

# Evaluating a Conceptual Framework for Implementing IT Governance: A Case of Uganda's Higher Institutions of Learning

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**Abstract** - The reliance on IT in day-to-day organisational activities raises concern about how to deal with its increasing complexity. Managing IT necessitates implementing IT governance to realise the benefits of IT use. However, there are inadequate and suitable frameworks to implement IT governance. For Higher Institutions of Learning (HILs) in Uganda, the case is not different, so there is need to provide a framework to implement IT governance in Uganda's HILs. This paper, therefore, applies design science research principles to develop and evaluate a conceptual framework for implementing IT governance in HILs in the context of Uganda (IGHU). The evaluated conceptual framework was developed in an earlier study. The evaluation methods used were case study and expert opinion which were based on understandability, ease of use, usefulness, and completeness. Results showed the framework satisfactorily implemented IT governance in Uganda's HILs.

Keywords: IT Governance, IT Governance Framework, Higher Institutions of Learning, Evaluation, Uganda

## I. INTRODUCTION

The growing use of IT in daily operations has increased concern about organisations' increased and perilous need for IT and how to handle its increasing complexity [1]. IT is vital in supporting institutional developments [2]. It is crucial for the growth, innovation, and consolidation of fusions and acquisitions. Yet, [3] present that consistently determining the benefits of IT presents some challenges for managers due to the particularities of IT management. According to [4], an understanding of and familiarity with IT are essential to developing the alignment between business strategy, mission, and IT. Also, IT improves effectiveness and efficiency in public service delivery in public sector organizations [5]. For Higher Institutions of Learning (HILs), IT enables automated access to public services using government IT platforms [6].

Managing IT systems necessitates implementing IT governance [7] to encourage and realise desirable behaviours in IT use. IT governance is a process by which organizations align their information technology operations and services with their performance goals and strategic objectives and assess the results [2]. IT governance is an essential instrument in supporting and achieving the goals

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of an organization [8]. IT governance smooths working processes [9]. Besides, it also offers solutions within budget, with better quality, and on time [10].

IT in HILs is complex, consisting of a heterogeneous set of technologies involving various applications, platforms, educational systems, and cloud applications to support their teaching, learning, research, and administrative processes [11]. In contrast, the increased complexity of IT, the need to control IT costs, and the consequences of legal requirements have caused organisations to reflect on the importance of IT governance [12].

In Uganda, to enable improved public service delivery, the government invests a lot of money in IT systems to serve its citizens [13]. The Ministry of ICT and National Guidance (MoICT&NG) is the lead ministry that provides necessary policy frameworks in conjunction with regulatory bodies such as the National Information Technology Authority-Uganda (NITA-U). The public sector in Uganda consists of ministries, departments, and agencies (local government and academia) [14]. In support of IT in the public sector, the government has enabled many organisations to connect to the National Data Transmission Backbone and e-Government Infrastructure. Implementing the Last Mile Project extends connectivity to 700 ministries, departments, and agencies across the country [15] and puts up ICT incubation hubs and centers and ICT parks to support ICT innovations and ICT-enabled services [14]. NITA-U has developed a methodology for managing IT projects for public and private sector organizations [13]. It provides structures and processes to enable the integration of IT and the projects' objectives. Also, there is heavy investment in IT systems to support operations in Uganda's HILs. Despite all this, IT systems continue to not satisfactorily work to meet users' expectations in HILs in Uganda [16]. Multiple systems, structures, processes, and technologies instituted at HILs bring significant complexity to managing IT, necessitating a focus on IT governance [11]. Empirical studies concerning appropriate IT governance frameworks and IT governance performance are still limited [11]. Most existing studies in the IT governance sphere have been for developed countries [17], disregarding the context of developing countries. Yet, the implementation of IT governance in HILs in Uganda is not known. Hence, the aim of this paper is to evaluate a conceptual framework for implementing IT governance in HILs in Uganda [21].

Framework evaluation is a systematic form that enables collecting information concerning the characteristics, activities, and outcomes of a framework to facilitate decision-making [18]. Frameworks must be conceptually articulate, dependable, and testable. [18] Furthermore, evaluation can help determine if a product will perform as planned, meet its goals and objectives, and may help to find areas for improvement. A product is considered complete if it meets the requirements and constraints of the problem it was supposed to solve [19]. According to [20], the basis for evaluating artifacts should depend on the requirements of the context in which it is applied. Evaluation of artifacts may take the following forms: performance, usability, reliability, consistency, accuracy, functionality, and completeness.

