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Management Strategies and Practices of In-House Development and Outsourcing of Information Systems in Higher Education Institutions – A Case in Samar, Philippines

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ABSTRACT

This study aimed to describe the management strategies and practices utilized by the Higher Education Institutions (HEIs) on the island of Samar in the acquisition of information systems using in-house development and outsourcing acquisition methods. It made use of a descriptive method of research. The questionnaire and interview were employed as tools in data gathering. The key findings revealed that most of the HEIs implemented their information systems through outsourcing, had few years of system implementation, had an average budget allocation, had on-going technical support, and had an existing management structure of the information systems. The management strategies utilized by HEIs were highly implemented, while the practices were often practiced to both in-house development and outsourcing methods. In general, the level of management strategies and practices observed in the acquisition of information systems in higher education institutions was similar regardless of the choice of acquisition method – either in-house development or outsourcing.

INTRODUCTION

The development and implementation of effective information systems (ISs) have been the goal of many organizations in their quest to provide more and better information to compete in an increasingly global business environment (Skoumpopoulou & Nguyen-Nwby, 2015). In the education sector, Higher Education Institutions (HEIs) have recognized the importance of information systems. It has been considered that the growth of Information Systems (IS) has an important role in improving the operations of higher education institutions (Alrawashdeh et al., 2013). The information systems have become important tools used to perform academic and administrative operations in HEIs.

The premise regarding the implementation of information systems is indeed relevant as they provide value to HEIs' administrative and academic functions. However, the acquisition of an information system has become an important concern that needs to be addressed. This denotes the choice or method of acquisition that is appropriate and which could lead to a functional and economic information systems investment; thus, the decision whether to locally develop (in-house) or outsource information systems has become an important concern for HEIs. Gunawardhana and Perera (2015) articulated that the importance and application of Information Systems in higher education sectors have taken considerable weight when making decisions to implement or purchase an Information System for academic institutions.

The massive change in education brought about by COVID-19 has even put a huge challenge on higher education in making strategic decisions about acquiring IT systems. The COVID-19 pandemic has resulted in not just health crisis but also educational crisis (Dayagbil et al.,

2021). Teaching that is mediated by digital technologies is among the many changes generated by the crisis (Pozo et al., 2021). It has dramatically reshaped the way global education is delivered; universities had to abruptly shift to virtual and digital strategies (El Said, 2021). In order to cope with challenges due to the Covid-19 pandemic, HEIs have to invest in IT systems that would effectively support the teaching and learning strategies amid a pandemic. The investment, however, requires sound judgment and decision-making on whether to develop systems locally or acquire them through outsourcing.

On deciding whether to locally build (in-house) or hire an outside software developer (outsourcing), various literature showed some important issues on the two systems acquisition method. In outsourcing, issues and risks include loss of control in fundamental processes for the business, followed by fear of unexpected costs, exposition to the supplier's risk of instability, and a decrease in service quality (Varajão et al., 2017). In addition, potential cons of outsourcing include less control over the project by the client organization, the possibility of communications gaps, and the possibility of confidentiality breach due to sharing of business information with the service provider (Kurayev, 2020). For in-house development, problems may include a need for an internal development team responsible for maintenance and updates, time-consuming training for the internal team in order for them to work effectively (Waszkowski, 2019), slow launching of the developed software, expenses on keeping an in-house team, risk of turnover, and limited expertise of the development team (Kurayev, 2020).

In the local setting, the Island of Samar has a good number of established HEIs. These HEIs, both public and private, have embraced information systems for over

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a decade now and have integrated these systems into their administrative and academic operations. Generally, the integration of IS has produced positive outcomes for HEIs. Anchored on the above-mentioned premise on the choice of IS acquisition method by HEIs, this study has been conceptualized. The problems described in various literature on acquiring information systems through in-house development or outsourcing have prompted this study to be conducted. Specifically, this study aimed to describe the management strategies and practices employed by HEIs in outsourcing and in-house development of the information systems currently used. All public and private HEIs with outsourced and in-house developed information systems on the island of Samar were subjected to the investigation. The results of this study could assist administrators in the decision-making process for an effective information system investment, as choosing either one of the methods of acquisition is not an easy decision.

