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# Functionality Performance of Information Systems in Higher Education Institutions

**Rodolfo F. Dollado, Jr.**[1]

[1]Northwest Samar State University, Calbayog City, Samar, Philippines
Email: [1]rodolfo.dolladojr@nwssu.edu.ph

**Abstract**

The goal of this research was to evaluate the performance of information systems in terms of functionality of the in-house developed and outsourced information systems of Higher Education Institutions (HEIs) on the Island of Samar, Philippines. A descriptive research design was used in order to obtain information on the performance of the information systems in terms of functionality. The technique employed for data collection was physical evaluation using an observation sheet. A total of thirteen (13) information systems were subjected to performance evaluation as there were thirteen HEIs from the different provinces of Samar Island that participated in the study. The overall results showed that the outsourced systems had better performance in terms of functionality since most of the indicators were completely existing and functional. On the other hand, the in-house systems have performed fairly with regard to the required features and functionalities of the system. The results of the study suggest that HEIs should acquire information systems that are completely functional, regardless of what acquisition method is adopted. Having information systems equipped with the required functionality features, the administrative and academic functions of HEIs are effectively and efficiently delivered.

**Keywords**: Information Systems, Information Systems Performance, Higher Education Institutions, HEI, Outsourced Information Systems, In-House Information Systems

## 1. INTRODUCTION

One of the most important components of today's business environment is information systems [1]. The acquisition and implementation of information systems in organizations have made significant transformations in the way business activities and practices are done. Many organizations have acquired information systems with the goal of achieving operational efficiency. With such capability, information systems indeed contribute to the effectiveness of doing business, thereby increasing productivity.

In Higher Education, the use of technology in learning systems in higher education institutions has been on the rise in the last few years [2]. Higher Education

Institutions (HEIs) are in the process of designing appropriate information systems (IS) to ensure sustainable development in order to adapt to changes [3]. Along this line, Alrawashdeh et al. [4] mentioned that the growth of Information Systems (IS) has a significant role in improving higher education institutions' operations. Gupta et al. [5] stated that the Information Systems (IS) have become an essential resource and component of any progressive university and assume a great role for all the stakeholders. For instance, the use of a Management Information System (MIS) in higher education helps teachers, researchers, and administrators by automating and controlling the entire educational process [6].

The aforementioned role in improving the operations of HEIs is an indication that information systems have become important tools used to perform the academic and administrative operations in higher education institutions. The information systems that are implemented in HEIs vary according to their purpose. These information systems allow for better data sharing and collaboration amongst departments within the educational institution [2]. Likewise, the ability of information systems to collect, process, distribute, and share data in an integrated and timely manner provides businesses with tremendous opportunities for success [1].

The preceding characteristics and the benefits that information systems provide suggest that it is therefore essential for the HEIs to look into the performance of the acquired systems. According to Purnama et al. [7], Information Systems / Information Technology (IS/IT) performance measurement requires specific consideration because it is likely to bring significant benefits to the business. Because most firms today rely on their information systems, measuring performance and efficiency in computer science has gained growing importance [8]. The dependency of the organizations on their information systems has made the performance evaluation of the acquired systems more significant and at the same time a critical issue. While information systems are seen as a useful tool that supports the management decisions of HEIs, there were many cases that reported the problems and issues relative to the performance of such systems. Abidin and Mansor [9] had made an affirmation about the issues in information systems' performance by stating that some information systems continue to encounter concerns such as sluggish response times, accessibility issues, and hardware/software compatibility issues. With these issues, evaluation of information systems is imperative.

In evaluating an information system's performance, the functionality of the system is a major concern. Functionality is defined as the ability of software to offer functions that meet the stated and implicit needs of users under specified conditions of usage [10][4]. The major goal of evaluating an IS's functionality is to improve its overall performance, particularly in terms of maintenance quality [11]. In the study of Vargas et al. [12], it was revealed that functionality (33%) was

regarded as the top reason why information systems fail, followed by missed schedule (32%), quality (21%), and cost (14%). The data revealed by Vargas et al. is a confirmation that the functionality of the information system is indeed critical and that it needs to be evaluated in order to determine if the system still supports the business. Evaluating the functionality of the systems is imperative so that the embedded set of functions in the systems can be gauged as to how they could satisfy the needs of the users and of the organizations like HEIs in general.