Therefore, this paper used design science research to develop and evaluate a conceptual framework for implementing IT governance in Uganda’s HILs (IGHU) attained in two phases: development and evaluation. The development phase was conducted in a previous study that designed a conceptual framework for IT governance mechanisms in Uganda’s HILs [21], which was evaluated in this paper. The IGHU evaluation was conducted using two methods; case study method using interview technique on 7 respondents and the expert opinion method using a survey technique on 9 experts from academia and practitioners. This paper was extracted from the following thesis: “A framework for Implementing IT Governance for Uganda’s Higher Institutions of Learning” [22]. The following sections are organized as follows: section 2 covers the research methodology, section 3 presents the results, and section 4 presents the conclusion.

*A. Application of Design Science Research*

The IGHU framework was developed using design science and its interplay with behavior science. This was inspired by the development of a conceptual framework to implement IT governance in the studied degrees awarding eight HILs in Uganda by providing an artifact, in this case, a framework. This framework provides the practical knowledge necessary for improving IT governance in these institutions. This knowledge is known as “design theory” [23].

Design science was used in this study because it is a problem-solving paradigm that seeks to extend the

boundaries of human and organisational capabilities by creating new and innovative artifacts. Design science research guides designing and evaluating new artifacts that solve a known problem [24]. For this study, the problem being addressed is the poor implementation of IT governance in Uganda’s Higher Institutions of Learning, which is solved by providing the IGHU framework (Figure 4) as an artifact.

Likewise, design theory development presents a cycle of proposing, refining, and testing design theory [25]. Design science research is presented in the form of a cycle in two phases: build and evaluation, which is iteratively done in relation to the artifact built to address the known problem and then evaluated on the solution it provides. The development was achieved in the following cycles, through iterations (Figure 1).

II. RESEARCH METHODOLOGY

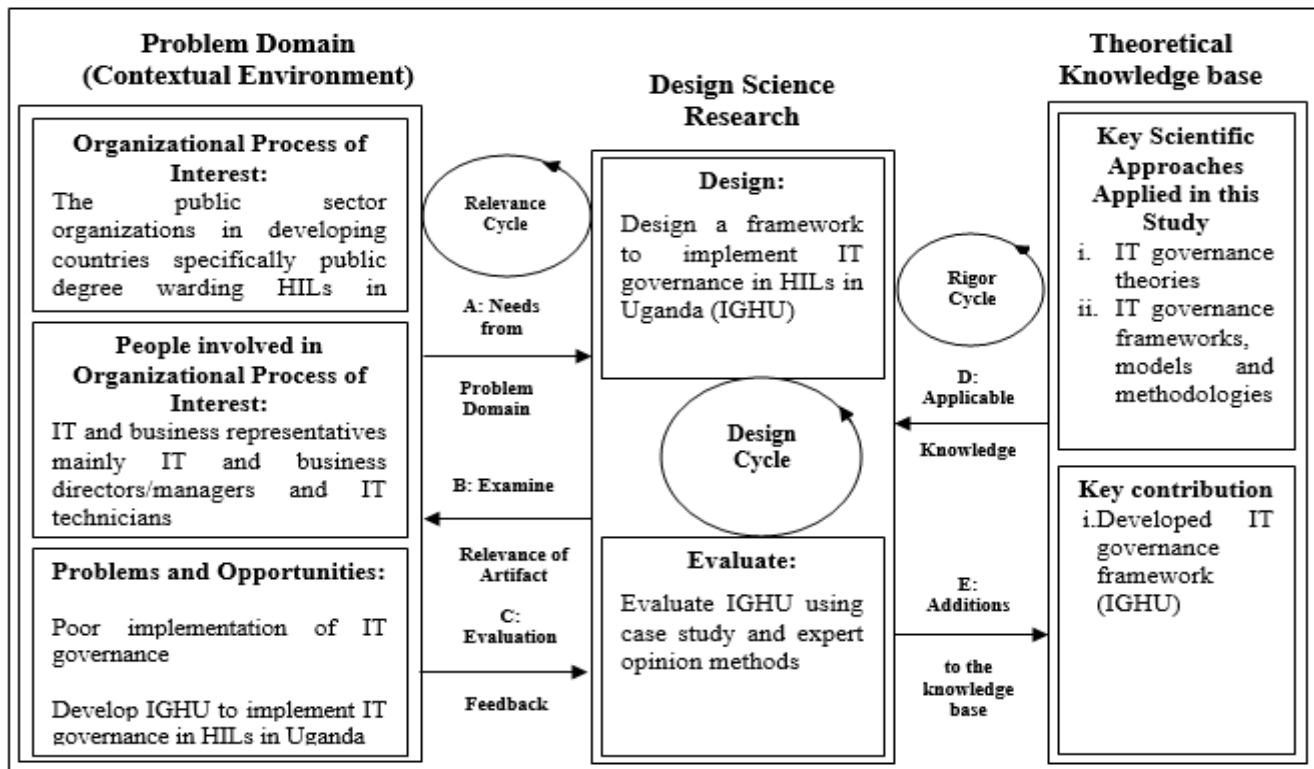


Figure 1: Adoption of Design Science Research Method [24]