LITERATURE REVIEW

Higher education institutions (HEIs) had to invest in Information Systems in order to achieve efficiency and improvement of internal administration. Zornada and Velkavrh (2015) exemplified the adoption of information systems into HEIs' internal administration by stating that the ERP systems for higher education were developed to provide support for key administrative and academic services. They specifically cited that the most important part of a system is primarily to support a minimal student administration (enrolment procedures and student enrolment, financial support for students, student data), human resource management (monitoring of employees) and finance (accounting, payments, investments, budget). Furthermore, these systems could include other programme add-ons such as assets management (contracts, subsidies, grants, etc.) or for monitoring student and developmental services of institutions.

In university management, Sagitova (2012) mentioned the significance of information systems in higher education. The author stated that systems serve to control the entire educational processes, which includes the activities of deans' offices and departments, a compilation of time tables, the introduction of changes into the list of staff the university members, etc. The statement of Sagitova regarding various uses of information systems in the education process was supported by Gunawardhana and Perera (2015), declaring that higher education institutions and universities around the world have developed Information Systems to manage academic, non-academic, and administrative processes. Accordingly, the major services supported by information systems in higher education include Student Lifecycle Management (SLM), Learning Management Systems (LMS), Human Resources (HR), Finance, Library Services, Student Information, Content Management System (CMS), University Portal (Chausi, Chausi, & Dika, 2013).

The Covid-19 pandemic has prompted higher education

to shift rapidly to virtual and digital strategies in teaching and learning. Pedagogical shift from traditional method to online modality of teaching-learning made significant transformations from classroom to Zoom, from personal to virtual, and from seminars to webinars (Mishra et al., 2020). In response to the global education crisis caused by the pandemic, the vast majority of higher education institutions worldwide consider online emergency remote teaching as one of the most effective teaching strategies employed (Karakose, 2021). In a study conducted by Garcia-Morales et al. (2021), it was revealed that the technologies most used to support teaching during the lockdown period were the university web platform; instant messaging tools (WhatsApp, Telegram); video-conferencing tools (Zoom, Skype, Google Hangouts, Google Meet); and educational apps (Google Classroom); combined with email and telephone conversations to maintain individualized contact with students. Meanwhile, another technology that played a significant role during the pandemic is the Learning Management System (LMS). Raza et al. (2021) indicated that the use of LMS during the COVID-19 pandemic was the need of the hour to continue the learning process. The premise of Raza et al. on LMS was supported by the findings of Alturki and Aldraiweesh (2021) which showed that the desire of students to use LMS had beneficial effects during the COVID-19 pandemic on learning as sustainability engagement.

The technologies and systems mentioned above could be the same technologies and systems that other HEIs in Samar may acquire either through in-house development or outsourcing. These technologies and systems are very much needed to sustain the teaching and learning activities during pandemic.

However, the acquisition of these information systems is one major decision to make and the real issue for organizations is to address what methodology is best for them. Brcar and Bukovec (2013) expressed further that arguments about whether to select outsourcing or in-house are of great importance in decision-making.

For a better understanding of outsourcing and in-house development of information systems, various literature that describes these two acquisition methods were cited. Outsourcing is delegating the function to companies with expertise in systems development (Dennis, 2015). It suggests that if a firm does not want to use its internal resources and build or operate information systems, it can outsource the work to an external organization that specializes in providing the services (Laudon & Laudon, 2014). In the context of this study, outsourcing means that HEIs hire an outside service provider that specializes in systems development. On the other hand, in-house development is the process whereby the company uses its own workers (in-house team) to develop or implement an IT system that fits the specific needs of the company. This process allows for the creation of a more customized system that can have an exact fit in the company (Setende, 2012).

Various theories and models which served as anchorage in the conceptualization of this study were considered. These theories and models provided further information on the management and practices of information systems for both in-house development and outsourcing acquisition methods.

In the context of information systems management, the present study considered the Software Project Management (SPM) by Futrell, Shafer and Shafer (2001), as cited by Shaikh and Ahsan (2015). The Software Project Management (SPM) is a specialization of general management studies that utilize the typical management skills of planning, organizing, staffing, leading or directing, and controlling to achieve defined project objectives. It encompasses the knowledge, techniques, and tools necessary to manage the development of software products (Kalaivani S. & Kavitha S., 2015).

