Information Technology Governance Practices of Selected Higher Education Institutions in Calabarzon: Basis for It Governance Procedures Manual

Farley L. Abrigo [1], Claudia Odette J. Ayala [2], Rogel L. Limpiada [3]

[1] Program Chairperson, Bachelor of Science in Computer Science, First Asia Institute of Technology and Humanities (FAITH) Colleges

[2] Dean, College of Arts and Sciences, Manuel S. Enverga University Foundation, Inc.

[3] Vice President for Academic Affairs, Program Chair, BCAED, Colegio de la Ciudad de Tayabas

Abstract

This study investigated the current state of Information Technology Governance (ITG) practices in higher educational institutions (HEIs) in the CALABARZON region, specifically those recognized by the Commission on Higher Education (CHED) as Centers of Excellence (COE) or Centers of Development (COD) in Information Technology (IT). A mixed-methods approach was employed, combining quantitative and qualitative data collection and analysis methods. A structured questionnaire was used to determine the corporate governance practices in IT as perceived and experienced by the respondents, while qualitative analysis supported the gathered data. The study revealed that HEIs in the CALABARZON region utilize various ITG standard frameworks, including BiSL, Campus++, ISO27001, ITS CMM-IT, and ISO38500, with ISO27001 and PMBOK being considered for future implementation. The respondents perceived a manageable degree of implementation of best practices in HEIs' IT Governance, and rated high degree of implementation across information systems and ITG mechanisms. The study also showed that HEIs mostly implemented and practiced standard ITG frameworks, with respondents assessing their institutions' IT Governance as being at a manageable level of maturity. The findings suggest that HEIs in the CALABARZON region have made significant strides in embracing Quality Assurance Frameworks, practicing IT goals alignment, and promoting an institution-wide view of IT. However, potential opportunities for improvement were identified, including Continuous Improvement for ITG, IT Resource Utilization, and Top-Level Management as ITG Champion. The primary barriers to effective ITG implementation were also identified, including lack of proper trainings, migrating to learning management system utilization, and stakeholders' resistance to change. The study's results served as the basis for producing an IT Procedures Manual applicable for HEIs, which can guide institutions in enhancing their IT governance practices and achieving excellence in education.

Keywords: Information Technology Governance (ITG), Higher Education Institutions (HEIs), IT Governance Frameworks, Quality Assurance, IT Procedures Manual

1. Introduction

The advent of the digital age has transformed the way higher education institutions (HEIs) operate, with information technology (IT) playing a vital role in enhancing teaching, learning, and research (Altbach, Reisberg, & Rumbley, 2009). Effective governance of IT resources is crucial in ensuring that HEIs achieve their strategic objectives, improve efficiency, and reduce risks (ISACA, 2018). Information Technology Governance (ITG) has emerged as a critical aspect of organizational governance, enabling institutions to align IT with their overall goals and objectives (Weill & Ross, 2004). Theoretically, ITG is grounded in various frameworks and standards that provide guidelines for its implementation. Notably, the Control Objectives for Information and Related Technology (COBIT) framework provides a comprehensive approach to IT governance, focusing on aligning IT with business objectives, delivering value, and managing risks (ISACA, 2018). The Information Technology Infrastructure Library (ITIL) framework, on the other hand, emphasizes the importance of IT service management, providing best practices for delivering high-quality IT services (AXELOS, 2018). Additionally, the International Organization for Standardization (ISO) has developed various standards, such as ISO/IEC 38500, which provides a framework for corporate governance of IT (ISO/IEC, 2015).

Globally, the importance of ITG has been recognized, with various frameworks and standards being developed to guide its implementation (De Haes & Van Grembergen, 2009). In Southeast Asia, countries such as Singapore, Malaysia, and Thailand have made significant strides in promoting ITG in various sectors, including education (Siau & Long, 2005). In the Philippines, the Commission on Higher Education (CHED) has emphasized the need for HEIs to adopt ITG frameworks to enhance their quality and competitiveness (CHED, 2018). In the CALABARZON region, HEIs have been at the forefront of IT adoption, with many institutions recognized as Centers of Excellence (COE) or Centers of Development (COD) in Information Technology by CHED (CHED, n.d.). However, despite the growing importance of ITG, there is a need to investigate the current state of ITG practices in these institutions, identify areas for improvement, and develop context-specific frameworks to guide its implementation. By understanding the current state of ITG practices in HEIs in the CALABARZON region, this study aims to contribute to the development of effective ITG frameworks that can enhance the quality and competitiveness of these institutions.

2. Review of Related Literature and Studies

A comprehensive review of several related studies and literature reveals several themes that are relevant to Information Technology Governance (ITG) in Higher Education Institutions (HEIs).

One of the primary themes that emerged from this review is the importance of ITG frameworks and standards in HEIs. Various studies have explored the use of ITG frameworks such as COBIT, ITIL, and ISO/IEC 38500 in HEIs. For instance, a study by Ismail and Hassan (2019) found that COBIT was widely used in Malaysian HEIs, highlighting its effectiveness in governing IT resources and aligning them with institutional objectives. Similarly, a study by Srivastava and Kumar (2020) found that ITIL was effective in improving IT service management in Thai HEIs, emphasizing the importance of adopting industry-recognized frameworks to enhance IT governance. These studies demonstrate the value of ITG frameworks in ensuring effective IT governance in HEIs.

Building on this theme, researchers have also investigated the implementation and maturity of ITG in HEIs. Several studies have investigated the implementation and maturity of ITG in HEIs. According to a study by Cruz and Santos (2018), HEIs in the Philippines were at the early stages of ITG maturity,

indicating a need for further development and improvement in IT governance practices. In contrast, a study by Alreemy and Abareshi (2020) found that ITG maturity was positively correlated with institutional performance, suggesting that HEIs that invest in ITG maturity are more likely to achieve their strategic objectives. These findings highlight the importance of assessing ITG maturity and identifying areas for improvement.

Another critical aspect of ITG in HEIs is quality assurance. Quality assurance has emerged as a critical aspect of ITG in HEIs. A study by Abdullah and Alias (2019) found that quality assurance frameworks such as ISO 9001 were effective in improving IT service quality in HEIs, highlighting the importance of adopting quality management principles to ensure high-quality IT services. The findings of this study underscore the need for HEIs to prioritize quality assurance in their ITG practices.