The relevance cycle: the numerous iterations of the relevance cycle involving A, B, and C enabled us to determine the requirements of this study's artifact and define the necessary criteria to evaluate results for this study [26] to establish if the built artifact enhances the contextual environment. The design cycle: A and C depict the contextual environment's needs and evaluation feedback. The outcomes of the design cycle are twofold. First, there is a need to examine the relevance of the design artifact to the contextual environment upon evaluation and the key additions to the knowledge base shown by B and E. Second, the relevant knowledge from the knowledge base used to support the design and evaluation of the artifact in this study is shown by D. The rigor cycle: This study adopted fundamental scientific approaches involving IT governance theories, IT governance frameworks, models and methodologies, as well as IT governance mechanisms to design, which resulted in the development of a conceptual framework to implement IT governance in Uganda's HILs [21], as earlier mentioned. The evaluation was accomplished in two phases using case study and expert opinion methods.

**1. Development Phase**

The development phase involved conducting an exploratory study to investigate the implemented IT governance mechanisms in the eight HILs in Uganda, namely: Makerere University, Mbarara University of Science and Technology, Gulu University, Kyambogo University, Busitema University, Kabale University, Lira University, and Soroti University. This led to the development of a conceptual framework for IT governance mechanisms in Uganda's HILs conducted in an earlier research [22]. The earlier study helped to derive and test constructs for the conceptual framework (IGHU). Which was a basis for the IGHU framework evaluation.

**2. Evaluation Phase**

In this paper, the evaluation criteria used were understandability, completeness, ease of use, and usefulness, as in earlier related studies [4]. The evaluation was done as follows:

*Phase 1.* Since the evaluation of IT governance is more appropriate in a real environment, the case study method was deemed suitable [27] to evaluate IGHU. The studied case was Kyambogo University because it was convenient for the researchers. Purposive sampling was used to determine the respondents who met the evaluation criterion [28]. Seven respondents were selected: IT directors/managers (four) and business directors/managers (three). Guided face-to-face interviews were conducted using interview questions. The IGHU framework was sent to the respondents before conducting the interviews. The respondents were individually interviewed for an average of 30 minutes, and the feedback was noted and recorded.

*Phase 2.* The expert opinion method was used in Phase 2 to evaluate IGHU. A self-administered questionnaire was used. Nine experts in IT governance in HILs were selected depending on their expertise, credibility, and dependability. This is in line with [29], who argued that an adequate number of 5–10 experts are needed for an evaluation. Respondents (from academia and practitioners) included: NITA-U (two), the Ministry of Education and Sports (one), the Ministry of ICT and National Guidance (two), and four HILs in Uganda, namely Makerere University (one), Mbarara University of Science and Technology (one), Soroti University (one), and Kabale University (one). The questionnaire consisted of a 5-point Likert scale ranging from “strongly agree” to “strongly disagree,” indicating the level of agreement of experts in IT governance. Likewise, the mean, mode, and standard deviation were used to determine the level of agreement of experts and the closeness of responses.

**III. RESULTS**

*A. Phase 1. Evaluation of IGHU using Case Study Method*

Respondents were represented from three levels of the organisational hierarchy: top management, middle management, and operational management. Three respondents represented top management, two represented middle management, and two represented operational management. To reduce bias in the results, respondents from different hierarchy levels were represented.

Table 1. Distribution of respondents for evaluation of IGHU using case study method

	<b>Top management</b>	<b>Middle management</b>	<b>Operational management</b>
IT directors/managers	ICT director - 1 (R1)	IT officer - 1 (R2)	<ul style="list-style-type: none"> <li>• Assistant IT officer (web and media) - 1 (R3)</li> <li>• Assistant IT officer (network and infrastructure development) - 1 (R4)</li> </ul>
Business directors/managers	<ul style="list-style-type: none"> <li>• Director Planning and Development - 1 (R5)</li> <li>• ICT auditor - 1 (R6)</li> </ul>	Procurement officer - 1 (R7)	
<b>Total</b>	<b>7</b>		

Interview responses and resultant improvements in IGHU were as follows:

**1. Understandability of IGHU:** The views of respondents on the understandability of IGHU were analysed as follows:

When asked if IGHU “was clear and not ambiguous,” Most of the respondents agreed that the framework was straightforward and did not leave any doubt; however, the

following was noted: R5 mentioned, *“The framework is clear to me since I head the directorate of planning and development.”* R7 and R4 observed that *“the framework should be more specific to HILs than public sector organisations.”* It was observed that the IT governance mechanism *“Strategic Business Objectives”* should be indicated to show the overall goal of the framework. R1 mentioned that *“consider how critical IT is in obtaining the institution’s objectives, such as teaching, learning, research, and administrative processes.”*

Respondents were asked if IGHU *“serves the purpose of implementing IT governance in HILs in Uganda.”* However, all the respondents noted that the framework serves the purpose of implementing IT governance. It was pointed out that the framework was a guiding tool for IT management. For example, *“if you look at the Integrated Financial Management System, it helps us run reports, and suppliers are paid timely, so this framework will guide”* R7. R6 noted that measuring the value of IT should be implemented at a high level in HILs to realize IT’s role. R6 was quoted as having said that *“if you can’t measure it, then you can’t control it.”*

Findings on *“easy to learn”*. Although most respondents mentioned that IGHU was easy to understand and spent little time mastering it, some respondents indicated the framework was lacking. For instance, it was observed that the information flow was not well presented. In addition, the framework had unidirectional arrows, implying information flows in one direction. For example, R3 informed us that *“there should be a bidirectional arrow between the Chief Information Officer (CIO) on board and executive IT management.”*

When asked if the IGHU *“has clear language,”* most respondents agreed that the framework had straightforward language. However, a term like *“CIO”* was new to most of them. For example, R2 and R7 mentioned that *“CIO is a new abbreviation, and such abbreviations should not be used in the framework or a key should be provided.”* R1 indicated that the word *“evaluation”* should be added to the process *“monitoring”* since monitoring is a continuous process and evaluation provides the outcome; therefore, the process should be named *“monitoring and evaluation.”* R1 further proposed that accountability for IT projects be combined with monitoring and evaluation and was quoted having said that *“you cannot monitor and evaluate without accounting for actions.”* Also, it was suggested that the *“architectural steering committee be renamed as the architecture and infrastructure committee since it is supposed to provide input, recommendations, and architected solutions on IT infrastructure service types such as data and voice networks, email, calendar, and productivity tools.”* R4.

**2. Ease of use of IGHU:** The views of respondents on the ease of use of IGHU were analysed as follows:

Findings on *“whether the framework was efficient to use”* showed that respondents agreed that IGHU was efficient to use. For example, R1 stated that *“the framework was to a greater degree efficient for usage.”* R3 mentioned that *“the framework greatly improves implementing IT governance*

*in academic institutions.”* R2 said that *“once awareness campaigns in HILs are undertaken, the framework can easily be used and should be steered by top management to lower people to avail support.”*

Findings on *“if the framework can easily be recalled and accepted”* showed that most respondents agreed that they quickly recognise IT governance mechanisms, and they recommended the framework be used. R7 noted that since *“the mechanisms are easily remembered because they are categorised into the internal and external environment.”* However, R6 noted that *“yes, the framework can easily be recalled, but staff who are old in nature have to be trained and nurtured to apply it.”*

When asked if the framework *“reduces operations tasks,”* most respondents noted that the framework reduces the functions of IT operations in HILs. One respondent informed us that *“since IT is an enabling component in the day-to-day activities in the institution, then the framework will help.”* R6. It was observed that the framework eliminates unnecessary tasks because it aligns mechanisms at their respective organisational levels.

Respondents were asked if the proposed framework is like well-known IT governance frameworks. Findings indicated that most respondents agreed that IGHU is somehow similar to the existing frameworks. It was observed that *“the framework is consistent with other general frameworks because it consists of mechanisms for IT governance implementation.”* R2. However, R3 urged the framework to be further structured for it to be more helpful.

**3. The usefulness of IGHU:** The views of respondents on the usefulness of IGHU were analysed as follows:

When asked to assess *“if the framework added knowledge,”* most respondents indicated that IGHU improved their skills. For example, R1 noted, *“the framework provides the necessary IT governance mechanisms that should be in place to realise IT governance implementation and improve IT management.”*

Findings on *“whether the framework guided in making appropriate IT decisions, planning of IT systems and improve strategic alignment of IT and business.”* Respondents noted that the framework would guide them in making IT decisions. R5 was quoted as having said that *“it is well detailed; it helps in the completion of IT processes, i.e., it is like a checklist.”* It was also observed that *“the framework will help in guiding policy development because usually policies are developed as emergency measures, so such a framework will guide policymakers”* R1. However, R4 told the researcher that *“once the framework is enhanced, it will help realise IT gaps.”* R5 also urged that IGHU be structured as an *“ICT Charter Outline for Universities.”* *“This outlines the decision-making authority and responsibility of various IT governance organs.”* R5. R7 also noted that stakeholders’ participation is like the government, industry, and customers since they are all stakeholders in HIL; thus, they should be combined.

