

ICT Governance Drivers and Effective ICT Governance at the University of Rwanda

Jean Bosco Nk. Ndushabandi*, Agnes N. Wausi

School of Computing and Informatics University of Nairobi, Kenya

*Corresponding author: j.b.ndushabandi@ur.ac.rw

Abstract Investments in information and communication technology (ICT) based systems and processes are essential for business organizations. Yet many organizations have not been able to derive maximum benefit from their substantial spending on ICT. Some organizations have seen their systems end up as technical or organizational failures. This paper aims at examining the relationship between ICT governance drivers and ICT governance at the University of Rwanda. Adopting the actor network theory perspective to ICT in organizations, we developed a conceptual framework for a holistic approach to examine the ICT governance concept. Empirical data was collected via a survey questionnaire with the respondents being participants from the six colleges, representatives' central administration consisting of top and senior authorities, middle managers as well as academic and ICT staff, thereby enabling an institutional level unit of analysis. The findings revealed a significant positive relationship between ICT strategic alignment and ICT governance; a significant positive relationship between ICT performance management and ICT governance; a significant positive relationship between ICT resource management and ICT governance and a high and significant positive relationship between ICT strategic alignment together with ICT performance management and ICT resource management and ICT governance with ICT resource management being a better predictor of ICT governance than the ICT strategic alignment and ICT performance management. This research therefore recommends that while putting in place ICT governance structures it is important to get the support of top, senior and middle managers as well as involve all stakeholders in the development and implementation of ICT governance at the Institution.

Keywords: *ICT Governance, ICT Management, ICT Strategic Alignment, ICT Performance Management, ICT Resource management, Actor Network Theory*

Cite This Article: Jean Bosco Nk. Ndushabandi, and Agnes N. Wausi, "ICT Governance Drivers and Effective ICT Governance at the University of Rwanda." *American Journal of Information Systems*, vol. 4, no. 2 (2016): 45-58. doi: 10.12691/ajis-4-2-3.

1. Introduction

Universities around the world like other organizations have integrated ICT into their processes to communicate and share information among their community.

It is easy for University ICT project managers to know how much they spent on ICT initiatives, but very few universities, especially in developing countries realize full benefits of their investments. ICT projects are risky, and many fail to deliver on stated business objectives. Every organization has limited resources and more to do than the budget will allow [1].

ICT projects that often fail to deliver value are a major source of contention within organizations. It is for this reason that so much emphasis is placed on high quality ICT project management and ICT project managers paying closer attention to return on ICT investment.

Universities obtain a return value on their ICT investment not only in the form of cost savings but also by improving its global internal organization, user satisfaction, university image and outreach.

The Center for Information Systems Research (CISR) has shown that the top performing organizations generate

up to 40% higher returns from their ICT investments than their competitors with weak ICT governance (ICTG) [2,3].

The term "governance" is essentially associated with accountability and responsibilities within an organization that pay particular attention to organizational structure, management mechanisms, and policies [4]. Many times, ICTG implementation fails due to ineffective institutionalization [5].

Researchers have contributed to the ICTG, with [6,7] suggesting two major frameworks for understanding ICTG implementation. While [6] revealed that organizations with superior ICT governance had 20% more profit than organizations with poor governance given the same strategic objectives, [7] emphasized on structures, processes and relational mechanisms as ICT governance arrangements.

However, the frameworks by [6,7] do not consider how ICTG emerges in organizations. To bridge this limitation, [8] goes beyond and examines best practices of ICTG and understanding how ICTG arrangements emerge in organizations and the social and technical contexts in which ICTG arrangements arise. They adopted [7] definition of ICTG because the definition acknowledges the relationship between corporate governance and ICTG, and stresses the importance of having well-balanced ICTG

arrangements in organizations. ICTG processes, structures and relational mechanisms, need to be blended together in order to derive ICTG value to assist in achieving the business' ultimate goal [8].

The relationship mechanisms introduce the social aspect which is well defined in Actor-Network Theory (ANT) by stating that human actors are not the only actors that compose the social sphere, since non-human actors are also part of it [9]. Therefore, ANT's contribution to social theory is in the recognition that social actors and social relationships do not exist without non-human actors and if studied in isolation from each other, important dynamics can be missed [10].