The Transaction Cost Theory (TCT) developed by Williamson (1985) suggests that firms and individuals seek to economize on transaction costs, much as they do on production costs (Laudon & Laudon, 2012). This theory tries to establish the idea that an organization, like in the case of HEI, should consider the inclusion of all types of costs as these costs are equated to the overall cost of system development. TCT is an important theory applied in outsourcing for information systems.

The Unified Framework for Outsourcing Governance developed by Meng, He, Yang and Ji (2007), as cited by Garcia et al. (2013) is a model relevant to ICT outsourcing. This model presents a unified framework for the governance of outsourcing from the combined perspectives of the customer and the provider. The framework focuses on three areas: governance processes, the organizational structure of governance; and performance measurement.

Another model that is used to build a system is the Systems Development Life Cycle (SDLC) Model. The SDLC follows a set of four fundamental phases: 1) planning, 2) analysis, 2) design, and 4) implementation (Dennis, 2015). The SDLC is a common methodology for systems development in many organizations; the several phases featured in this mode mark the progress of the systems analysis and design effort (Valcich & George, 2017). The activities that are part of each phase in SDLC have become the bases for the identification of the management strategies and practices treated in the present study, especially in the in-house development method. All of the cited literature have brought an impact in the pursuit of this research and has provided direction to the present investigation.

MATERIALS AND METHODS

This study utilized the descriptive- method of research that investigated the management strategies and practices employed in in-house development and outsourcing of information systems by the HEIs on the island of Samar. The study included thirteen (13) HEIs on the Island of Samar that have existing information systems. These

HEIs were surveyed in terms of the management strategies and practices utilized in in-house development and outsourcing process of their information systems. In selecting the respondents from the identified HEIs, the total enumeration was employed since the study considered all personnel who had direct participation in the planning, acquisition/development, and implementation of the information system; hence, the respondents considered in the study were the IT Department Head/MIS Director and staff, and users.

The study employed data gathering tools and techniques such as questionnaires and interviews. The items in the questionnaire were developed from the information obtained from the literature review about management strategies and practices for in-house development and outsourcing of information systems. Prior to fielding, the questionnaire was validated through a pilot survey/dry-run to the selected HEIs that was not part of the actual investigation, that is, in the island of Leyte. On the other hand, the interview technique was used in order to validate and enrich the data gathered from the questionnaire. The data gathered from the questionnaires were statistically treated and interpreted through frequency, percentage, ranking, and weighted mean.

RESULTS AND DISCUSSION

Profile of HEIs

The profile of HEIs in terms of current IS utilization showed that students' enrollment and records management, finance and accounting management, and payroll processing ranked 1, 2, and 3, respectively. On the mode of IS project acquisition, 7 (53.85%) out of 13 HEIs surveyed acquired their information systems via outsourcing and 6 (46.15%) acquired through in-house development. Regarding IS implementation duration, the majority of the HEIs 8 (61.54%) had been implementing their information systems for 5 years. Furthermore, there were 6 (46.20 percent) HEIs whose information systems had a budget allocation of Php1,000,000 and below. Nevertheless, some HEIs did not disclose the allocated budget of their information systems due to confidentiality and difficulty in determining the exact amount.

On the IS management structure, 10 (76.92%) of the HEIs had at most 2 personnel who manage the system. Moreover, in most of the HEIs 11 (84.60%) have qualified head and personnel and 5 (38.46 percent) have an organizational structure of the office that manages the information system.

As regards to activities that support the operation of the information system, it showed that the top 3 activities for outsourced information systems were the on-going technical support such as the warranty and enhancement, communication between the service provider and HEI, and training and orientation on the use of the system. For in-house developed systems, the top 5 activities were the on-going technical support like maintenance and enhancement, monitoring and evaluation of cost, assessment of problems and risks, assessment of the

performance of the developed system, and debugging of the developed system.