**4. Completeness of the IGHU:** The views of respondents on the entirety of IGHU were analysed as follows:

The assessment of IGHU's completeness revealed that the framework was, to a greater extent, complete. Respondents noted that the framework catered to key stakeholders in IT governance. However, R4 said that “the framework will be regarded as complete only if the raised concerns are addressed.”

The improved framework is shown in figure 2 as follows:

*B. Phase 2: Evaluation of IGHU using expert opinion method*

The improved IGHU framework (Figure 2) was sent to IT governance experts prior the exercise.

Table 2. Distribution of experts for evaluation of IGHU

Organization	Experts in IT governance	Title
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MoICT&NG	2	i) Commissioner of e-services ii) Board member (ICT)
MoES	1	i) Head of ICT department
NITA-U	2	i) Senior system analyst ii) Board member (ICT)
MUK	1	Director of ICT
SU	1	Head, ICT department
MUST	1	Systems administrator
KAB	1	Head, ICT department
Total	9	

Results for experts in IT governance were as follows:

**1. Understandability of IGHU:** The aspects assessed were whether the IGHU was clear and not ambiguous, served the purpose of implementing IT governance, was easy to learn and had clear language. The mean, mode, and standard deviation of experts concerning the understandability of IGHU are in table 3.

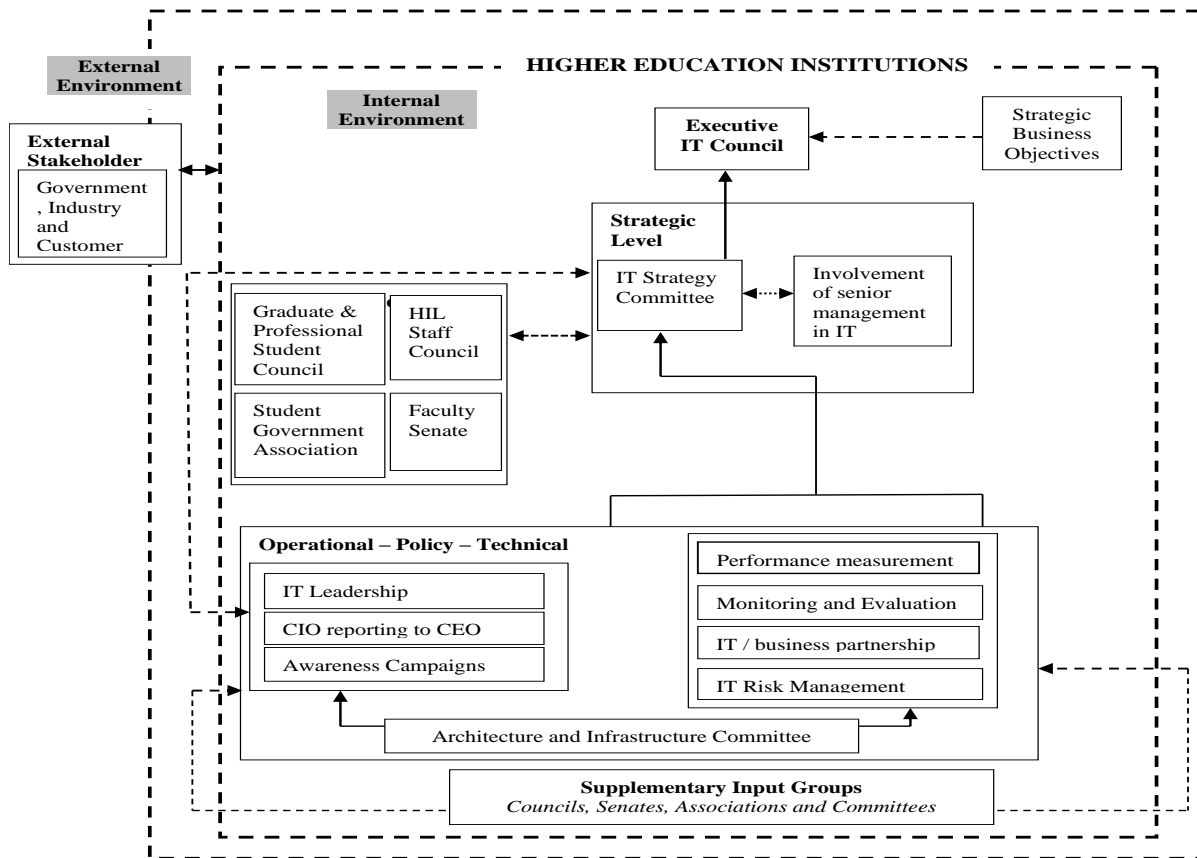


Figure 2. IT governance framework for HILs in Uganda from phase 1 of framework evaluation [22]

