that the core elements of operational efficiency such as people, process, and technology should be aligned to develop organizational performance.

Table 3 presents the summary of organizational performance, it can be gleaned that the Instruction/Learning Opportunities / Environment ranks 1st with a weighted mean of 3.23, it was followed by the community extension performance which is evident on the weighted mean of 3.09 and the factor that obtained lowest weighted mean is the research performance with 3.03. The cited organizational factors were evaluated with satisfactory performance.

The results revealed that the respondents viewed that satisfactory performance is evident in Instruction/Learning Opportunities/Environment with 49.81 percent while 12.89 percent rated fair and needs improvement.

The internship program is part of the Instruction/Learning Opportunities/ Environment on which the process The program is designed for students to have a chance to learn by doing on which they are supervised by a mentor who assists them to achieve the desired goals. This also determined the quality of instruction an institution has provided to its students. The acquired knowledge and skills are being tested by the guidance of a mentor. Moreover, the students are also required to conduct researches that are aligned on the institutional research agenda. This is part of the curriculum wherein students are conducting relevant researches that could contribute to the quest for knowledge. In terms of OJT practice, the observed HEI's

has processed on how to deploy student on the workplace.

The concept of internship and research drive in the educational institutions was proved to be the most important functional model to have real-world learning opportunities. This is combined with the principle of skills in problem-solving, collaborative work, linking knowledge to action, and sustainability methods. [24]

Consequently, faculty performance evaluation programs, processes, or frameworks are also perceived to be an important factor in performance teaching. The perceived performance of faculty is contributory to professional development and as well as the organizational development of an academic institution. The process of evaluation not only measures the faculty itself but also the extent of implementation of the faculty development program offered. This cultivates a process of improvement on the faculty performance, the quality of teaching and learning to assist in the decision making the process. The observed HEI's have their procedures on faculty evaluation. Most of them are utilizing faculty evaluation system to easily generate results on the assessment of each faculty. The human resource department is in charge of conducting the evaluation and presenting the result to each faculty. The said practice assists the administration in identifying the possible areas of improvement for the plan, particularly on the instruction and faculty development program.

This is consistent with what was observed in Goe, Biggers, and Croft's previous studies [25] who reported that assessment leads to teacher growth and enhances the methods of teaching and learning. It was also mentioned that the evaluation results will be used for decision-making purposes to improve the process and contribute to the faculty's professional growth.

In the quality of instruction, the presence of instructional materials is necessary to support the teachers on effective delivery of instruction. The instructor must provide detailed instructional materials to meet the students ' needs, which would improve the students ' opportunities to practice their skills.

Table 3. Organizational Performance of Higher Educational Institution

Organizational Performance	NI%	F%	S%	VS%	Faculty WM	Admin WM	Total WM	VI	R
Instruction / Learning Opportunities / Environment	1.39	11.5	49.81	37.29	3.24	3.18	3.23	S	1
Research	3.22	21.32	44.97	30.42	3.04	2.98	3.03	S	3
Extension	2.93	17.46	47.61	31.96	3.11	3.01	3.09	S	2
Overall Mean	2.51	16.76	47.46	33.22	3.13	3.06	3.12		

Likewise, to support learning, on the utilization of the course modules, a variety of learning styles can be implemented. There will be a variety of activities that can be performed when the lessons are properly reviewed and delivered. It is not as difficult to provide instructional materials as before. There are many sources of information that can be used by a teacher. This is through technology integration and internet power. In just a click, information and resources will just pop out on the screen. As can be noticed on the results, the provision for instructional materials ranks 2nd from the bottom. This implied that the production of such is not being practiced in the institution. They more rely on the textbook available on the market and internet resources.

Uzuegbu, Mbadiwe, and Anulobi [7] supported the idea that instructional materials are important in the learning and comprehension of the learners. The teacher must adopt and train new technologies to develop comprehensive educational material. It is recommended that the government and educational institutions fund the provision of resources for teaching and learning.

Furthermore, in terms of organizational performance in research, is evident that 44.97 percent rated the factors satisfactory, while 30.42 percent assessed it very satisfactory and almost 24.54 percent viewed it as fair and needs improvement.

The main purpose of the research is to utilize its output on the decision-making process. This must be the basis of the development of an operational or strategic plan of educational institutions. As can be observed, most of the HEIs are investing in research activities for them to identify their strengths and weaknesses to be competitive with their neighbor institutions.