Like many other Universities in the developing world, ICT contribution to the University of Rwanda service delivery improvement, could be coupled with ICT governance related concerns that include:

- Scattered and fragmented ICT initiatives and applications with the loss of synergies and economies of scale in and across the University.
- A lack of identified critical areas to which more focus can be directed for success, given the ICT resources and related knowledge and culture constraints.
- A lack of top and middle management support and active involvement of both ICT and University personnel in planning, implementing and monitoring ICT-enabled business applications.
- A lack of clear coordination controls and active ICT performance measures in and across the University for its major activities, computerization and support.
- The ineffective use of the available ICT professionals and difficulty in holding individuals accountable for their results, thus affecting the optimal use of ICT.
- Difficulties in managing cost-effectively constantly rising ICT investment including ICT applications and enabling infrastructure.
- The lack of a clear guide for ICT integration into University strategies and reform program.

Against this background, the study sought to investigate ICTG at the University of Rwanda, and thereby contributing to the understanding of ICT governance in Universities. The objectives of the study were:

1. To examine the relationship between ICT strategic alignment and ICT governance at the UR.
2. To examine the relationship between ICT performance management and ICT governance at the UR.
3. To examine the relationship between ICT resource management and ICT governance at the UR
4. To examine the relationship between ICT Strategic alignment together with ICT performance management and ICT resource management and ICT Governance at the UR.

2. ICTG Theoretical Perspectives

2.1. Actor Network Theory

Actor network theory (ANT) emerged during the mid 1980s, primarily with the work of Bruno Latour, Michel

Callon, and John Law. ANT is a conceptual frame for exploring collective socio-technical processes, where a particular attention focuses to science and technologic activity [11]. ANT has been used as a theoretical framework used in social studies of technology to explain the way technological artifacts are constructed in society [9].

Anchoring on ANT as a theoretical lens, [8] developed a model, illustrated in Figure 1, to analyze how ICTG emerges and in what circumstances stable ICTG arrangements can be produced. The model links the interdependency between ICTG arrangements that are structures, processes and relational mechanisms with ICT infrastructure. Thus, the interaction between ICTG arrangements and ICT infrastructure serves as a foundation upon which to achieve business coherence and support the alignment of ICT strategy and business strategy [12]. In this case, ICTG arrangements and ICT infrastructure are actor-networks, but they can also be treated as actors.

ITG arrangements and IT infrastructure are both heterogeneous in the sense that they consist of interdependent elements of humans, organizational processes and technology. The interaction between ITG arrangements and ICT infrastructure can be explored through the lens of ANT because their development are not only limited to the critical role of technology, but also involves the human and social aspects. Thus, ITG arrangements and IT infrastructure are considered as a socio-technological phenomenon that highlights the enabling and restricting role of ICT in a socio-technical process [8].

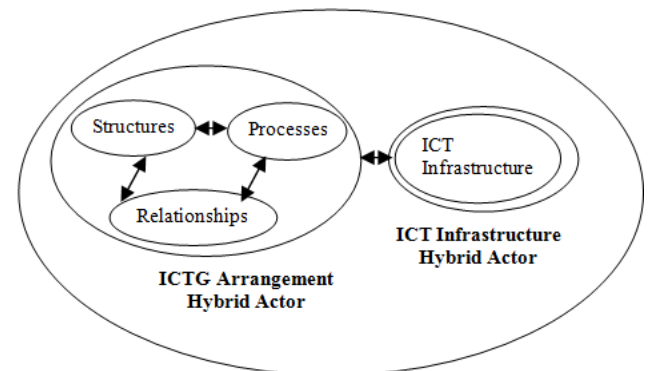


Figure 1. ICTG Arrangement and ICT Infrastructure [8]

2.2. ICTG Drivers and Outcomes

ICT has long been recognized as one of the most critical factors for an organization to increase its efficiency, competitiveness and innovation [13]. However, [13] argues that by merely investing in the state of the art ICT alone cannot ensure the realization of these benefits to an organization. As a consequence, the board of directors and top management need to understand the strategic importance of ICT and ought to put ICT governance firmly on their agenda. The overall objective of ICT governance, therefore, is to understand the issues around the strategic importance of ICT to enable the organization to sustain its operations and implement the strategies required to extend its activities into the future [14].