Key: CIO – Chief Information Officer

Table 3. Understandability of IGHU

	Mean ( $\bar{x}$ )	Mode ( $\mu$ )	Standard Deviation ( $\sigma$ )
I find IGHU clear and not ambiguous	4.22	4.00	0.44
I easily understand the external mechanisms in IGHU	4.11	4.00	0.60
I clearly understand the internal mechanisms in IGHU	4.44	4.00	0.53

IGHU was convenient to be used	4.67	5.00	0.50
The purpose of the IGHU is understandable	4.44	4.00	0.53
There is the ease of learning to perform IT governance	3.67	4.00	0.71
IGHU is well described	4.44	4.00	0.53
The language used was simple and easy to understand	3.78	4.00	0.67

Average Mean	4.22	4.13	0.56
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Experts in IT governance agreed that IGHU was clear, and they would easily differentiate IT governance mechanisms for the internal and external environments. They further expressed that IGHU was detailed and well-described. However, it was noted that the terms used should be customised to the common and well-known terms of Ugandan HILs. Such terms included “Graduate & Professional Student Council” to “Research and Graduate Studies”; “HILs Staff Council” to “Academic Staff Association and Non-Academic Staff Association”; “Awareness Campaigns” to “Awareness and Advocacy”; and “Student Government Association” to “University Guild.” It was also suggested that the following IT governance mechanisms be eliminated, such as the architecture and infrastructure committee, because its functions are presumed to be handled by IT leadership.

The average mean of 4.22 showed that experts in IT governance clearly and well understood the framework. Still, the average standard deviation, at 0.56, reflected a less significant difference in experts’ viewpoints.

**2. Ease of use of IGHU:** The aspects assessed were whether IGHU was efficient to use, easily recalled, acceptable, reduced the tasks of operation, like well-known IT governance frameworks, and was convenient in use. The mean, mode, and standard deviation of experts concerning the ease of use of IGHU are in table 4.

Table 4. Ease of use of the IGHU

	$\bar{x}$	$\mu$	$\sigma$
I find IGHU applicable	3.78	4.00	0.67
I spent little time learning IGHU	4.00	4.00	0.00
I easily remember IGHU	3.89	4.00	0.33
I think IGHU is reliable in use	4.00	4.00	0.00
I am satisfied with the use of IGHU	3.67	4.00	1.00
IGHU lessens my tasks of operation	4.00	4.00	0.00
IGHU is consistent with other known IT governance frameworks	4.44	4.00	0.53
Average Mean	3.97	4.00	0.36

Experts pointed out that little time was spent learning IGHU and that the framework is reliable, fastens the operating procedures, and could easily be applied. In addition, the average mean of 3.97 and the average standard deviation of 0.36 showed that IGHU was not challenging to be used.

**3. The usefulness of IGHU:** The aspects assessed were whether IGHU added knowledge, guided in making appropriate IT decisions, helped plan IT systems, improved alignment of IT with institutional goals, and helped increase IT governance maturity levels and reliability. The mean, mode, and standard deviation of experts concerning the usefulness of IGHU are in table 5.

Table 5. Usefulness of IGHU

	$\bar{x}$	$\mu$	$\sigma$
IGHU improves my knowledge of IT governance	4.00	4.00	0.00
IGHU increases my desire to use IT	4.56	5.00	0.53
IGHU guides me in making rightful IT decisions	3.78	4.00	0.67
IGHU helps me in planning for IT systems	3.78	4.00	0.67
IGHU helps in the strategic alignment of IT and business goals	4.56	5.00	0.53
IGHU narrows the gap between the IT department and top management	4.44	4.00	0.53
IGHU helps to increase maturity levels of IT governance in HIL	4.56	5.00	0.53
Average Mean	4.24	4.43	0.49

It was confirmed that IGHU increased the experts’ knowledge of IT governance, guided them in making appropriate IT decisions, and bridged the gap between IT directorates/departments, as well as senior managers/decision-makers. However, the following were observed to enhance IGHU: First, the IT steering committee needs to be added and chaired by high-level staff like the CEO (Vice Chancellor) for its presence to be felt. The IT steering committee follows up on decisions made by the IT strategy committee. The average mean of 4.24 showed that experts in IT governance strongly agreed that IGHU was useful. The average standard deviation of 0.49 confirmed that experts’ opinions did not greatly differ.