The functionality of information systems can be measured using a set of criteria. One important criterion is access controls. Unauthorized individuals are prevented from accessing information resources by access controls, which are implemented utilizing two key functions: authentication and authorization [13]. The objective of data access control in an information system is to limit the actions or processes that users of the system can perform [14]. Another important criterion is security. According to Boiko and Shendryk [15], in recent years, the incidence of illegal actions in information systems (IS) has steadily increased, resulting in massive financial and material losses. Furthermore, information system security is linked to access control as it is one of its components [14]. The interoperability of the information systems is also an important consideration. Salleh et al. [16] described functionality interoperability as the capacity of a system to interact with other systems without requiring additional actions from the user. All the aforementioned criteria are just a few that have been considered in this research.

While there were several studies that reported the advantages of acquiring information systems, unfortunately, there is not enough research that focused on the evaluation of performance in terms of functionality of the information systems acquired by HEIs on the Island of Samar. For this reason, this study has been undertaken. The primary goal of this study is to evaluate the functionality of the information systems of higher education institutions in Samar, regardless the systems were acquired or developed in-house or outsourced. The results of this study could assist administrators of HEIs in the decision-making process for effective investment in information systems regardless of the acquisition method applied, whether the systems will be locally developed (in-house) or outsourced.

## 2. METHODS

This study used a descriptive research design that aimed to obtain information on the functionality of the information systems acquired by HEIs in Samar Island, Philippines. The study included thirteen (13) HEIs which consisted of State Universities and Colleges (SUCs) and private HEIs with in-house developed and outsourced information systems. The HEIs that participated in the study come from the three (3) different provinces of Samar Island, namely, Western Samar, Eastern Samar, and Northern Samar.

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The primary data gathering technique employed in collecting data was physical evaluation which utilized an observation sheet. The observation sheet contained criteria that were used to observe the behavior and determine how the systems performed according to the set of criteria. The performance evaluation focused on the functionality of the systems which were measured in terms of the following criteria: 1) access; 2) data entry and create records; 3) search and retrieve records; 4) records processing; 5) edit and update records; 6) delete records; 7) report generation; 8) interoperability; 9) error prevention and control; and 10) security. The observation sheet was used side-by-side with observation and demonstration. Prior to its actual use, the observation sheet was subjected to expert validation in order to evaluate how each indicator is relevant to measuring the performance of the information systems. The initial version of the observation sheet was presented to a group of IT faculty of the Northwest Samar State University in Calbayog City. Each of the experts made his/her corrections and suggestions to further improve the items in the observation sheet, including clarity and conciseness of the items. After several stages of revisions, the final copy of the observation sheet was prepared and finalized for fielding. The items in the observation sheet were based on the reviewed literature on systems performance.

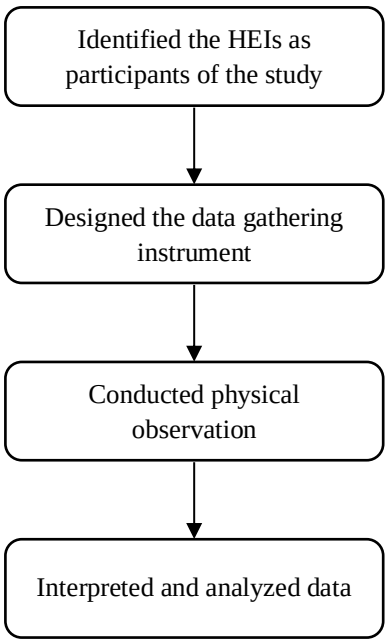


**Figure 1.** The Research Process Flowchart

The actual conduct of the study observed a set of activities. These activities are shown in the research process flowchart illustrated in Figure 1. Initially, the

researcher had made a request to the Commission on Higher Education Regional Office VIII (CHEDRO8) for the list of HEIs operating in the region. The list was used to determine which HEI should be considered as participants in the study. After determining the HEIs, the researcher designed the data gathering instrument, an observation sheet. This instrument was subjected to expert validation and had undergone several stages of revisions based on the comments and recommendations of the experts. The final and improved version of the instrument was used during the actual physical observation in determining the performance of the information systems. After the physical observation has been completed, the data were interpreted and analyzed. The analyzed data had become the basis for documenting the results of the study.