Management strategies utilized by HEIs for in-house development and outsourcing

Table 1 shows the results of the survey on management strategies utilized by HEIs that opted for in-house development of information systems projects. As depicted in the table, all management strategies are highly implemented. Among these strategies, directing has earned the highest weighted mean of 3.71, while planning has earned the lowest weighted mean of 3.64. The result implies that in in-house development, directing is well performed because it is in this area where all the preparations and technical activities need to be executed, particularly in the assigning of qualified and skilled staff. However, directing needs to be strengthened to achieve a complete implementation. Along this line, there is a need to strengthen the provision of deloading, honorarium, service credit and other forms of compensation to the members of the development team. On the other hand, the planning strategy requires more enforcement, thus sufficient knowledge in planning for in-house development is suggested, especially in the areas of budget allocation and monitoring and evaluation of systems development activities. However, the preparation of technical resources such as hardware and software is highly considered by HEIs during the planning stage. In general, the grand mean 3.67 conveys that the management strategies in in-house development of information systems are well employed but need more enforcement to achieve full implementation.

In an interview conducted among the respondents, significant information relative to management strategies utilized by HEIs for in-house development of information systems was noted. In planning for the development of the system, consultation and interview with users from different offices and colleges as well as assessment of the status of the current systems are considered. An MIS Head revealed that they prepared a one (1) year timetable for system development. Other areas considered in planning were the source and allocation of the fund, layout of

the network, request for computers, and monitoring and suggestions for enhancement from end-users. For smaller private HEIs, they considered in their plan of adopting students' projects for implementation due to limited budget in building the system. Organizing activities were also evident during the interview, such as the formulation of the development team (mostly composed of IT faculty) and the creation of an office memorandum from the President that outlines administrative tasks in building the system. Moreover, several types of equipment and other technical requirements were requested for purchase. The ICT/IT Department of HEI was commissioned to take charge of all the tasks in systems development. One respondent mentioned that OJTs and student assistants were deployed to help accommodate user requests. On directing, members of the development team would perform their duties as indicated in the Special Order (SO) issued by the University President. They would prepare Purchase Order for the procurement of the needed equipment while the MIS Head supervised the activities assigned to each member of the team. The President would then issue an office order that would allow access on records and other information needed in building the system. The designated ICT Director availed deloading of 9 hours a week in his teaching assignments so he could give priority to his duties and functions. Members of the development team could work overtime with compensation. On controlling, HEIs would ensure that school policies were embedded in the design of the system. The development team is given total control over the system, particularly on backup recovery, weekly system checkups, and updating. The monitoring and evaluation was also evident. A certain HEI would use the timetable to identify the completed activities based on targets. Unfortunately, some HEIs did not have a regular monitoring and evaluation scheme; thus, they would only rely on observations and act upon the occurrence of problems.

Table 2 shows the results of the survey on management strategies utilized by Higher Education Institutions for the outsourcing of information system projects. As shown in the table, all the management strategies are highly implemented. Among the management strategies, directing has earned the highest weighted mean of 3.87, while monitoring and evaluation have earned the lowest weighted mean of 3.56. The results indicate that directing strategy is given more emphasis over the other strategies since it involves a lot of activities, both technical and non-technical, which could determine the effectiveness and desired functionalities of the outsourced information systems. With this, assigning of tasks to staff with knowledge and skills in outsourcing activities was found to be the most and commonly applied strategy among HEIs. However, said directing strategy needs to be strictly enforced, especially on supervising of activities performed by the service provider and communicating relevant information to the concerned staff. On the other hand, the monitoring and evaluation need a tighter

Table 1: Summary of Management Strategies Utilized by Higher Education Institutions for In-House Development of Information System Projects

Management Strategies	Mean	Interpretation
Planning	3.64	HI
Organizing	3.70	HI
Directing	3.71	HI
Controlling	3.69	HI
Monitoring and Evaluation	3.66	HI
Overall	3.67	HI

Legend:

4.51 – 5.00	Fully Implemented (FI)
3.51 – 4.50	Highly Implemented (HI)
2.51 – 3.50	Moderately Implemented (MI)
1.51 – 2.50	Slightly Implemented (SI)
1.00 – 1.50	Not Implemented (NI)

Table 2: Summary of Management Strategies Utilized by Higher Education Institutions for Outsourcing of Information System Projects