The relationship between ITG and institutional performance is also a significant theme in the literature. Several studies have explored the relationship between ITG and institutional performance. According to a study by Ali and Lee (2019), effective ITG was positively correlated with institutional performance, suggesting that HEIs that implement effective ITG practices are more likely to achieve their strategic objectives. Similarly, a study by Fernando and Fernando (2020) found that ITG was critical in achieving strategic objectives in HEIs, emphasizing the need for HEIs to prioritize ITG in their strategic planning. These findings highlight the importance of effective ITG in driving institutional performance.

Despite the benefits of ITG, several challenges and barriers to implementation have been identified. Several studies have identified challenges and barriers to ITG implementation in HEIs, including lack of top management support, limited resources, and resistance to change. According to a study by Goh and Tan (2018), lack of awareness and understanding of ITG frameworks was a major barrier to implementation, highlighting the need for HEIs to invest in ITG training and awareness programs to overcome this challenge. These findings underscore the importance of addressing these challenges to ensure successful ITG implementation.

By synthesizing these themes, it is clear that ITG is a critical aspect of HEIs, and that effective ITG practices can drive institutional performance. However, HEIs must also address the challenges and barriers to ITG implementation to realize its benefits.

3. Abbreviations and Acronyms

ASL – Application Service Library

BiSL – Business Information Service Library

CALABARZON – Cavite, Laguna, Batangas, Rizal, and Quezon

CHED – Commission on Higher Education

CMM-IT – Capability Maturity Model

COD – Center of Development

COE – Center of Excellence

HEI – Higher Education Institution

ISO – International Organization for Standardization

IT – Information Technology

ITG – Information Technology Governance

PMBOK – Project Management Body of Knowledge

4. Methods

This study employed a mixed-methods approach to investigate the current state of Information Technology Governance (ITG) practices in higher educational institutions (HEIs) in the CALABARZON region, specifically those recognized by the Commission on Higher Education (CHED) as Centers of Excellence (COE) or Centers of Development (COD) in Information Technology (IT). The mixed-methods approach combined quantitative and qualitative data collection and analysis methods to provide a comprehensive understanding of ITG practices in HEIs.

The study used a concurrent triangulation design, where both quantitative and qualitative data were collected and analyzed simultaneously. This design allowed for the integration of numerical data from the questionnaire with thematic data from the qualitative analysis, providing a more nuanced understanding of ITG practices in HEIs. By using this design, the study was able to capture both the breadth and depth of ITG practices in HEIs.

The population of this study consisted of HEIs in the CALABARZON region recognized by CHED as COE or COD in IT. A purposive sampling technique was used to select the participants, who were IT personnel and administrators from the identified HEIs. The sample size was determined based on the number of HEIs that met the inclusion criteria and the number of participants who responded to the questionnaire. This sampling technique ensured that the participants were knowledgeable about ITG practices in their institutions.

Data collection was done through a structured questionnaire and semi-structured interviews. The questionnaire was designed to determine the corporate governance practices in IT as perceived and experienced by the respondents. The questionnaire consisted of items that assessed the degree of implementation of best practices in ITG, ITG mechanisms, and IT goals alignment. The semi-structured interviews were conducted to gather more in-depth information about the ITG practices and challenges faced by the HEIs. These interviews provided valuable insights into the experiences and perceptions of IT personnel and administrators.

The questionnaire was developed based on existing ITG frameworks and standards, including COBIT, ITIL, and ISO/IEC 38500. The questionnaire was pilot-tested with a small group of IT personnel and administrators to ensure its validity and reliability. The results of the pilot test were used to refine the questionnaire and ensure that it was effective in measuring the variables of interest. This rigorous process ensured that the questionnaire was a reliable and valid instrument for data collection.

Quantitative data were analyzed using descriptive statistics, including means, frequencies, and percentages. The data were also analyzed using inferential statistics to identify significant relationship in the level of maturity of IT Governance and IT Governance practices. Qualitative data were also analyzed using thematic analysis, where codes and themes were identified and categorized to provide a deeper understanding of the ITG practices and challenges faced by the HEIs. The qualitative analysis involved coding and categorizing the data from the semi-structured interviews, which provided valuable insights into the experiences and perceptions of IT personnel and administrators.

The findings of the study were used to develop an IT Procedures Manual applicable for HEIs. The manual was designed to guide institutions in enhancing their IT governance practices and achieving excellence in education. The manual included procedures and guidelines for ITG, IT service management, and IT resource utilization, among others. This manual is expected to be a valuable resource for HEIs in improving their ITG practices.

Throughout the study, ethical considerations were taken into account to ensure the integrity and validity of the findings. The study adhered to the principles of informed consent, confidentiality, and anonymity. Participants were informed about the purpose and objectives of the study, and their consent was obtained before, data collection. The data collected were kept confidential and anonymous to ensure the privacy and security of the participants' information. This ensured that the study was conducted in an ethical and responsible manner.

5. Results and Discussion

This section presents the findings of the study on the IT governance practices of selected Higher Education Institutions (HEIs) in CALABARZON, Philippines, recognized as Centers of Development (CODs) or Centers of Excellence (COEs). The results provide insights into the current state of IT governance in these institutions, highlighting the frameworks and standards being used, as well as the challenges and opportunities associated with their implementation. The following discussion interprets the findings in the context of existing literature and best practices in IT governance, with the aim of identifying areas for improvement and informing the development of an IT governance procedures manual.

Part 1. Profile of the IT Governance of Higher Education Institutions recognized as CODs/COEs in terms of Frameworks Currently Being Used and Frameworks Being Considered in the Future

In today's digital age, higher education institutions (HEIs) recognized as Centers of Development (CODs) or Centers of Excellence (COEs) face increasing pressure to leverage information technology (IT) to drive innovation, improve efficiency, and enhance academic excellence. Effective IT governance is crucial in enabling these institutions to achieve their strategic objectives, ensure accountability, and mitigate risks. This section presents a profile of the IT governance practices of CODs/COEs, focusing on the frameworks currently being used and those being considered for future adoption. By examining the IT governance frameworks employed by these institutions, this study aims to identify best practices, trends, and areas for improvement, ultimately contributing to the development of more effective IT governance strategies in higher education.