The vital elements of learning environments are equipment such as laboratories, buildings, and other facilities that enhance the activities of the institution. As part of the trifocal function of education; instruction, research, and community extension, the provision of facilities for each area are contributory to the successful implementation of its agenda. In research work, infrastructures are fundamental requirements such as the provision of technological equipment such as internet and statistical software that could aid in the process of research methods. Among the HEI's understudy, only one institution has a complete provision of such requirements. They could easily produce and review researches because they have the available resources. In return, they have a good number of published and conducted researches. While the remaining four institutions are still in the process of enhancing the research capabilities, they practice conduct of research,

the internet connectivity is good, there are enough computers but lack of statistical and plagiarism software.

The investment in the resources for research is highly needed to efficiently produce the quality of research. Aydin [10], iterated that the research productivity is influenced by the external variables that include the quality of technological facilities and the provision of training.

The items that concern with research activities revealed with the lowest rating among the factors cited on organizational performance in terms of research. This is supposed to be on top of a priority since its role in academic institutions is imperative for the development and sustainability of an organization. The research output directly influences the quality of teaching and learning and on the processes of the HEI. The commitment of the faculty and staff in engaging with research activities is important. Everyone should encourage to participate to have a knowledge-driven environment. The responsibility of the researcher does not end on the research output. It is necessary to publish those work to have a permanent record of research to ensure that it is not misleading and it promotes an accurate and honest research output. The level of research performance of the surveyed HEI is low as revealed in the study. The number of published researches are limited and also the participation of the faculty and staff.

Dotong and Laguador [12] asserted that research activities provide opportunities for faculty to update on new trends concerning their discipline. The conduct of research can offer a chance to present in national and international conferences for research presentations that could be a venue for collaboration with the other researcher.

The results revealed that the process of knowledge acquisition and facilitating learning is being applied to the HEI understudy. The culture of having a quality of instruction is highly appreciated and various activities to support teaching and learning are evident such as OJT activities research part of curricula and development of student analytical and critical thinking. Hence, an improvement in the areas of research must be prioritized to increase the research output and publication to international/national journals. The conduct of research in HEI is vital to promote new knowledge and to have a reliant basis on the decision-making process.

Besides, respondents assessed the organizational performance factors satisfactory as evident on the composite mean of 3.09, which was comprised of the evaluation made by the 46.1 percent of the respondents,

while 31.96 percent perceived that it is very satisfactory and 20.39 percent rated it as fair and needs improvement.

Being a Catholic Educational Institutions, the active participation of the faculty in community extension programs is evident. The faculty serves as the facilitator on extending help to the community by sharing the knowledge, skills, and technology existing in the organization to improve people’s life. The faculty of the ASAS schools actively participate in this endeavour. They are the lead organizers together with their students in communication with the outreach center of the institution on planning and implementing the extension program activities. In involving these activities, the faculty can also gain experiential knowledge that can be shared inside the classroom.

The result is contradictory to the findings of Malm et al. [26] who assert that the engagement of faculty members of extension programs is low. The decision of the latter is being influenced by institutional practices, culture, and structure. The personal and institutional stories are vital to the involvement in community extension programs.

The factors which concern the increase in the number of extension projects conducted, increase in the number of communities assisted, and increase in the number of consultants from various disciplines to participate in the activities was rated next to lowest as organizational performance in community extension is concerned. This implies that there are inadequate practices on extension services. Exploring and thorough planning must be employed to oversee that lapses that need proper attention. The presence of the alumni is needed to increase the number of consultants for a special program. Their skills and knowledge can contribute to improving organizational performance in community extension.

Also, the factor that pertains to meeting the relevance of the extension program and activities to the university or college and to the community it serves got the lowest composite mean of 3.03. The respondents believed that the factor performance is satisfactory, while 29.4 percent

viewed that it is very satisfactory and 22.7 percent answered fair and needs improvement.