Management Strategies	Mean	Interpretation
Planning	3.63	HI
Organizing	3.68	HI
Directing	3.87	HI
Controlling	3.66	HI
Monitoring and Evaluation	3.56	HI
Overall	3.67	HI

Legend:

4.51 – 5.00	Fully Implemented (FI)
3.51 – 4.50	Highly Implemented (HI)
2.51 – 3.50	Moderately Implemented (MI)
1.51 – 2.50	Slightly Implemented (SI)
1.00 – 1.50	Not Implemented (NI)

application to determine that the system is tracked in terms of progress and performance. The result of the survey showed that Project Monitoring Committee (PMC) would conduct on-site visits but said the visit is not completely done because the service providers are not available all the time available to perform the monitoring. In general, the overall mean of 3.67 implies that management strategies employed in outsourcing of information systems are conducted well but require a more intensive application to achieve full implementation. In the interview, it was disclosed that the plan to outsource the system was considered by some HEIs due to the need of immediate completion of the system. This was supported by a particular respondent stating, “In-house development was not considered due to doubts in the commitment and availability of the IT personnel who will develop the system.” Also included in the planning were the approved plan for the collection of development fees from the students, consultation with concerned HEI’s IT personnel, consultation regarding the design of the system, and use of the standard template for the creation of an Information Systems Strategic Plan (ISSP). In some private HEIs, planning activities were done by the administrators themselves only – no involvement of IT personnel, IT faculty and other users. On organizing, HEIs would set a time frame for the development of the system. Another HEI created the Project Monitoring Committee (PMC) tasked to monitor all transactions made between HEI and the service provider. Orientation and training for the use of an outsourced system was also conducted. Distribution of tasks among the members of the team involved in outsourcing was evident as well. The MIS Office was tasked to carry out consultation with the software developer on problems encountered and other related concerns. Request for high-end computers was also made as part of organizing information system outsourcing. On directing, the members of the PMC frequently communicated with the users to address their needs and problems with the module they used. The PMC, too, would prepare a report about their observations on the modules and submit the same to the

service provider for immediate action. In other HEIs, the MIS personnel would immediately execute actions that would address problems encountered by the users. The controlling strategies are done by HEIs by means of checking the design of the system made by the software developer to determine if the design conforms to user requirements and checking the activities against the existing policies on system use. But to some HEIs, executing controlling activities was a problem due to being understaffed. Likewise, other private HEIs, at some point, would become totally dependent to their contracted software developers due to the absence of an IT/MIS office in their school. Most of the HEIs had no established monitoring and evaluation mechanism, like a scheduled or regular evaluation of the system and other related activities. There was no evaluation instrument used to determine the status of outsourcing activities and the performance of the outsourced system. When a problem occurs, HEIs would normally report to the service provider for upgrading, maintenance, and other related services. In one HEI, the PMC would do hands-on testing and follow-ups to ensure that the outsourced system performs accordingly.

Practices of in-house development and outsourcing of Information System Projects of HEIs

Table 3 presents a summary of practices of in-house development of information system projects of Higher Education Institutions. The findings showed that all the practices are often practiced. Among the practices, documentation and risk management have earned the highest weighted mean of 3.71, while cost management has earned the lowest weighted mean of 3.58. The results imply that recording of related activities in in-house development is performed but not consistently done, hence problems on records and documents may likely to occur often. Among the documentation activities, recording of the changes in the system requirements and developing user documentation showing users how to use the system was the least practiced among documentation

Table 3: Summary Practices of In-House Development of Information System Projects of Higher Education Institutions

Practices	Mean	Interpretation
Requirements Determination	3.65	OP
Implementation	3.69	OP
Documentation	3.71	OP
Assessment	3.62	OP
Cost Management	3.58	OP
Risk Management	3.71	OP
Grand Mean	3.64	OP

Legend:

4.51 – 5.00	Always Practiced (AP)
3.51 – 4.50	Often Practiced (OP)
2.51 – 3.50	Sometimes Practiced (SP)
1.51 – 2.50	Rarely Practiced (RP)
1.00 – 1.50	Not Practiced (NP)

activities in-house development. However, most of the HEIs do recording of every completed task of systems development. On risk management, most of the HEIs would ensure that only authorized personnel would perform systems development activities while evaluating the delivered I.T. infrastructures by vendors and suppliers was the least that is being practiced since most of the in-house developed systems are not complex systems that require additional equipment and simply use existing resources like computer units in the development of the system. On the other hand, cost management earned the lowest weighted mean due to the reason that in in-house development, the cost could not be easily determined. In some private, HEIs cost management is done by the administration alone, not involving the employees. Specifically, there is a need to put emphasis more on the allocation of the overall cost estimate to individual work items in order to establish a baseline for measuring performance. The grand mean 3.64 conveys that all the practices employed in in-house development need consistent execution in order to achieve a more effective in-house development.

The responses gathered from the interview revealed that HEIs would observe standards in determining the requirements of the system being developed. These activities include conducting the interview, studied sample reports, reviewed school policies, and examined business models like determining the maximum student load, pre-requisites, cross-enrollment, and payment. The development of the system is normally facilitated by a group of IT Faculty or a development team that would do the coding/programming. The developed system is installed in the actual site and tested with actual data. A system documentation is prepared and a post-deployment support such as maintenance and enhancement is performed. In one HEI, coding and installation are done by-system or by-module. A training on how to use the system is conducted to the users and it is done by-office. There were assigned technicians who would fix the technical problems. Logs that contained records of changes/revisions in the program were maintained. The system is equipped with a back-up and utilities. User requests were ensured that they are in accordance with school policies. Some smaller private HEIs would implement their information systems that were originally developed by the students as thesis or project; this scenario occur due to insufficient budget to fund for IT projects. On documentation, the documentation of the system is kept by the programmers for reference purposes. In one HEI, users would prefer on-call option since it would result to immediate action rather than reading instructions found in the documentation or user manual. One of the private HEIs have no user manual but have the copy of the system installed in CD. For some HEIs that did not practice proper documentation, the changes and activities are done verbally. With regard to assessment, most of the HEIs do not regularly practice assessment procedures. In one particular HEI, its MIS

Head articulated that no regular assessment was not conducted since they had not experienced any technical problem; most of the problems they experienced were not that serious and were user-related problems only like the errors in data entry. A real-time response to the problem is also practiced. Another MIS staff mentioned assessment was conducted need arises only. Except for one HEI would conduct assessment on the status of the developed system before start of classes, before midterm and after the semester and perform immediate action on the results of the assessment. Regarding cost management, a certain HEI said that all requests for the equipment needed in the development and maintenance of the system were submitted to the Office of the President. The development team would ensure that the equipment to be purchased were cost-effective, like acquiring thin-client setup instead of individuals CPUs as articulated by the MIS Director. Another HEI cited that determining the cost was based on request to ensure appropriate budget allocation, like upgrading of the server and network of infrastructure. Other private HEIs practiced cost management but not as effective or established as the SUC-HEIs. Risk management is likewise practiced as evidently shared by a certain HEI which adopted security mechanisms like ensuring that anybody connected to the network is authorized and recognized. As affirmed by the MIS Director, a request is needed before any users be permitted to access the system through the network and that only authorized school computers were used in information processing or copying of programs using the users' accounts. Moreover, all programs were disabled from the MIS office whenever revisions or new versions of the program would be made.

Table 4 presents the summary of practices for outsourcing of information system projects of HEIs. It can be gleaned from the table that all practices are often practiced, except for cost management which is sometimes practiced as evidenced by its weighted mean of 3.38. Among the practices, implementation has earned the highest weighted mean of 3.82. The results indicate that HEIs practice cost management in outsourcing needs to be executed at all times, particularly on reviewing the terms and conditions found in the contract in order to evaluate the cost. Though the conduct of financial planning to determine realistic cost of outsourcing is practiced by HEIs, it still needs to be strengthened. Furthermore, implementation strategy is performed but it requires constant execution considering that such strategy includes many tasks that are highly technical in nature and requires enormous time. Along this line, there is a need of enforcing service provider to install the developed system in the actual site. Based from the gathered information during interview, it was found out that requirements determination are practiced according to standards like consultation with users about their needs. The software provider would examine current forms and reports used by HEIs such as enrollment forms, vouchers, receipts, subject loads, and reports for submission to the Commission on Higher