## 3. RESULTS AND DISCUSSION

### 3.1 Access

Table 1 displays the results of the performance of information systems of HEIs in terms of access. It can be gleaned from the table that 100% of information systems could completely allow login using username and password and display an error message for invalid access. These indicators were very much evident because they are basic functions in any information system in terms of access to data and information, regardless if the system is in-house developed or outsourced. On allowing remote access, there were 67% of the in-house and 71% of the outsourced systems could perform the said indicator. Surprisingly, 0% or none of the in-house developed systems would allow login through a device, while 14% of the outsourced systems exhibited the said task. This could mean that the use of a device like a scanner for access to the system is a feature that was not originally considered in the design of most of the information systems acquired by HEIs. On the provision of password recovery, 83% of in-house and 71% of outsourced could demonstrate the said indicator. Moreover, there were the same results in the provisions of a username and password modification and efficient login activity from in-house and outsourced with 83% and 100%, respectively. Looking at the figures in the table, it could mean that the outsourced information systems acquired by HEIs are more functional in terms of access since the majority of them have demonstrated the indicators, except for allowing users to log in using a device.

It was further revealed that other systems allowed sharing of accounts in order to access the system. However, it was mentioned by a certain IT personnel that access to the system becomes a problem during a server failure. Some systems used

backdoor access when a login becomes an error. Other systems were designed as stand-alone systems so that access to remote data cannot be made. Furthermore, the outsourced systems were efficient with respect to access. It only takes a few seconds to log in and process the entered username and password.

**Table 1.** Functionality performance of information systems of Higher Education Institutions in terms of access

| Indicator | In-House | | | | Outsource | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | | No | | Yes | | No | |
| | f | % | f | % | f | % | f | % |
| Login with username and password | 6 | 100 | 0 | 0 | 7 | 100 | 0 | 0 |
| Display error message for invalid access | 6 | 100 | 0 | 0 | 7 | 100 | 0 | 0 |
| Allow remote access | 4 | 67 | 2 | 33 | 5 | 71 | 2 | 29 |
| Allow log-in through a device | 0 | 0 | 6 | 100 | 1 | 14 | 6 | 86 |
| Provide password recovery | 5 | 83 | 1 | 17 | 5 | 71 | 2 | 29 |
| Provide username and password modification | 5 | 83 | 1 | 17 | 7 | 100 | 0 | 0 |
| Efficient login activity | 5 | 83 | 1 | 17 | 7 | 100 | 0 | 0 |

### 3.2 Data entry and creating records

Table 2 shows the results of the evaluation of the systems with respect to data entry and creating records. The data revealed that 100% of the in-house and outsourced information systems could provide input verification and control, use efficient input methods such as radio buttons, checkboxes, and dropdown, provide default values, display error and feedback messages for wrong entries, and display a confirmation message to save records. For the rest of the indicators, the results vary. On showing a logical sequence of data entry and providing auto-format data entry, both groups of systems have the same performance in the two indicators with 83% from in-house and 100% from outsourced systems. With regard to accepting data from devices like barcodes and biometrics, only 17% from in-house while 86% from outsourced systems have demonstrated the said task. Furthermore, 67% from in-house and 71% from outsourced systems could import files from other sources, e.g. Excel files, exhibited said indicator. The general assessment implies that outsourced information systems had a better performance having exhibited seven of the ten indicators on data entry and creating records criterion; outsourced systems have a more effective and efficient data entry and record creation mechanism.