Table 4 depicts the test of the relationship between organizational performance and management efficiency. The results revealed that there is a highly significant positive relationship between the Organizational Performance and Management Efficiency in terms of People as denoted by the computed p-values of less than 0.01 alpha level. This signifies that those respondents who observed higher management efficiency with regards to people on governance, organization, and leadership, and staffing/ HR Management and Hiring are also those who answered higher in organizational performance concerning infrastructure, research, and extension. This was supported by the notion of Unsal [27] that technology management is an important source of competitive advantage. The process of adaptation to technological innovations creates transformation to the organization. It can be noted that the management efficiency of people in terms of governance, organization, and leadership has a high positive correlation on research. It revealed that the role of IT leaders in promoting the effective management of technology in HEI has a direct impact on organizational performance on research. This is supported by the findings of Polka and Kardash [28], that the human element is substantial in technology integration in education. The presence of innovators, implementers, and educational leadership is vital to assists in decision-making and opportunity for growth.

Moreover, Table 5 displays the result that there is a highly significant positive relationship between the Organizational Performance and Management Efficiency in terms of process as denoted by the computed p-values of less than 0.01 alpha level. This signifies that those respondents who observed higher management efficiency with regards to process are also those who answered higher in organizational performance with regard to infrastructure, research, and extension.

Table 4. Significant Relationship between Organizational Performance and Management Efficiency in terms of People

People		Organizational Performance		
		Infrastructure	Research	Extension
On Governance, Organization, and Leadership	Correlation Coefficient	.664(**)	.730(**)	.688(**)
	p-value	.000	.000	.000
On Staffing / HR Management / Hiring	Correlation Coefficient	.659(**)	.652(**)	.667(**)
	p-value	.000	.000	.000

**Significant at p-value<0.01 (2-tailed)

This is contradictory to the notions of Lausa [8], which revealed that there is no significant relationship between IT operational efficiency and instruction. As can be noted in the results, there is a high positive correlation between agility, adaptability, responsiveness, and infrastructure, as well as the same factor to research. This implies that the presence of an MIS leader as the main component of the management efficiency of the latter is vital in an organization. Active participation in strategic planning plays an integral role in the achievement of the quality of services on HEI. This was proven by Mc Afee [29] who stated that the success of an organization depends on a leader who performs well and enables the organization to embrace change. Hence, in terms of research, strong support on the facilities such as the Internet, statistical software, and other technological equipment is also necessary. Furthermore, a high positive correlation is also seen between strategic planning and research. This indicates that strategic planning for technology has an impact on the conduct of successful research, which is supported by F, et al. [30] that Information Technology leads to the improvement of the quality of service and serves as a catalyst for

innovations. Likewise, a high positive correlation is observed between administrative resource planning and research and also with community extension. The policy and procedures on enterprise resource planning and the deployment of new technologies directly affect the factors of research and community extension. This was proven by Aydin [10], in his claim that research productivity is influenced by the quality of technological facilities.

Also, Table 6 shows that there is a highly significant positive relationship between the Organizational Performance and Management Efficiency in terms of Technology as denoted by the computed p-values of less than 0.01 alpha level. This signifies that those respondents who observed higher management efficiency with regards to technology on security, funding IT systems, and IT infrastructure are also those who answered higher in organizational performance with regard to infrastructure, research, and extension. As reflected, all of the factors on management efficiency in terms of technology has a high positive correlation on organizational performance.

Table 5. Significant Relationship between Organizational Performance and Management Efficiency in terms of Process

Process		Organizational Performance		
		Infrastructure	Research	Extension
On Identity / Access Management	Correlation Coefficient	.667(**)	.696(**)	.676(**)
	p-value	.000	.000	.000
On Disaster Recovery / Business Continuity (D/ BC)	Correlation Coefficient	.671(**)	.696(**)	.725(**)
	p-value	.000	.000	.000
On Teaching and Learning with Technology	Correlation Coefficient	.691(**)	.676(**)	.665(**)
	p-value	.000	.000	.000
On Agility, Adaptability, and Responsiveness	Correlation Coefficient	.707(**)	.703(**)	.681(**)
	p-value	.000	.000	.000
On Strategic Planning	Correlation Coefficient	.680(**)	.714(**)	.657(**)
	p-value	.000	.000	.000
On Administrative / Enterprise Resource Planning / IS	Correlation Coefficient	.681(**)	.753(**)	.726(**)
	p-value	.000	.000	.000

**Significant at p-value<0.01 (2-tailed)

Table 6. Significant Relationship between Organizational Performance and Management Efficiency in terms of Technology