Table 1: Distribution of the HEIs Recognized as CODs/COEs according to IT Governance Frameworks Currently Being Used

IT Governance Frameworks	Frequency	Percentage
BiSL – Business Information Service Library	4	13.79
Campus++	4	13.79
ISO27001: Information Security Management System	4	13.79
IT Service CMM-IT Service Capability Maturity Model	4	13.79
ISO38500: The International Standard for Corporate Governance of IT Governance	4	13.79
Accreditation Instrument	3	10.34
CHED CMOs	3	10.34

ASL-Application Service Library	3	10.34
Total	**29**	**100.00**

Table 1 shows the distribution of Higher Education Institutions (HEIs) recognized as Centers of Development (CODs) or Centers of Excellence (COEs) according to the IT governance frameworks they currently use. It reveals a diverse range of frameworks being adopted. According to the data, 13.79% of the institutions use BiSL (Business Information Service Library), Campus++, ISO27001: Information Security Management System, IT Service CMM (Capability Maturity Model), and ISO38500: Corporate Governance of IT. This suggests that these institutions value business-oriented IT service management, campus-specific IT management solutions, information security management, service delivery, and corporate governance of IT.

The adoption of these IT governance frameworks is consistent with the goals of COEs and CODs, which aim to sustain and develop excellence in higher education institutions. As noted by the Commission on Higher Education (CHED), COEs and CODs are designated to enhance teaching, research, and service programs, ultimately contributing to nation-building and national development (CHED, n.d.). Effective IT governance frameworks like BiSL, ISO27001, and ISO38500 can support these goals by ensuring efficient IT service management, information security, and board-level oversight.

The implementation of these frameworks however can be complex and resource-intensive. For instance, the IT Service CMM requires significant process maturity and service delivery capabilities, which may be challenging for some institutions to achieve (SEI, 2010). Additionally, the use of multiple frameworks may lead to duplication of efforts and increased administrative burden (Simonsson & Johnson, 2006).

The adoption of IT governance frameworks by HEIs recognized as CODs/COEs in the Philippines reflects their commitment to excellence and quality in IT management. While there are challenges associated with implementing these frameworks, the benefits of effective IT governance, such as improved service delivery and information security, make them worthwhile investments for institutions seeking to achieve excellence.

Table 2: Distribution of the HEIs Recognized as CODs/COEs according to the IT Governance Frameworks Being Considered in the Future

IT Governance Frameworks to be considered in the Future	Frequency	Percentage
ISO27001: Information Security Management System	15	51.72
PMBOK-Project Management Body of Knowledge	14	48.28
Total	**29**	**100.00**

The distribution of Higher Education Institutions (HEIs) recognized as Centers of Development (CODs) or Centers of Excellence (COEs) according to the IT governance frameworks they are considering for future adoption is shown in Table 2 and reveals a strong interest in two specific frameworks. According to the data, 51.72% of the institutions are considering ISO27001: Information Security Management System, while 48.28% are looking at PMBOK-Project Management Body of Knowledge. This suggests

that these institutions prioritize information security management and project management as key areas for improvement in their IT governance practices.

The interest in ISO27001 is consistent with the growing importance of information security in higher education institutions. As noted by Humphreys (2008), information security breaches can have significant consequences for organizations, including financial losses and damage to reputation. By adopting ISO27001, HEIs can demonstrate their commitment to protecting sensitive information and ensuring the confidentiality, integrity, and availability of their data. This is particularly important in the context of HEIs, which often handle sensitive student and research data.

The consideration of PMBOK is also noteworthy, as project management is a critical aspect of IT governance. According to the Project Management Institute (PMI), effective project management can help organizations achieve their strategic objectives and realize benefits from their investments (PMI, 2017). By adopting PMBOK, HEIs can improve their project management capabilities, ensuring that IT projects are delivered on time, within budget, and to the required quality standards.

However, it's worth noting that the adoption of new IT governance frameworks can be a complex and resource-intensive process. As observed by von Solms and von Solms (2006), the implementation of IT governance frameworks requires significant organizational change, including updates to policies, procedures, and culture. Therefore, HEIs need to carefully consider their specific needs and resources before adopting new frameworks.

The above findings suggest that HEIs recognized as CODs/COEs in the Philippines are prioritizing information security management and project management as key areas for improvement in their IT governance practices. The adoption of ISO27001 and PMBOK can help these institutions enhance their IT governance capabilities, ensuring that they can protect sensitive information and deliver IT projects effectively.

Part 2. Levels of Maturity of the IT Governance in the CALABARZON HEIs recognized by CHED as CODs/COEs in IT

The maturity of IT governance in higher education institutions (HEIs) is a critical factor in determining the effectiveness of their IT systems and overall institutional performance. This section presents an assessment of the levels of maturity of IT governance in CALABARZON HEIs recognized by the Commission on Higher Education (CHED) as Centers of Development (CODs) or Centers of Excellence (COEs) in IT. By evaluating the maturity levels of IT governance in these institutions, this section of the study aims to identify areas of strength and weakness, and provide insights into the best practices and strategies that can be employed to enhance IT governance and achieve institutional goals.

Table 3: Mean Scores of the Levels of Maturity of the IT Governance in the CALABARZON HEIs recognized by CHED as CODs/COEs in IT

Statements	Mean	Verbal Interpretation	Rank
Our institution aims to provide high level IT policies and procedures which comply with external laws and regulations and support international standards.	4.10	Managed	1.5

Our institution aims to achieve the planned goals in the IT projects.	4.10	Managed	1.5
Our institution defines an IT architecture that will include process definition and system integration.	4.07	Managed	4.5
Our institution aims to ensure that IT systems are flexible and agile in responding to future changes.	4.07	Managed	4.5
Our institution aims to incorporate respect for people and social and environmental values within the IT strategy.	4.07	Managed	4.5
Our institution aims to exchange IT experiences with other organizations and with society as a whole.	4.07	Managed	4.5
Our institution aims to have a very clear idea of the vision and IT strategy for the whole HEI.	4.03	Managed	8.5
Our institution aims to align the IT strategy and the institutional strategy.	4.03	Managed	8.5
Our institution aims to reach IT objectives using an integral IT governance system.	4.03	Managed	8.5
Our institution aims to have a decision making structure aligned with the IT strategy.	4.03	Managed	8.5
Our institution aims to guarantee that the established ITs are working according to plan.	4.00	Managed	12.5
Our institution aims to make IT-based services meet the level required by the users.	4.00	Managed	12.5
Our institution aims to know and manage IT associated risks.	4.00	Managed	12.5
Our institution aims to have adequate and sufficiently trained staff who can govern IT efficiently.	4.00	Managed	12.5
Our institution aims to make IT decisions that are correctly reasoned and effective.	3.97	Managed	15.5
Our institution aims to acquire the necessary technology to fulfil the requirements of the institution.	3.97	Managed	15.5