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**Table 2.** Functionality performance of information systems of Higher Education Institutions in terms of data entry and creating records

| Indicator | In-House | | | | Outsource | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | | No | | Yes | | No | |
| | f | % | f | % | f | % | f | % |
| Show logical sequence of data entry | 5 | 83 | 1 | 17 | 7 | 100 | 0 | 0 |
| Provide input verification and control | 6 | 100 | 0 | 0 | 7 | 100 | 0 | 0 |
| Provide auto-format data entry | 5 | 83 | 1 | 17 | 7 | 100 | 0 | 0 |
| Use efficient input methods such as radio buttons, checkboxes, & dropdown | 6 | 100 | 0 | 0 | 7 | 100 | 0 | 0 |
| Provide default values | 6 | 100 | 0 | 0 | 7 | 100 | 0 | 0 |
| Display error and feedback messages for wrong entry | 6 | 100 | 0 | 0 | 7 | 100 | 0 | 0 |
| Display confirmation message to save records | 6 | 100 | 0 | 0 | 7 | 100 | 0 | 0 |
| Accept data from devices like barcode, biometric, etc. | 1 | 17 | 5 | 83 | 6 | 86 | 1 | 14 |
| Import files from other sources, e.g. Excel file | 4 | 67 | 2 | 33 | 5 | 71 | 2 | 29 |

### 3.3 Searching and retrieving records

Table 3 reveals the results of the evaluation of the searching and retrieving records. Looking at the figures, 100% of the in-house and outsourced systems have demonstrated the search with subject categories and efficient search and retrieval of records. On search based on a combination of subject categories within a single query, 33% from in-house and 86% from outsourced have exhibited the said indicator. With regard to the display of searched records in order, like ascending order, there were 83% of in-house and 100% of outsourced systems have displayed the said indicator. Meanwhile, there were 0% and 43% from in-house and outsourced systems, respectively, on search records using devices. Having a lower percentage of searching for records using a device, it implies that most of the information systems acquired by HEIs did not use external devices that could be used in searching and retrieval of records. From the data presented in the table, it could be inferred that outsourced information systems were more functional in terms of search and retrieve records since most of the indicators were evident during the physical evaluation.

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**Table 3.** Functionality performance of information systems of Higher Education Institutions in terms of searching and retrieving records

| Indicator | In-House | | | | Outsource | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | | No | | Yes | | No | |
| | f | % | f | % | f | % | f | % |
| Search with subject categories, e.g. number, lastname, firstname, etc. | 6 | 100 | 0 | 0 | 7 | 100 | 0 | 0 |
| Search based on a combination of subject categories within a single query | 2 | 33 | 4 | 67 | 6 | 86 | 1 | 14 |
| Searched records are displayed in order, e.g. ascending | 5 | 83 | 1 | 17 | 7 | 100 | 0 | 0 |
| Search records using devices | 0 | 0 | 6 | 100 | 3 | 43 | 4 | 57 |
| Efficient search & retrieval of records | 6 | 100 | 0 | 0 | 7 | 100 | 0 | 0 |

### 3.4 Records processing

In Table 4, the results of the evaluation in terms of records processing are presented. Based on the table, the two groups of information systems vary only on that indicator which requires that the output can be exported to other file types, like PDF with 67% and 71% from in-house and outsourced, respectively. For the rest of the indicators, there were 83% from in-house and 100% from outsourced on performing query/search, update, delete, and report generation, generating accurate output, maintaining logs for processed records, and efficient records processing. The results evidently show that outsourced systems were more functional in terms of records processing having performed four of the five indicators of records processing tasks.

The evaluation of the performance further revealed that some of the in-house developed systems could extract data needed in the preparation of the reports for submission to the Commission on Higher Education (CHED), Department of Budget and Management (DBM), and other external agencies. However, some in-house developed systems demonstrate inefficient processing by not generating a report, wrong computation of fees, and absence of logs for every transaction. Oftentimes, a back-door is done in editing/updating of records and also requires a thorough checking after editing/updating of records.

For the outsourced systems, records processing is affected by some problems which are normally beyond control. Along this line, the MIS Director of a particular SUC exemplified the user factor as one of the causes of problems. He cited that users sometimes would enter misspelled data and so correcting the spelling of those data would cause a significant delay in the processing time. The outsourced systems also maintain logs for the processed records, but others maintain only the latest processed records and so previous processed records could not be seen already in the system so that problems in records processing are hardly traced.