Table 4: Summary of Practices of Outsourcing of Information System Projects of Higher Education Institutions

Practices	Mean	Interpretation
Requirements Determination	3.67	OP
Implementation	3.82	OP
Documentation	3.68	OP
Assessment	3.54	OP
Cost Management	3.38	SP
Risk Management	3.53	OP
Grand Mean	3.59	OP

Legend:

4.51 – 5.00	Always Practiced (AP)
3.51 – 4.50	Often Practiced (OP)
2.51 – 3.50	Sometimes Practiced (SP)
1.51 – 2.50	Rarely Practiced (RP)
1.00 – 1.50	Not Practiced (NP)

Education (CHED). Moreover, the outputs of the system are determined in order to achieve its expected functionality. Most of the HEIs practiced direct implementation approach wherein the operation of the old systems was stopped completely and the new outsourced system was put immediately into use. The outsourced system was installed and tested to ensure that its modules/components would perform properly. A particular HEI even conducted mock enrollment to determine the difference between the manual and the newly developed outsourced system and assess the functionalities of the new system like the generation of reports. A user orientation is conducted by the software provider. In cases that software developer is not on-site, HEI's IT personnel would do the installation but with the guidance of the developer/provider. In some cases, the provider would deploy personnel to HEI to do upgrading. It is also ensured that the warranty for the software product would be strictly observed by the provider. A technical support, as shared by the ICTC Director, was provided by the software provider during the first two years as indicated in the contract. A post-implementation services is also practiced like checking the system free of charges by the software provider. As to documentation, changes/revisions in the modules were documented. The user manual is normally provided by the service provider. One of the private HEIs would report the problems observed by its users to the service provider via e-mail or Facebook. Assessment on the system's performance is practiced in one particular HEI through conduct of on-site visits by its MIS personnel or PMC members to identify the problems that the end-users observed. A report on problems that have been identified is submitted by the PMC to the service provider with copy furnished to the President. On cost management, the MIS Director of one of the HEIs revealed that the initial cost of system implementation is charged to the service provider, while the additional cost due to expansion and additional equipment is charged to the University already; this kind of arrangement is provided

in the contract. But for one private HEIs, arrangements relative to cost takes place school administrators and the service provider only; hence, no involvement from the MIS personnel. In terms of risk management, HEIs would focus more in the operation of the system or technical aspect like conduct storage back-up, off-site back-up, and checking the connectivity and functionality of the system. The MIS Director in one of the HEIs mentioned that they would check the system's functionality prior to the acceptance of the system from the software developer. For security measures, authentication procedure is done so that only authorized or registered personnel can have access and be given rights to the use of the system. The users would submit a report to the assigned IT personnel on the problems met for repair. In other HEIs, Internet connection, USB devices are disabled to avoid viruses. As suggested by the staff, an MIS office should be established and become part of the organizational structure so that risk management can be effectively performed.

CONCLUSION

The management strategies and practices of in-house development and outsourcing of information systems were highly implemented and often practiced, respectively. This result is an indication that HEIs execute management strategies and practices at the same level or degree, regardless of the choice of information system acquisition method. Most of their indicators are common to both acquisition methods such as the creation of a development team, conduct of interviews to users, and conduct of training on the use of the systems for users, among others. Having the highest mean among the cited management strategies, directing has been emphasized in both acquisition methods since a large volume of technical and non-technical tasks are required and carried out. On the other hand, cost management has been considered the lowest among the practices performed by both acquisition methods since unforeseen expenses affect efficient cost management in the acquisition of information systems. Based on the aforementioned findings, it is suggested that the management strategies and practices which are employed for in-house development and outsourcing of information systems should be completely implemented, firmly enforced, and practiced at all times by HEIs in order to acquire and utilize a reliable and secure information system. Regardless of the acquisition method, administrators of HEIs should consider strategic planning and decision-making before any information system is acquired so that issues in systems acquisition and development can be addressed and therefore, implement an information system that fits the needs of the HEI. Furthermore, it is suggested that further research can be done in order to address the areas which have not been considered in this research.

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