Our institution aims to know and achieve the return value on IT investment.	3.90	Managed	17
General Mean	**4.03**	**Managed**	

Table 3 presents the mean scores of the levels of maturity of IT governance in CALABARZON Higher Education Institutions (HEIs) recognized by CHED as Centers of Development (CODs) or Centers of Excellence (COEs) in IT. The mean scores range from 3.90 to 4.10, with a general mean of 4.03, indicating a "Managed" level of maturity. This finding is consistent with the literature on effective IT governance, which emphasizes the importance of aligning IT systems with organizational objectives and complying with external laws and regulations (IT Governance Institute, 2007). The top two statements with the highest mean scores are related to providing high-level IT policies and procedures that comply with external laws and regulations, and achieving planned goals in IT projects. This suggests that these institutions have a strong focus on compliance and goal achievement, which is a key aspect of effective IT governance (Weill & Ross, 2004).

However, the lower mean scores for statements related to IT investment management and technology acquisition suggest that these institutions may need to focus more on these areas to achieve better outcomes. According to Weill and Ross (2004), effective IT governance involves balancing IT investments with business needs, which is critical for achieving organizational objectives. Similarly, a study by Prasad et al. (2015) found that effective IT investment management is crucial for achieving business value from IT investments.

The findings also suggest that CALABARZON HEIs recognized as CODs/COEs in IT have established IT governance practices, but may not have achieved full optimization. This is consistent with the findings of a study by Simonsson and Johnson (2006), which found that IT governance maturity is not always correlated with organizational performance. Therefore, these institutions may need to focus on optimizing their IT governance practices to achieve better outcomes.

Overall, the analysis of the table suggests that CALABARZON HEIs recognized as CODs/COEs in IT have made significant progress in establishing IT governance practices, particularly in compliance and goal achievement. However, there may be opportunities for improvement in areas such as IT investment management and technology acquisition. By focusing on these areas and integrating IT governance with overall organizational governance, these institutions can further enhance their IT governance practices and achieve better outcomes (International Organization for Standardization, 2015).

Part 3. Information Technology Governance Practices of the Selected Higher Education Institution

The effective governance of information technology (IT) is crucial for higher education institutions (HEIs) to achieve their strategic objectives, improve efficiency, and enhance academic excellence. This section presents an in-depth examination of the IT governance practices of selected HEIs, highlighting their strengths, weaknesses, and areas for improvement. By exploring the IT governance frameworks, policies, and procedures in place, this part of the study aims to identify best practices and provide insights into the effective management of IT resources in HEIs. The findings of this section will contribute to a better understanding of the role of IT governance in supporting the mission and vision of HEIs, and inform strategies for improving IT governance practices in these institutions.

Table 4: Consolidated Information Technology Governance Practices of the Selected Higher Education Institution

IT Governance Practices	Subcomponents	Mean	Verbal Interpretation
Governance	Alignment	4.14	Very Good
	Assurance	4.14	Very Good
	Vision	4.10	Very Good
Resources	People	4.13	Very Good
	Technology	4.11	Very Good
	Finance	4.00	Very Good
Organization	Policies	4.18	Very Good
	Structure	4.12	Very Good
	Decision-Making	4.06	Very Good
Services	Service Delivery	4.11	Very Good
	Systems	4.06	Very Good
	Projects	4.02	Very Good
General Mean		**4.10**	**Very Good**

The table above presents a comprehensive overview of the IT governance practices of selected higher education institutions, highlighting the strengths and weaknesses of various subcomponents. The overall mean score of 4.10 indicates a "Very Good" level of IT governance practices, suggesting that these institutions have established effective frameworks and processes to manage their IT resources.

The subcomponents with the highest mean scores are Organization Policies (4.18) and Governance Alignment (4.14), indicating that these institutions have well-established policies and governance structures that align with their strategic objectives. This finding is consistent with the literature on effective IT governance, which emphasizes the importance of aligning IT strategies with organizational objectives (IT Governance Institute, 2007). According to Weill and Ross (2004), effective IT governance involves establishing clear policies and procedures that guide IT decision-making and ensure alignment with organizational goals.

The subcomponents related to Resources, such as People (4.13), Technology (4.11), and Finance (4.00), also scored high, indicating that these institutions have effective management practices in place for these critical resources. This finding is supported by the literature on IT resource management, which highlights the importance of effective management of IT resources to achieve organizational objectives (Prasad et al., 2015).

The Services subcomponents, including Service Delivery (4.11), Systems (4.06), and Projects (4.02), also scored well, indicating that these institutions have effective service delivery and project management practices in place. According to a study by AXELOS (2016), effective service delivery and project management are critical for achieving business value from IT investments.

Meanwhile, the scores also suggest that there may be opportunities for improvement in certain areas, such as Finance (4.00) and Projects (4.02). According to a study by ISACA (2018), effective IT governance involves identifying and managing IT-related risks, which may require additional focus on financial management and project management practices.

The above stated findings manifests that selected higher education institutions have established effective IT governance practices, but may need to focus on optimizing certain areas to achieve even better outcomes. By building on their strengths and addressing areas for improvement, these institutions can further enhance their IT governance practices and achieve better alignment with their strategic objectives.

Part 4. Test for Significant Relationship Between Information Technology Governance Practices of the Selected Higher Education Institution and Levels of Maturity of the IT Governance

The relationship between information technology (IT) governance practices and the levels of maturity of IT governance is another crucial aspect of understanding the effectiveness of IT governance in higher education institutions. This section presents the results of a statistical analysis testing for significant relationships between the IT governance practices of selected higher education institutions and their levels of maturity of IT governance. By examining the correlations between these variables, this study aims to identify potential linkages between specific IT governance practices and the maturity levels of IT governance, providing insights into the impact of effective IT governance practices on the overall maturity of IT governance in these institutions.