**4. Completeness of IGHU:** The aspects assessed were whether IGHU entailed all the necessary mechanisms to implement IT governance and catered to all stakeholders involved in IT leadership and decision-making in HILs. The mean, mode, and standard deviation of experts concerning the completeness of IGHU are in table 6.

Table 6. Completeness of the IGHU

	$\bar{x}$	$\mu$	$\sigma$
I think IGHU has sufficient mechanisms required to implement IT governance	4.00	4.00	0.00
IGHU caters to all stakeholders involved in IT leadership and decision-making in HILs	4.00	4.00	0.00
Average Mean	4.00	4.00	0.00

Experts noted that IGHU was, to a great extent, complete. However, experts urged the researcher to incorporate the suggestions given. The average mean of 4.00 showed experts strongly agreed that IGHU was to a great extent complete. The average standard deviation of 0.00 confirmed the experts’ opinions were not different.

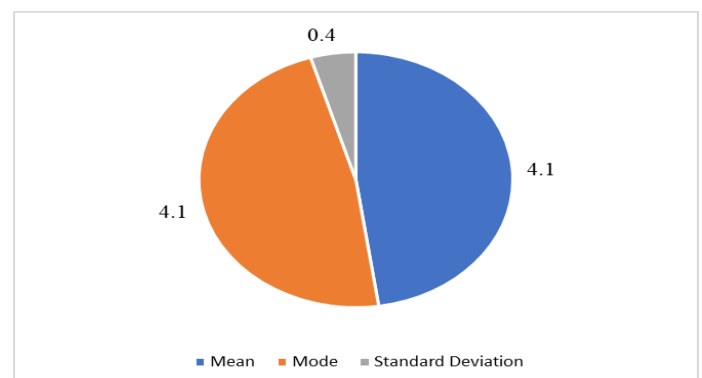


Figure 3. The average overall mean, mode, and standard deviation of experts in IT governance

The overall  $\bar{x}$  of the evaluation of IGHU was 4.1, the overall  $\mu$  of the evaluation of IGHU was 4.1, and the overall  $\sigma$  of the evaluation of IGHU was 0.4. The responses from experts in IT governance and the resultant improvements were made on IGHU upon incorporating the suggestions given. The resultant framework for implementing IT governance in HILs in Uganda is shown in Figure 4.

IGHU consists of the internal environment and the external environment. The internal environment shows established structures in HILs that affect the overall strategic objectives of HILs and the position of IT. In contrast, the external environment stipulates IT-related aspects that HILs and their decision-making organs do not directly control. The internal environment comprises three domains. Each domain encompasses mechanisms that are realised through decision and input structures; these are the executive, strategic, and operational-technical-policy domains.

*Executive domain:* The executive domain is the final decision-making level in HILs concerning IT operations and related management tiers. This domain oversees the overall direction and monitors and assesses IT governance mechanisms. Moreover,

it ensures that IT enables and helps to achieve HILs' mission and business objectives. This is attained by ensuring that the IT

*Strategic domain:* The strategic domain consists of IT governance mechanisms that input and make recommendations that are approved by the executive domain. It is concerned with planning, building, running, and improving all aspects of an IT organization. The domain ensures that IT creates optimal value and mitigates risks.

*Operational-Technical-Policy domain:* This domain is concerned with analysing specialised technical aspects that lead to recommendations, plans, and policies excluded from the strategic domain scope. It ensures that IT builds, maintains, and replaces IT architectural processes based on the risk appetite of the executive domain. This domain handles specifications of IT and risk assessment.

IGHU consists of other bodies, such as the IT advisory body; groups that belong to this body holistically represent the voices of stakeholders. The groups collectively represent the interests of their constituents and actively advocate using either informal or formal mechanisms to meet those interests.

strategic plan is aligned with business goals to realize IT's role.