**Table 4.** Functionality performance of information systems of Higher Education Institutions in terms of records processing

| Indicator | In-House | | | | Outsource | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | | No | | Yes | | No | |
| | f | % | f | % | f | % | f | % |
| Perform query/search, update, delete, and report generation | 5 | 83 | 1 | 17 | 7 | 100 | 0 | 0 |
| Generate accurate output | 5 | 83 | 1 | 17 | 7 | 100 | 0 | 0 |
| Output can be exported to other file types, e.g. PDF | 4 | 67 | 2 | 33 | 5 | 71 | 2 | 29 |
| Maintain logs for processed records | 5 | 83 | 1 | 17 | 7 | 100 | 0 | 0 |
| Efficient records processing | 5 | 83 | 1 | 17 | 7 | 100 | 0 | 0 |

### 3.5 Editing and updating records

Table 5 displays the data on the performance of outsourced information systems of HEIs with respect to editing and updating records. The data revealed that all the indicators were 100% exhibited by the outsourced systems. For in-house, 100% of the systems could display a confirmation message to edit/update records and makes the database updated when a record is edited/updated, 83% could perform edit/update by an authorized user only, and 67% could maintain logs for edited/updated records. The results clearly show that outsourced systems have a better performance having shown all the tasks of editing and updating records. This could further mean that managing records is more effective in outsourced systems. During the physical evaluation, the logs maintained by outsourced systems would completely show the latest edited or updated record made by the user every time he or she would make updating activities or use the system.

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**Table 5.** Functionality performance of information systems of Higher Education Institutions in terms of editing and updating records

| Indicator | In-House | | | | Outsource | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | | No | | Yes | | No | |
| | f | % | f | % | f | % | f | % |
| Only authorized user can edit/update | 5 | 83 | 1 | 17 | 7 | 100 | 0 | 0 |
| Display confirmation message to edit/update | 6 | 100 | 0 | 0 | 7 | 100 | 0 | 0 |
| Database is updated when record is edited/updated | 6 | 100 | 0 | 0 | 7 | 100 | 0 | 0 |
| Maintain logs for edited/updated records | 4 | 67 | 2 | 33 | 7 | 100 | 0 | 0 |

### 3.6 Deleting records

In Table 6, the results of the evaluation on deleting records are revealed. As displayed in the table, all of the indicators were 100% exhibited by the outsourced information systems. On the other hand, the results for in-house vary with 50% for displaying a confirmation message to delete a record, 17% for removing a record based on user request, 33% for a database is updated when a record is deleted, 17% for only authorized user can delete record, and 33% for maintaining logs for deleted records. In this case, outsourced systems were completely functional in terms of deleting records; hence incorrect information can be easily mitigated.

Moreover, it was further shown that some of the in-house developed systems did not allow deleting records; instead, records were canceled or deactivated only. The interoperability of these systems was demonstrated through the use of network infrastructures such as Wi-Fi and wired network. Also, other in-house developed systems did not provide user-type access and so deleting of records can be done by any unauthorized staff. On the other hand, most outsourced systems could not delete records because the records are normally not deleted for reference purposes. The non-deletion of records was demonstrated by an MIS staff by indicating "inactive" or "active" options only instead of removing the records permanently from the database. This case has been further exemplified in the case of "back out enrollees" or "transfer of school". This feature of the system is useful also in accommodating a student again after years of absence.