Table 7: Pearson r: Significant Relationship Between Information Technology Governance Practices of the Selected Higher Education Institution and Levels of Maturity of the IT Governance

Levels of Maturity of the IT Governance					
Indicators	**Pearson Coefficient**	**Interpretation**	**p-value**	**Decision**	**Remarks**
Governance	0.845	Very Strong Positive Correlation	0.000	Reject Ho	Significant
Resources	0.762	Very Strong Positive Correlation	0.000	Reject Ho	Significant
Organization	0.749	Very Strong Positive Correlation	0.000	Reject Ho	Significant
Services	0.665	Strong Positive Correlation	0.000	Reject Ho	Significant

Note: *"If p value is less than or equal to the level of significance (0.05) reject Ho, otherwise failed to reject Ho."*

The table presents the results of a Pearson r correlation analysis examining the relationship between the information technology (IT) governance practices of selected higher education institutions and their levels of maturity of IT governance. The analysis reveals a significant positive correlation between IT governance practices and levels of maturity of IT governance across all indicators, including Governance (0.845), Resources (0.762), Organization (0.749), and Services (0.665). These findings suggest that effective IT governance practices are strongly associated with higher levels of maturity of IT governance,

indicating that institutions with well-established governance structures, resource management practices, and organizational frameworks are more likely to achieve higher levels of maturity in their IT governance.

The strong correlations observed in this study are consistent with the literature on IT governance, which emphasizes the importance of effective governance structures and resource management practices in achieving maturity in IT governance (Ko & Fink, 2010; Wilkin & Chenhall, 2010). According to Ko and Fink (2010), effective IT governance involves establishing clear roles and responsibilities, which is essential for achieving maturity in IT governance. Similarly, Wilkin and Chenhall (2010) found that effective IT governance involves aligning IT strategies with organizational objectives, which is critical for achieving business value from IT investments.

The strong positive correlation observed in Services suggests that institutions with effective service delivery practices are also more likely to achieve higher levels of maturity in their IT governance. This finding is supported by the literature on IT service management, which highlights the importance of effective service delivery practices in achieving business value from IT investments (Kotarba, 2016). According to Kotarba (2016), effective service delivery practices involve designing and delivering services that meet the needs of customers and stakeholders.

The statistical significance of the correlations, as indicated by the p-values, suggests that the observed relationships are unlikely to be due to chance and that there is a real relationship between IT governance practices and levels of maturity of IT governance. These findings have implications for practice, highlighting the importance of investing in effective IT governance practices to achieve maturity in IT governance.

Table 8: Multiple Regression Analysis: Significant Factors that Predict the Levels of Maturity of the IT Governance

Independent Variables	Regression Coefficient	p-value	Decision	Remarks
Constant	0.528	0.333	Failed to Reject Ho	Not Significant
Governance	1.659	0.000	Reject Ho	Significant
Resources	0.266	0.481	Failed to Reject Ho	Not Significant
Organization	-0.925	0.115	Failed to Reject Ho	Not Significant
Services	-0.153	0.586	Failed to Reject Ho	Not Significant

Note: "If p value is less than or equal to the level of significance (0.05) reject Ho, otherwise failed to reject Ho."

Table 8 presents the results of a multiple regression analysis examining the significant factors that predict the levels of maturity of IT governance. The analysis reveals that only one independent variable, Governance, has a significant impact on the levels of maturity of IT governance. The regression coefficient for Governance is 1.659, indicating a strong positive relationship between Governance and the levels of

maturity of IT governance. The p-value associated with Governance is 0.000, which is less than the level of significance (0.05), indicating that the relationship is statistically significant.

This finding suggests that effective governance practices are critical for achieving maturity in IT governance. According to a study by the International Organization for Standardization (2015), effective governance involves establishing clear roles and responsibilities, which is essential for achieving maturity in IT governance. A study by Van Grembergen and De Haes (2009) also found that effective IT governance involves establishing a clear governance framework, which includes well-defined roles and responsibilities.

The other independent variables, Resources, Organization, and Services, do not have a significant impact on the levels of maturity of IT governance. The p-values associated with these variables are greater than 0.05, indicating that the relationships are not statistically significant. This finding may suggest that while these factors are important for IT governance, they may not be as critical as Governance in predicting the levels of maturity of IT governance.

The results of this study are consistent with the findings of other studies that have emphasized the importance of effective governance practices in achieving maturity in IT governance. For example, a study by Nfuka and Rusu (2011) found that effective IT governance involves establishing clear governance structures and processes, which is essential for achieving maturity in IT governance.

The foregoing findings of this study connotes that effective governance practices are critical for achieving maturity in IT governance. Institutions that establish well-designed governance structures and practices are more likely to achieve higher levels of maturity in their IT governance.

Part 5. How is IT Governance being implemented in the CALABARZON HEIs recognized by CHED as COEs/COD in IT

The implementation of IT governance in higher education institutions is crucial for ensuring that IT resources are utilized effectively and efficiently to support academic and administrative processes. This section presents the qualitative data obtained from the key informants of the study.

Table 9: Sub-Coding on the IT Governance Implementation in the CALABARZON HEIs Recognized by CHED as COEs/COD in IT

Interview Question No.	Sub-Coding	Themes/Meaning Units
1	S1, S2, S3, S4: Adherence to Curriculum Implementation, Utilization of a Quality Assurance Framework, and Establishment of an MIS Department	Curriculum Integrity, Quality Control, Technological Infrastructure
2	S1, S2, S3, S4: IT Administrator and Implementer, Provider of Service Delivery, and Supervisor of IT Functions	IT Leadership, Service Delivery, Operational Oversight

3	S1, S2, S3, S4: Centralized IT Governance Strategies, Centralized IT Governance Procedures & Committee Meetings, and Structured Governance	Centralized Decision-Making, Governance Procedures, Collaboration and Oversight
4	S1, S2, S3, S4: Centralization of IT Governance Structure, Centralization of IT Governance Structure & Committee Meetings, Structured Governance	Centralization of Control, Coordination and Accountability, Strategic Alignment
5	S1, S2, S3, S4: Data Security and Privacy, Data Security and Privacy, Training and support. and Database System, and Annual Planning Review	Information Protection, Training and Support, Database Management
6	S1, S2, S3, S4: Computer Laboratory Policy, ISO Accreditation & IT Policies and Procedures Manual, and IT Administrative, Academic Infrastructure, & User Account Policy	Regulation and Compliance, Operational Guidelines, Infrastructure and Access Control
7	S1, S2, S3, S4: Needs License and/or Patents and IT Resource Utilization, Strategic/Operational Planning, and Social Media Platform and Annual Institutional Planning	Legal and Resource Management, Strategic Planning, Digital Presence and Engagement

The qualitative data presented in Table 9 provides valuable insights into the IT governance implementation in CALABARZON Higher Education Institutions (HEIs) recognized by CHED as COEs/COD in IT. The sub-coding themes and meaning units reveal a strong emphasis on curriculum integrity, quality control, and technological infrastructure, as evident in the responses to interview question 1. This finding is consistent with the literature on IT governance in higher education, which highlights the importance of aligning IT strategies with academic goals and objectives (Biddix, 2018). According to Biddix (2018), effective IT governance involves ensuring that IT resources are utilized to support academic programs and initiatives.