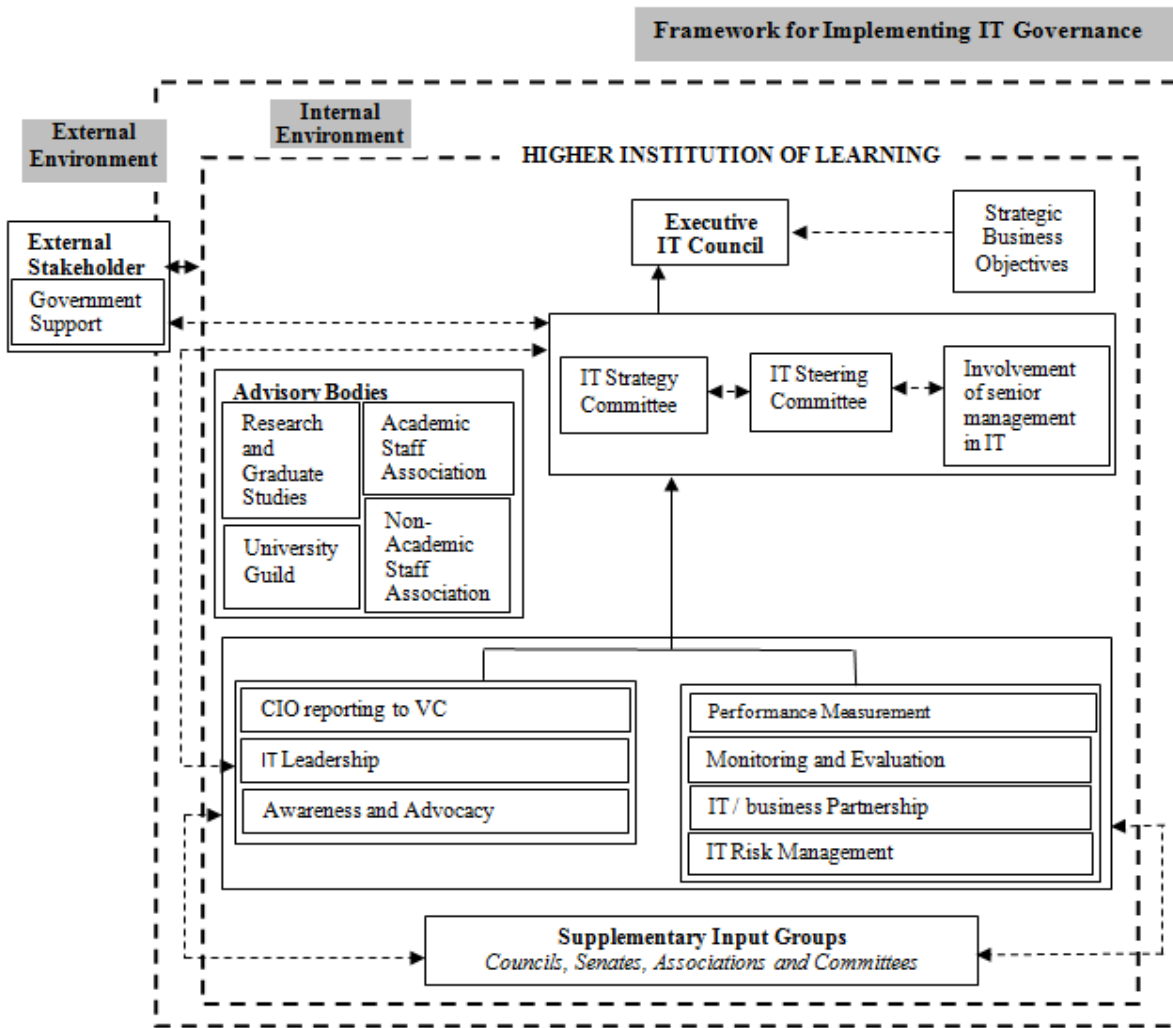


Figure 4. Framework for implementing IT Governance in HILs in Uganda (IGHU)

Key: CIO -> Chief Information Officer such as IT officer



Some IT governance mechanisms required critical observation by the IT executive council; hence, the bidirectional dotted arrows were indicated from the government, industry, and customers and operation levels connecting to the Executive IT Council. Such mechanisms included IT risk management, the CIO reporting to the CEO, IT leadership, and awareness and advocacy.

### I. CONTRIBUTION OF THIS PAPER

IGHU provides people in IT leadership and decision-making with appropriate mechanisms for implementing IT governance.

IGHU enables public managers, decision-makers, and IT practitioners to improve IT-related plans, prioritise limited IT resources for the sustainability of public service delivery, and enhance the continuing strategies for the successful alignment of IT and business.

### II. CONCLUSION

This study sought to evaluate IGHU. Design science methodology was used to build and evaluate IGHU. The IGHU framework was developed using a previous study: a conceptual framework to implement IT governance in Uganda's HILs. Evaluation of IGHU was conducted using case study and expert opinion methods. Generally, the evaluation of IGHU was positive concerning understandability, ease of use, usefulness, and completeness. This shows that IGHU satisfactorily implements IT governance in HILs in Uganda and organizations with similar contexts.

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