Technology		Organizational Performance		
		Infrastructure	Research	Extension
On Security	Correlation Coefficient	.718(**)	.737(**)	.718(**)
	p-value	.000	.000	.000
On Funding IT Systems	Correlation Coefficient	.743(**)	.765(**)	.740(**)
	p-value	.000	.000	.000
On IT Infrastructure	Correlation Coefficient	.724(**)	.751(**)	.730(**)
	p-value	.000	.000	.000

**Significant at p-value<0.01 (2-tailed)

This indicates that the components of security, funding IT system and IT infrastructure has a significant role in achieving the organizational performance of an institution. This is in support of the findings of Pucciarelli and Kaplan [31] that technology integration contributes to competitive advantage.

The succeeding figure is the framework conceptualized based on the findings of the study conducted and anchored on the Leavitt's Diamond Model.

The input of the framework is the efficient management of people, process, and technology. People are the persons, or a team involved in the efficient management of technology, who are the MIS leaders or the MIS team that has the initiatives to plan and improve the technological services. This is also concerned with the provision of training to the faculty and staff to implement innovative methods of teaching and learning. Moreover, the process activities consist of the improvement of technological efficiency that focuses on identity and access management, disaster recovery management, programs for the integration of technology in the teaching and learning process, and developing plan for the implementation of the current and trending technologies. Furthermore, technology is the provision of support to technological initiatives, which covers the

security, investment infrastructures, and funding on technological initiatives.

The organizational performance of Higher Education Institutions can be measured on the tri-fold functions of the education system, composed of Instruction, Research, and Community Extension.

The quality of the instruction is the lifeblood of the academic institution. This is where the quality of the students is honed. The instruction must be supported by different activities that provide better learning and understanding of the difference between principles and practice [32]. In the same context, the provision of technology as support to the teaching-learning process can be an efficient way to deliver instruction that improves students learning outcomes. The process also enhances the students' interest and engagement that leads to the progress of academic performance. This is supported by Pavel et al. [30] that technology serves as a catalyst for innovation, quality, and excellence and it improves the teaching and learning process that satisfies the needs of the stakeholders.

Research is the main source of acquisition of knowledge in Higher Education Institutions. The primary function of research is to produce outputs that are consistent with the institutions and national research agenda.

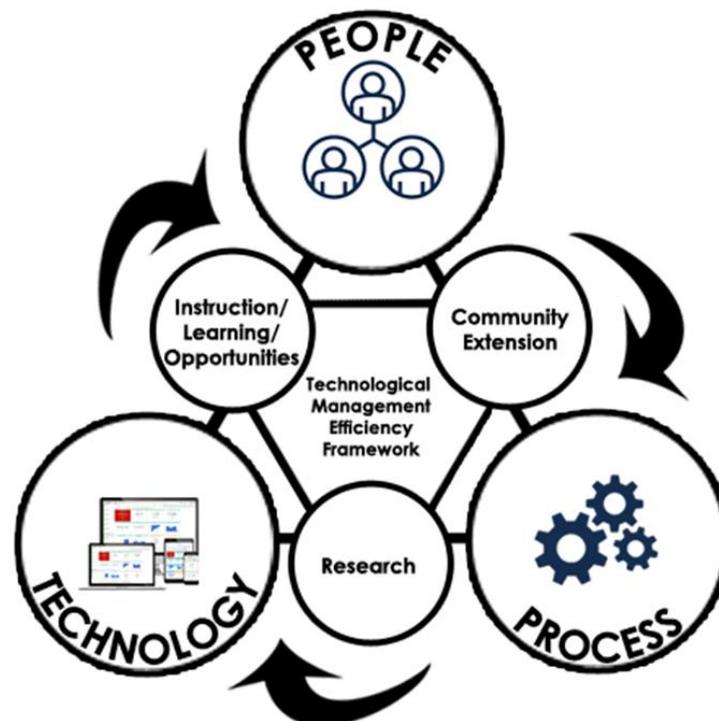


Figure 2. Magnaye – Laylo Technological Management Efficiency (MLTME) Proposed Integrated Framework

This also aims to contribute to the development of the processes and transfer of knowledge by the utilization of technology. This is where new ideas, values, and policies are generated. The active participation of every HEI in research activities is highly encouraged. This is supported by the goal of the NHERA-2 which aims to produce and create new knowledge, apply that particular acquired knowledge, and disseminate the knowledge to the community. [9]

Furthermore, Community Extension is the initiative to conduct extension services programs to the wider community. The transfer of the knowledge system is the implication of technology in this area. Planning, developing, and implementing technological-related activities can enhance and contribute to the understanding of the adopted community. The extension programs aim to support the needs of the less privileged particularly on the search for knowledge. Dotong and Laguador [12] mentioned that extending support of educational institutions is a noble achievement that helps the less fortunate citizens to adapt and build a strong community.