The themes of IT leadership, service delivery, and operational oversight emerged in response to interview question 2, indicating that IT administrators play a critical role in implementing IT governance in these institutions. This finding is supported by the literature on IT leadership, which emphasizes the importance of effective leadership in driving IT innovation and excellence (Kumar & Singh, 2017). According to Kumar and Singh (2017), IT leaders must possess a deep understanding of IT trends and best practices to make informed decisions.

The data also reveal a strong emphasis on centralized decision-making, governance procedures, and collaboration and oversight, as evident in the responses to interview questions 3 and 4. This finding is consistent with the literature on IT governance, which highlights the importance of establishing clear governance structures and procedures to ensure accountability and transparency (Tuttle & Vandervelde, 2007). According to Tuttle and Vandervelde (2007), effective IT governance involves establishing clear roles and responsibilities to ensure that IT resources are utilized efficiently.

The themes of information protection, training and support, and database management emerged in response to interview question 5, indicating that these institutions prioritize data security and privacy. This finding is supported by the literature on data security, which emphasizes the importance of protecting sensitive information and ensuring compliance with relevant laws and regulations (Siponen & Willison, 2007). According to Siponen and Willison (2007), effective data security involves implementing robust security measures and providing training and support to users.

The data also reveal a strong emphasis on regulation and compliance, operational guidelines, infrastructure and access control, as evident in the responses to interview question 6. This finding is consistent with the literature on IT governance, which highlights the importance of establishing clear policies and procedures to ensure compliance with relevant laws and regulations (Von Solms & Von Solms, 2004). According to Von Solms and Von Solms (2004), effective IT governance involves establishing a robust framework of policies and procedures to guide IT decision-making.

Finally, the themes of legal and resource management, strategic planning, digital presence and engagement emerged in response to interview question 7, indicating that these institutions prioritize strategic planning and resource management. This finding is supported by the literature on strategic planning, which emphasizes the importance of aligning IT strategies with organizational goals and objectives (Bryson, 2018). According to Bryson (2018), effective strategic planning involves establishing clear goals and objectives and allocating resources to support strategic initiatives.

Overall, the findings suggest that CALABARZON HEIs recognized by CHED as COEs/COD in IT prioritize IT governance implementation, with a strong emphasis on curriculum integrity, quality control, technological infrastructure, IT leadership, service delivery, and operational oversight. These findings have implications for practice, highlighting the importance of establishing clear governance structures and procedures, prioritizing data security and privacy, and ensuring compliance with relevant laws and regulations.

Part 6. How potential barriers and opportunities are being mitigated and addressed in the implementation of IT Governance in the CALABARZON HEIs recognized by CHED as COEs/CODs in IT

Table 10: Sub-Coding on the Potential Barriers and Opportunities in the Implementation of IT Governance in the CALABARZON HEIs Recognized by CHED as COEs/COD in IT are being Mitigated and Addressed

Interview Question No.	Sub-Coding	Themes/Meaning Units
1	S1, S2, S3, S4: Lack of Proper Trainings, Use of Learning Management System, and Stakeholders' Resistance to Change	Training Gaps, Adoption of Technology, Resistance to Change
2	S1, S2, S3, S4: Continuous Improvement of the ITG, IT Resource Utilization, and Top Level Management as ITG Champion	Ongoing Enhancement, Resource Efficiency, Leadership Support

3	S1, S2, S3, S4: Implementing IT Strategies, Management Support, and Top Level Management Support	Strategic Execution, Management Involvement, Top-Level Advocacy
4	S1, S2, S3, S4: Good Policy and Proper Trainings, Professional Contribution, and Standard Procedure & Institution Wide Policy	Policy Framework, Professional Development, Standardized Procedures
5	S1, S2, S3, S4: Trainings & Seminars and Data Protection, Fast Changing Technology, and ISO Certification	Knowledge Enhancement, Data Security, Quality Assurance

The qualitative data presented in Table 10 provides a nuanced understanding of the potential barriers and opportunities in the implementation of IT governance in CALABARZON Higher Education Institutions (HEIs) recognized by CHED as COEs/CODs in IT. Analyzing the data sequentially, it becomes apparent that the institutions face several challenges, including training gaps, adoption of technology, and resistance to change, as evident in the responses to interview question 1. This finding is consistent with the literature on IT adoption, which highlights the importance of addressing user resistance to change through effective training and support (Al-Gahtani, 2016). According to Al-Gahtani (2016), training programs can enhance user acceptance and adoption of new technologies.

However, the institutions have implemented various strategies to mitigate these barriers and capitalize on opportunities. For instance, the themes of ongoing enhancement, resource efficiency, and leadership support emerged in response to interview question 2, indicating that the institutions prioritize continuous improvement and resource utilization. This finding is supported by the literature on IT governance, which emphasizes the importance of establishing a culture of continuous improvement and leveraging leadership support to drive IT innovation (Wilkin & Chenhall, 2010). According to Wilkin and Chenhall (2010), effective IT governance involves establishing a framework for continuous improvement and leveraging leadership support to drive IT innovation.

The data also reveal that the institutions have implemented strategic execution, management involvement, and top-level advocacy to address potential barriers and opportunities, as evident in the responses to interview question 3. This finding is consistent with the literature on strategic planning, which highlights the importance of aligning IT strategies with organizational goals and objectives (Mintzberg & Waters, 1985). According to Mintzberg and Waters (1985), effective strategic planning involves establishing clear goals and objectives and allocating resources to support strategic initiatives.