J.C. Henderson and N. Venkatraman introduced the concepts of business and ICT alignment and ICT

governance in the early 1990's. The strategic alignment concept concerns with the idea to align business strategy with ICT strategy on one hand and align strategies with internal organization and processes on the other [15], and Henderson and Venkatraman argue that the inability to realize value from ICT investment is, in part due to the lack of alignment between ICT and business strategies [16]. [17,18] considered ICT governance as one of the twelve components of the strategic alignment model and suggested that ICT governance was concerned with how the authority for resources, risk, conflict resolution, and responsibility for ICT is shared among business partners, ICT management, and service providers. This is similar to the perception of other researchers, such as [6] and [19] that describe ICT governance as (a) the distribution of ICT decision-making rights and responsibilities among different stakeholders in the organization, and (b) the rules and procedures for making and monitoring decisions on strategic ICT concerns. The ICT Governance Institute is of the view that ICTG is the responsibility of the Board of Directors and executive management, and therefore an integral part of enterprise governance. Further ICTG consists of the leadership and organizational structures and processes that ensure that the organization's IT sustains and extends the organization's strategy and objectives [20,21].

The foregoing perspectives of ICTG lead to five main focus areas for ICT governance, all driven by stakeholder value, as illustrated by [21] in Figure 2. The focus areas are categorized as drivers (strategic alignment, resource management and performance measurement) and outcomes (value delivery and risk management).

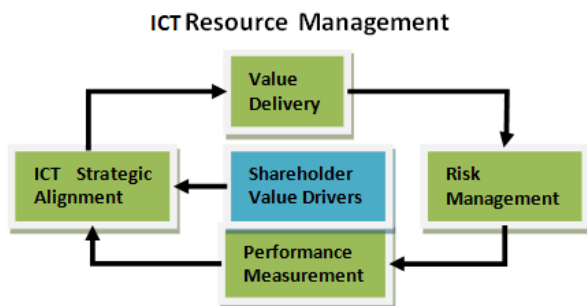


Figure 2. Five Focus areas for ICT Governance

2.3. ICT Governance Conceptual Approach

Based on the review of literature, we identified and considered three categories of factors that serve as drivers of ICT Governance: ICT Strategic alignment, Performance management, and ICT Resource management.

2.3.1. ICT Strategic Alignment

ICT strategic alignment focuses on ensuring the linkage of business and ICT plans; defining, maintaining and validating the ICT value proposition; and aligning ICT operations with enterprise operations, getting top and middle management support and ownership and ensures organization change strategy is established [15].

2.3.1.1. Clear ICT Strategy, Principles and Policies

IS Strategic planning relates to the long term direction an organization would like to take in leveraging technology for improving its business processes. The purpose of ICT

strategy is that enterprises can enhance their level of information system, based on the modern information technology, and provide better services for the management strategy [23,24]. Lack of involvement of the ICT executive in the creation of the business strategy indicates that there is a risk that the ICT strategy and plans will not be aligned with the business strategy.

2.3.1.2. Effective Alignment and Communication between ICT Strategy and Business Strategy

The alignment between business and ICT is one of important aspect of ICT governance. ICT-business alignment enables organizations to adhere to business objectives, and to maximize the value from ICT investment [7]. The assumption is that all organizations have a corporate or business strategy, and if they do not or at least if such a strategy is not written down, there is little with which to strategically align information technology. Furthermore, ICT cannot be viewed as different from business. A strategy for ICT can be formulated to fit the corporate strategy without regard to any other issues [25]. This implies that there should be a better communications between ICT strategy and business strategy to avoid poor understanding of the value or contribution the other provides.

2.3.1.3. Getting Adequate Top and Middle Management Support and Ownership

Top management must support and articulate the need for ICT governance and communicate its functionality within the context of the organization's strategy, structure and systems. Top management commitment for ICT related initiatives enhances ICT success by making ICT resources available, supporting and guiding the ICT functions. This requires top executives to act as business visionaries [26]. According to IT Governance Institute (ITGI) the standard assists top management to understand and fulfill their legal, regulatory, and ethical obligations in respect of their organizations' use of ICT. The lack of such support may see ICT resources having little effect on performance, even when substantial investments are made to acquire or develop the ICT resources [27].

2.3.1.4. Adequate Stakeholders' Involvement

The success of ICTG implementations requires the engagement of stakeholders with clear roles, goals and a shared understanding of the common agenda. Information Systems Audit and Control Association (ISACA) has defined a stakeholder as anyone, who has a responsibility for, an expectation from, or some other interest in the organization. Control Objectives for Information and related Technology Five (COBIT 5) on the other hand has not only defined the Stakeholder but also incorporates stakeholders as a vital and integral component throughout. [6] revealed that the more the organization involves key stakeholders, the more successful the governance of ICT becomes. As the primary role for organization is to create value for Stakeholders, then it is reasonable to see stakeholders actively involved in the governance of information technology as a strategic asset [28].