The management efficiency of people, process and technology, as well as the organizational performance on instruction, research, and community extension can help to develop the Higher Educational Institution. The technological management efficiency in educational institutions that tends to influence the organizational performance can enhance the academic performance of students that leads to being a competent individual that will contribute to the workforce in the future. While the research output can lead to institutional development that helps with the improvement of the current system. Furthermore, community extension programs, it can alleviate the needs of others on the current trends on technological capability.

In general, the proposed framework can improve the organizational performance of the institution as well as the wider community. If there is an improvement this could lead to better business performance, this may result in the growth of enrolment, an increase in the research output, and proliferation of the number of adopted communities that need intervention.

Figure 2 presents the proposed framework for the management efficiency of Information Technology toward competitive organizational performance. The framework was conceptualized from the results of the study. It was revealed that there is a high positive relationship between organizational performance and management efficiency on people, process, and technology. It shows that any changes in technology will

affect performance. This is supported by the findings of Fred [3] that changes in another component will affect the others and it is necessary to have the right balance on the factors to achieve the implementation of change.

The framework suggests developing plans for management efficiency in Technology, as revealed that the level of efficiency is significantly lower. A plan to enhance activities on security, funding IT systems and IT infrastructure may uplift the organizational performance.

Similarly, on organizational performance, there is a high level in terms of Instruction/Learning Opportunities/Environment and significantly lower in research performance.

The proposed framework is supposed to balance the efficiency of the components such as people, process and technology. This aims to strengthen and balance the input on three factors by strengthening the weak areas of the variables. For people, the researcher suggested establishing the MIS department for the provision of MIS advisory committees for planning and implementing IT initiatives and to provide proper access to information of faculty and staff. While on the process, attention to the following factors are imperative; budget allocation for disaster recovery and continuity, the stipulation of policy and procedure of deployment of new technologies, developing of strategic plan capability to drive IT budget and investments, MIS leader's actions on distributing tools for others and training plan implementation for staff selection, deployment, and management. Hence, to enhance technology focusing on the following areas are vital, having policies and procedures on revenue streaming, provide a mechanism on benchmarking, have adequate planning, staff, and infrastructure resources, and implementation of comprehensive risk assessment to identify the potential mitigation to threats.

The enhancement of the factors with a lower level of efficiency and a lower level of performance may result in a positive change in technological management and organizational performance.

CONCLUSION AND RECOMMENDATION

The respondents observed that there is a high level of efficiency primarily on people management, specifically on staffing/HR management/hiring, followed by process and technology. While, on Organizational Performance, Instruction obtained the highest rating on satisfaction followed by community extension and research obtained the least rating.

The findings proved that Technological management efficiency is significantly related to organizational performance. There is a significantly higher level of

management efficiency in terms of people and lower in technology, whereas, there is a significantly high level of organizational performance in terms of Instruction/Learning Opportunities/ Environment and significantly lower in terms of research performance.

A framework was proposed for Technological Management Efficiency toward competitive Organizational Performance.

Hence, the following are recommended with the aforementioned conclusions:

The Higher Educational Institutions must provide strong support to the faculty and staff on proper access to information, and updating other agencies that affect the working condition. There is also a need for the provision of a budget for disaster recovery and business continuity.

Consequently, policies and procedures in revenue streaming must be formulated which are better aligned with the current drivers of IT costs.

With regards to Research, the HEI must strengthen the research capacity by increasing research activities, and leveraging research outputs, and provide support and equal opportunities for faculty members and administrators. Likewise, technology should be integrated by acquiring software for quantitative and qualitative research and the use of plagiarism checker to test the quality of research output.

Lastly, an extensive IT management plan based on the proposed framework must be developed to promote effective integration of IT on the teaching and learning process and activities related to organizational performance.

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