Furthermore, the themes of policy framework, professional development, and standardized procedures emerged in response to interview question 4, indicating that the institutions prioritize establishing clear policies and procedures to guide IT decision-making. This finding is supported by the literature on IT governance, which emphasizes the importance of establishing a robust framework of policies and procedures to ensure accountability and transparency (Von Solms & Von Solms, 2004). According to Von Solms and Von Solms (2004), effective IT governance involves establishing a framework of policies and procedures that guide IT decision-making and ensure compliance with relevant laws and regulations.

Finally, the themes of knowledge enhancement, data security, and quality assurance emerged in response to interview question 5, indicating that the institutions prioritize knowledge enhancement and data security. This finding is consistent with the literature on IT security, which highlights the importance of protecting sensitive information and ensuring compliance with relevant laws and regulations (Dhillon & Backhouse, 2001). According to Dhillon and Backhouse (2001), effective IT security involves implementing robust security measures and providing training and support to users.

Overall, the findings suggest that CALABARZON HEIs recognized by CHED as COEs/CODs in IT have implemented various strategies to mitigate potential barriers and capitalize on opportunities in the implementation of IT governance. These strategies include establishing clear policies and procedures, prioritizing continuous improvement and resource utilization, and leveraging leadership support to drive IT innovation.

6. Conclusions

The effective governance of information technology (IT) is crucial for higher education institutions to achieve their strategic objectives, improve efficiency, and continuously enhance academic excellence. Based on the findings of this study, this section presents conclusions and recommendations that aim to inform and guide higher education institutions in improving their IT governance practices and achieving maturity in IT governance.

After a comprehensive analysis of the IT governance practices of selected higher education institutions, the following conclusions are drawn:

1. Higher Education Institutions (HEIs) recognized as Centers of Development (CODs) or Centers of Excellence (COEs) in the Philippines are adopting various IT governance frameworks to support their goals of excellence. They prioritize information security management and project management, with many considering ISO27001 and PMBOK for future adoption.
2. The selected higher education institutions have a "Managed" level of maturity in IT governance, indicating that they have established effective IT governance practices but may not have achieved full optimization.
3. There is a significant positive correlation between IT governance practices and levels of maturity of IT governance, suggesting that effective IT governance practices are strongly associated with higher levels of maturity in IT governance. Governance was identified as a significant predictor of the levels of maturity of IT governance, highlighting the importance of effective governance structures and practices in achieving maturity in IT governance.
4. The selected higher education institutions have implemented various strategies to mitigate potential barriers and capitalize on opportunities in the implementation of IT governance, including establishing clear policies and procedures, prioritizing continuous improvement and resource utilization, and leveraging leadership support to drive IT innovation.
5. The HEIs prioritize knowledge enhancement and data security, recognizing the importance of protecting sensitive information and ensuring compliance with relevant laws and regulations.
6. The institutions have established a culture of continuous improvement, with a focus on ongoing enhancement, resource efficiency, and leadership support.

7. Recommendations

In relation to the above enumerated conclusions, the following recommendations are drawn to support these institutions in their efforts to leverage IT to drive innovation, excellence, and success.

1. The HEIs recognized as CODs/COEs in the Philippines may strategically adopt and implement IT governance frameworks like ISO27001 and PMBOK, tailored to their specific needs and resources, to enhance their information security management and project management capabilities, ultimately supporting their goals of excellence in teaching, research, and service programs.

2. Higher education institutions may focus on further improving their IT governance practices, particularly in areas such as Governance, Resources, Organization, and Services, to achieve higher levels of maturity in IT governance. Institutions should establish clear governance structures and practices, including well-defined roles, responsibilities, and accountability mechanisms, to support effective IT governance.

3. The Higher Educational Institutions should develop effective service delivery practices that meet the needs of customers and stakeholders, to achieve business value from IT investments.

4. The institutions should regularly monitor and evaluate their IT governance practices to identify areas for improvement and ensure that they are aligned with organizational objectives.

5. Higher education institutions should continue to prioritize knowledge enhancement and data security, investing in training programs and robust security measures to protect sensitive information and ensure compliance with relevant laws and regulations. Institutions should establish a robust framework of policies and procedures to guide IT decision-making, ensuring accountability and transparency in IT governance.

6. Institutions should leverage leadership support to drive IT innovation, establishing clear governance structures and practices that prioritize continuous improvement and resource utilization. Institutions should regularly monitor and evaluate their IT governance practices, identifying areas for improvement and ensuring that they are aligned with organizational objectives.

8. Authors' Biography

Dr. Farley L. Abrigo is a dedicated educator and IT professional with extensive experience in academic and IT project management. He holds a Doctor of Education (Ed.D.) in Educational Management degree from Manuel S. Enverga University Foundation, and an MS and BS in Computer Science from AMA Computer University. Formerly working as Quality Assurance Officer, he is currently serving as Computer Science Chair at First Asia Institute of Technology and Humanities (FAITH Colleges). He has presented research on IT governance and innovative tech solutions, and is involved in various professional organizations like PSITE and PACUCOA.

Dr. Claudia Odette J. Ayala is a devoted researcher and educator at the College of Arts and Sciences, Manuel S. Enverga University Foundation, Lucena City. Her research interests include language education, literature, and cultural studies, with a focus on enhancing teaching practices and understanding cultural contexts. With a strong academic background, including a Doctor of Philosophy in Development Communication, Dr. Ayala has published research and presented papers at various conferences,

contributing to the field of language education and literature. She is an active member of professional organizations, fostering collaboration and knowledge sharing among peers.

Dr. Rogel L. Limpiada is a renowned educator and academic leader, he served as the President of the Council of Deans and Educators of Business in Region IV-A for the Academic Year 2024-2025. A distinguished alumnus of Manuel S. Enverga University Foundation, San Pablo Colleges, Polytechnic University of the Philippines and St. Linus University, Dr. Limpiada holds multiple degrees, including Bachelor of Science in Industrial Engineering, Master of Arts in Education, Master in Business Administration, Doctor in Education Management, and Doctor in Business Administration. He earned 18 Units in the PhD in Industrial Psychology program at EARIST, and now enrolled in the Doctor in Public Administration in Tarlac State University. A multi-awarded academic leader, Dr. Limpiada has received numerous local and international recognitions, including the Natatanging Lucenahin Award, Asia's Most Empowered Research Educator, and Outstanding Professor, Researcher, and Exemplary School Administrator of the Year. With a strong passion for research and international collaboration, Dr. Limpiada has presented papers in various countries and has established partnerships with universities worldwide. He is also a visiting professor at the Asian Institute of Cambodia. As a seasoned educator and leader, Dr. Limpiada continues to inspire and empower future generations of educators and professionals at the Colegio de la Ciudad de Tayabas where he is currently a Professor I and Vice President for Academic Affairs.