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**Table 6.** Functionality performance of information systems of Higher Education Institutions in terms of deleting records

| Indicator | In-House | | | | Outsource | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | | No | | Yes | | No | |
| | f | % | f | % | f | % | f | % |
| Display confirmation message to delete record | 3 | 50 | 3 | 50 | 7 | 100 | 0 | 0 |
| Remove record based on user request | 1 | 17 | 5 | 83 | 7 | 100 | 0 | 0 |
| Database is updated when record is deleted | 2 | 33 | 4 | 67 | 7 | 100 | 0 | 0 |
| Only authorized user can delete record | 1 | 17 | 5 | 83 | 7 | 100 | 0 | 0 |
| Maintain logs for deleted records | 2 | 33 | 4 | 67 | 7 | 100 | 0 | 0 |

### 3.7 Report generation

Table 7 shows the performance of in-house and outsourced information systems of HEIs in terms of report generation. The data showed that all or 100% of the outsourced systems performed all the indicators of report generation. Meanwhile, there was a variation in the performance from in-house systems as indicated by the following results: 100% for print reports based on a specific query, 67% for providing print logs/activity logs, and 83% for print reports based on user need, print reports in a specified format, efficient generation of reports, and only authorized users can generate a report. The results indicate that outsourced systems are totally functional with respect to the generation of reports and so computer-generated reports are easily provided to support decision-making.

The results of the evaluation on report generation further showed that some in-house developed systems could extract data for report submission to CHED, DBM, and other external agencies. Other in-house developed systems have no monitoring for each system activity. On the other hand, the outsourced systems similarly generate reports efficiently which could take seconds only. However other outsourced systems generate erroneous output when the data entered are incorrect. As exemplified by one staff, the printing of the student's Certificate of Registration (COR) could not be processed properly when the required data are not provided. This case is beyond the control of the system as justified by a certain IT personnel of one of the HEIs.

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**Table 7.** Functionality performance of information systems of Higher Education Institutions in terms of report generation

| Indicator | In-House | | | | Outsource | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | | No | | Yes | | No | |
| | f | % | f | % | f | % | f | % |
| Print reports based on user need | 5 | 83 | 1 | 17 | 7 | 100 | 0 | 0 |
| Print reports based on a specific query | 6 | 100 | 0 | 0 | 7 | 100 | 0 | 0 |
| Provide print logs/activity logs | 4 | 67 | 2 | 33 | 7 | 100 | 0 | 0 |
| Print reports in a specified format | 5 | 83 | 1 | 17 | 7 | 100 | 0 | 0 |
| Efficient generation of reports | 5 | 83 | 1 | 17 | 7 | 100 | 0 | 0 |
| Only authorized users can generate a report | 5 | 83 | 1 | 17 | 7 | 100 | 0 | 0 |

### 3.8 Interoperability

Table 8 displays the data on the performance of the in-house and outsourced systems in terms of interoperability. The data disclosed that 67% of the in-house systems performed all the indicators of interoperability. As to outsourced, 71% exhibited access to remote data, 86% performed efficient sharing of data, and a 100% reliable network connectivity. For this criterion, outsourced systems performed better having higher percentages in all the indicators of interoperability. This makes outsourced systems more capable to exchange information, connect, and communicate among computers and devices.

The evaluation of interoperability further revealed that the in-house developed systems, as mentioned by one MIS staff, fail when the server or LAN fails. Most of these systems have not experienced a system crash or system failure unless the problem on LAN occurs. Other in-house developed systems perform inefficient sharing of data as evidenced by a manual storing of data in the database. As to the outsourced systems, the majority of these systems demonstrated interoperability. These systems could share and access remote data efficiently. However, one MIS staff mentioned that the interoperability of the system fails when it is simultaneously used by many users. In effect, the transmission of data from one office to another is delayed. One MIS staff also mentioned that the loss of network connectivity causes ineffective interoperability. This observation hindered access to data by the users from remote office/s.

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**Table 8.** Functionality performance of information systems of Higher Education Institutions in terms of interoperability

| Indicator | In-House | | | | Outsource | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | | No | | Yes | | No | |
| | f | % | f | % | f | % | f | % |
| Can access remote data | 4 | 67 | 2 | 33 | 5 | 71 | 2 | 29 |
| Efficient sharing of data | 4 | 67 | 2 | 33 | 6 | 86 | 1 | 14 |
| Reliable network connectivity | 4 | 67 | 2 | 33 | 7 | 100 | 0 | 0 |