9. References

1. Abdullah, A., & Alias, R. "The impact of ISO 9001 on IT service quality in higher education institutions." Journal of Quality Assurance in Hospitality & Tourism, 2019, 20(3), 257-273.
2. Al-Gahtani, S. S. "Empirical investigation of e-learning acceptance and assimilation: A structural equation model." Applied Computing and Informatics, 2016, 12(1), 37-50.
3. Ali, M., & Lee, S. "The relationship between IT governance and institutional performance in higher education institutions." Journal of Enterprise Information Management, 2019, 32(5), 737-755.
4. Alreemy, Z., & Abareshi, A. "IT governance maturity and institutional performance: A systematic review." Journal of Systems and Information Technology, 2020, 22(1), 2-20.
5. Altbach, P. G., Reisberg, L., & Rumbley, L. E. "Trends in global higher education: Tracking an academic revolution." 2009, UNESCO.
6. AXELOS. "ITIL Foundation: ITIL 4th Edition." 2016.
7. Biddix, J. P. "IT governance in higher education: A framework for decision-making." Journal of Higher Education Policy and Management, 2018, 40(1), 35-48.
8. Bryson, J. M. "Strategic planning for public and nonprofit organizations: A guide to strengthening and sustaining organizational achievement (5th ed.)." 2018, John Wiley & Sons.
9. CHED. "CHED Memorandum Order No. 32, s. 2018." 2018.
10. CHED. (n.d.). "Centers of Excellence and Development. Commission on Higher Education."
11. Cruz, R., & Santos, R. "IT governance maturity in Philippine higher education institutions: A case study." Journal of Information Technology Education: Research, 2018, 17, 105-125.
12. De Haes, S., & Van Grembergen, W. "An exploratory study into IT governance

implementations and its impact on business/IT alignment. Information Systems Management, 2009, 26(2), 123-137

13. Dhillon, G., & Backhouse, J. "Current directions in IS security research: Towards socio-organizational perspectives. Information Systems Journal, 2001, 11(2), 127-153.

14. Fernando, S., & Fernando, E. "IT governance and strategic objectives in higher education institutions: A case study. Journal of Cases on Information Technology, 2020, 22(2), 1-15.

15. Goh, S., & Tan, K. "Barriers to IT governance implementation in higher education institutions: A case study." Journal of Information Systems Education, 2018, 29(2), 147-158.

16. Humphreys, E. Information security and ISO 27001: An introduction. Information Security Technical Report, 2008, 13(2), 68-73.

17. International Organization for Standardization. "ISO/IEC 38500:2015 - Corporate Governance of Information Technology." 2015.

18. ISACA. "COBIT 2019 Framework: Introduction and Methodology." 2018.

19. Ismail, N., & Hassan, R. COBIT framework adoption in Malaysian higher education institutions: A survey. Journal of Information Systems and Technology Management, 2019, 16(2), 155-172.

20. ISO/IEC. "ISO/IEC 38500:2015 Corporate governance of information technology." 2015.

21. IT Governance Institute. "IT Governance Global Status Report." 2007.

22. Ko, D., & Fink, D. "IT governance: A critical review and research agenda. International." Journal of Accounting Information Systems, 2010, 11(2), 115-133.

23. Kotarba, M. "IT service management: A study of critical success factors." Journal of Enterprise Information Management, 2016, 29(4), 567-585.

24. Kumar, S., & Singh, M. "IT leadership: A study of critical success factors." Journal of Enterprise Information Management, 2017, 30(4), 567-585.

25. Mintzberg, H., & Waters, J. A. "Of strategies, deliberate and emergent." Strategic Management Journal, 1987, 6(3), 257-272.

26. Nfuka, E. N., & Rusu, L. "The effect of critical success factors on IT governance \ performance." Industrial Management & Data Systems, 2011, 111(9), 1418-1448.

27. Prasad, A., Heales, J., & Green, P. "Measuring the business value of IT investments: A systematic review." International Journal of Accounting Information Systems, 2015, 17, 28-46.

28. Project Management Institute. "A guide to the project management body of knowledge (PMBOK guide) (6th ed.)." 2017.

29. SEI. "CMMI for Services, Version 1.3. Software Engineering Institute." 2010.

30. Siau, K., & Long, Y. "Synthesizing e-government stage models - a meta-synthesis based on meta-ethnography approach." Industrial Management & Data Systems, 2005, 105(4), 443-458

31. Simonsson, M., & Johnson, P. "Assessment of IT governance - A prioritization of ISACA's COBIT." Proceedings of the 2006 ACM SIGMIS CPR Conference on Computer Personnel Research, 2006, 48-57.

32. Siponen, M., & Willison, R. "Information security management standards: Problems and solutions." Information & Management, 2007, 44(3), 267-275.

33. Srivastava, S., & Kumar, P. "Improving IT service management using ITIL in Thai higher education institutions: A case study." Journal of Service Science Research, 2020, 12(1), 35-50.

34. Tuttle, B., & Vandervelde, S. D. "An empirical examination of the IT governance framework." Journal of Information Systems, 2007, 21(1), 67-86.

35. Van Grembergen, W., & De Haes, S. "Enterprise governance of information technology: Achieving strategic alignment and value." 2009, Springer Science & Business Media.

36. Von Solms, B., & Von Solms, R. "Information security governance: A model for boards of directors. In H. S. Venter, M. Eloff, L. Labuschagne, & J. H. P. Eloff (Eds.)," Proceedings of the ISSA 2006 from Insight to Foresight Conference, 2006, (pp. 1-9).

37. Weill, P., & Ross, J. W. "IT governance: How top performers manage IT decision rights for superior results." 2004, Harvard Business School Press.

38. Wilkin, C. L., & Chenhall, R. H. "A review of IT governance literature: Taxonomy and directions for future research." Journal of Information Systems, 2010, 24(1), 57-81.