### 3.9 Error prevention and control

In Table 9, the results on the performance of information systems in terms of error prevention and control are displayed. As shown in the figures, there was a 100% performance both from in-house and outsourced systems with respect to the display of warning messages and reminders. However, the two groups of information systems have different results on the rest of the indicators. On a display of error messages for erroneous entries, there was 83% and 100% performance from in-house and outsourced systems, respectively. As to retry tasks after an error, 33% of the in-house while 100% of the outsourced systems have demonstrated the said indicator. With regard to providing undo function to reverse actions, 0% or none of the in-house systems exhibited the said indicator, while there was 86% in outsourced. Because of the absence of undo function, in-house developed systems had the tendency to allow to continue processing data and perform wrong actions since there is no feature of the system that could reverse the wrong actions committed by the users. In terms of providing a confirmation message before saving, 83% of in-house and 100% of outsourced systems demonstrated the said indicator. The general assessment would tell that outsourced systems were more functional in terms of error prevention and control as evidenced by having almost perfectly exhibited all the indicators. This further implies that having almost perfectly exhibited all the indicators of prevention and control, outsourced systems could effectively avoid potential problems such as errors and threats. Moreover, outsourced systems could ensure that the data entered are error-free before they are saved onto the database and processed by the system.

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**Table 9.** Functionality performance of information systems of Higher Education Institutions in terms of error prevention and control

| Indicator | In-House | | | | Outsource | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | | No | | Yes | | No | |
| | f | % | f | % | f | % | f | % |
| Display warning messages and reminders | 6 | 100 | 0 | 0 | 7 | 100 | 0 | 0 |
| Display error messages for erroneous entries | 5 | 83 | 1 | 17 | 7 | 100 | 0 | 0 |
| Retry task after an error | 2 | 33 | 4 | 67 | 7 | 100 | 0 | 0 |
| Provide Undo function to reverse actions | 0 | 0 | 6 | 100 | 6 | 86 | 1 | 14 |
| Provide confirmation message before saving | 5 | 83 | 1 | 17 | 7 | 100 | 0 | 0 |

### 3.10 Security

Table 10 exhibits the performance of the in-house and outsourced systems of HEIs in terms of security. As shown in the table, there was 100% performance from outsourced systems and 83% performance from in-house systems on security. This clearly implies that outsourced systems are completely functional in terms of security; hence, outsourced systems are dependable and more protected against illegal access, intrusion, and unauthorized modification of data and information.

**Table 10.** Functionality performance of information systems of Higher Education Institutions in terms of security

| Indicator | In-House | | | | Outsource | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | | No | | Yes | | No | |
| | f | % | f | % | f | % | f | % |
| Assign user accounts & password | 5 | 83 | 1 | 17 | 7 | 100 | 0 | 0 |
| Provide privileges to access & view records | 5 | 83 | 1 | 17 | 7 | 100 | 0 | 0 |

## 4. CONCLUSION

The acquisition and implementation of information systems in organizations have transformed the way business is conducted. The transformation of doing business

has led to business effectiveness and increased productivity. In higher education, information systems displayed an important role in improving the operations of higher education institutions (HEIs). These systems have been used to perform the academic and administrative functions of HEIs effectively and efficiently. With the increasing importance of information systems in organizations, evaluation of their functionality becomes imperative. Anchored on the premise of information system performance evaluation, this study has been conducted. The study evaluated the in-house developed and outsourced information systems acquired by various HEIs on the Island of Samar. The overall results showed that the outsourced systems have better performance in terms of functionality since most of the indicators were completely existing and functional at the time of evaluation. This could mean that the outsourced systems have better design and architecture in terms of systems functionality. On the other hand, the in-house systems have performed fairly with regard to the required features and functionalities of the system. Nevertheless, all the information systems of HEIs, either in-house or outsourced, have their strengths and limitations when it comes to functionality. Based on the aforementioned findings, it is suggested that HEIs should acquire information systems that are completely functional regardless of what acquisition method is adopted. Having information systems equipped with required functionality features, effective and efficient delivery of the administrative and academic functions of HEIs are ensured. Furthermore, it is suggested that this study be replicated in order to gather further information on issues about the performance of information systems in terms of functionality and to address the areas which have not been considered in this research.

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