2.3.2. ICT Performance management

ICT performance measurement tracks and monitors strategy implementation, project completion, resource

usage, process performance and service delivery, using, for example, balanced scorecards that translate strategy into action to achieve goals measurable beyond conventional accounting.

2.3.2.1. Good project Management Methodology

A project is conducted within a management environment that is created for the purpose of delivering one or more products, services or results according to a specified business case. PProjects IN Controlled Environments (Prince 2) a process-based method for effective project management has defined a project as: 'A temporary organization that is created for the purpose of delivering one or more business products according to an agreed Business Case'. The objective of the Project Management Methodology is that all projects are managed in accordance with a consistent and appropriate methodology throughout the duration of the project, ensuring sponsors expectations are met through a successful delivery against time, cost and quality parameters. The Project Management Methodology promulgates appropriate management and controls through the four phases of a project (1) Initiation & Approval (2) Governance & Planning (3) Execution & Control (4) Closure & Review.

2.3.2.2. Effective Performance Management Strategy

Performance management is a discipline that aligns performance with strategy using performance metrics. A strategy, which is part of business strategy development and execution, directed towards individual and team performance, focused on employee development, integrated with a formal performance appraisal component, directed by line managers, and assimilated with human resource and reward management systems [29]. Performance management is a four-step cycle that involves: creating strategy and plans, monitoring the execution of those plans, and adjusting activity and objectives to achieve strategic goals. This four-step cycle

revolves around integrated data and metrics, which provide a measurement framework to measure the effectiveness of strategic and management processes [30].

2.3.3. ICT Resource Management

Resource management is about the optimal investment in, and the proper management of, critical ICT resources which are applications, information, infrastructure and people. They are key issues related to the optimization of knowledge and infrastructure [21].

2.3.3.1. Sufficient Financial Support

ICT strategic planning is required to manage and direct all ICT resources in line with the business strategy and priorities. Many organizations have not been able to derive maximum benefit from their substantial spending on ICT. Therefore ICT is seen as cost center. A framework should be established and maintained to manage ICT-enabled investment programs and that encompasses cost, benefits, prioritization within budget, a formal budgeting process and management against the budget.

2.3.3.2. Adequate ICT skills & staff

Inefficient ICT resources, ICT staff with inadequate skills or staff burnout or dissatisfaction, these are ICT human resource issues that require effective oversight and good governance to ensure that people management and skills development is addressed effectively. As people are important assets, governance and the internal control environment are heavily dependent on the motivation and competence of personnel.

2.4. Conceptual Framework

Figure 3 represents a conceptual framework that integrates the factors that drive effective ICT governance in an organization to the ICT Governance concept and is used to formulate the study’s hypothesis as:

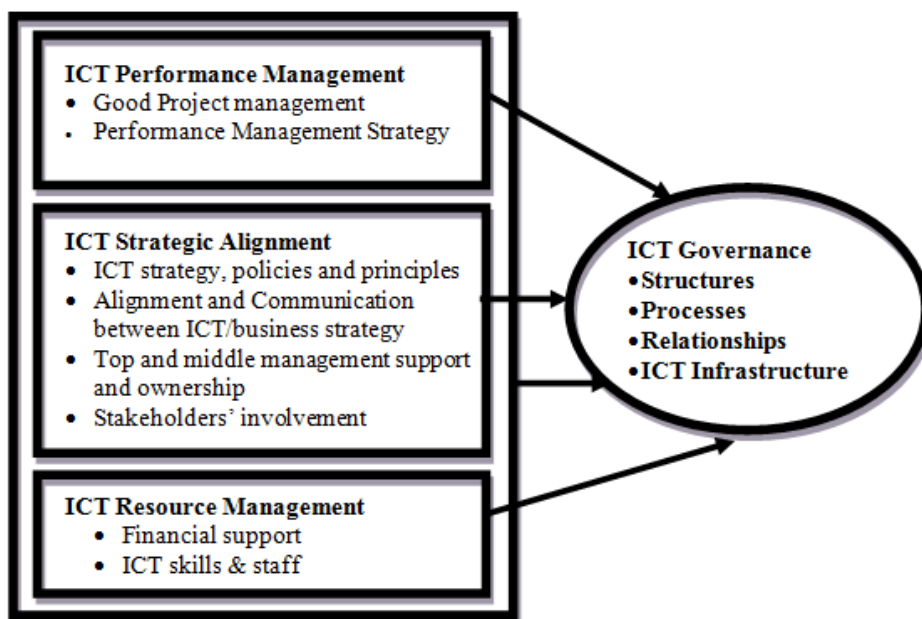


Figure 3. Conceptual Framework

H1: ICT Strategic Alignment has a significant positive influence on ICT Governance.

H2: ICT Performance Management has a significant positive influence on ICT Governance.

- H3:** ICT Resource Management has a significant positive influence on ICT Governance.
- H4:** ICT Strategic Alignment together with ICT Performance Management and ICT Resource Management have a significant positive influence on ICT Governance.

3. Methodology

3.1. Research Design

The research adopted a quantitative approach to analyze the correlated effect of the three drivers on ICT governance. The study population consisted of the public university in Rwanda; in this case, the University of Rwanda as it is the only public university in Rwanda. The unit of analysis was the institution as represented by the participants drawn from the six colleges, central administrations consisting of top and senior staff, middle managers, as well as Academic and ICT staff.

Following the objectives of this study, stratified purposive sampling was applied. The strata of interest in this case included; Top authorities (Vice Chancellor, Deputy Vice Chancellor for Administration and Finance and the Deputy Vice Chancellor for Academic and Research); Senior Authorities of the six colleges (six Principals); Middle managers (Director of Finance, Director Planning, Director Human resource, Deans and Project managers from each college and central administration here called headquarter), while academic staffs were mostly senior lectures who had occupied managerial positions. ICT staff were drawn those occupying departmental positions from each of the six college and central administration.

3.2. Data Collection

A self-administered questionnaire using five-point Likert scale ranging from "strongly disagree" to "strongly agree" was used to examine participants' responses to form the primary data. A paper based questionnaire was hand delivered to all the potential respondents. A total of 92 questionnaires were issued and 83 questionnaires were returned giving a response rate of 83/92=90.2%. Two questionnaires had invalid data and therefore could not proceed to the stage of analysis. The number of valid questionnaires that were analyzed further was 81.

3.3. Validity and Reliability Test

3.3.1. Reliability Test

The reliability was calculated using internal consistency technique, which is the internal consistency of the questionnaire that was determined through Cronbach's alpha coefficient to calculate the correlation of each item based on the mean inter-item correlation. The Cronbach's Alpha coefficient (α), should not, according to recommendations, be below 0.70 [31]. Results in the Table 2 below indicated that the questionnaire was reliable as observed from the Cronbach's Alpha values which were above 0.7 in either case respectively. The Alpha values meet acceptance standards for the research and reflecting a similarity in the research. Therefore; since, the Cronbach's alpha score for all items the instruments are above acceptable level of alpha (i.e. 0.70), the instruments employed in this study was reliable.

Table 1. Reliability Coefficient

Variables	Cronbach's Alpha	N of Items
Independent	.902	44
Dependent	.894	26

3.3.2. Validity Test

3.3.2.1. Validity of Instrument

For this study the researcher used the validity of instrument to measure the degree to which collected data were not reflecting any opinion or biases. In order to test the validity of the instruments, questionnaires were first scrutinized for consistency and a pre-test of the instruments done by distributing the questionnaire to four potential respondents representing middle managers, academic staff, and ICT staff. The pre-test results were used to correct the questionnaire.

3.3.2.2. Validity of Construct

Factor analysis using principal component analysis extraction method and varimax rotation method to determine the Eigen value and factor loading matrix of each item of the instrument was used to measure construct validity. The factor loading of items was evaluated using the criteria of Eigen value, and the results tabulated in Table 2.

Table 2. Validity of Construct

Variables of the study	Number of Items	Factor Analysis		
		Component	Eigen Value	Factor Loading
ICT Strategic Alignment	24	9	1.062	79.13%
ICT Performance Management	10	4	1.012	71.81%
ICT Resource Management	10	3	1.199	66.76%
ICTG Mechanisms	26	6	1.173	71.58%

Based on the results, the questionnaire employed in this study was considered as valid because of the factors loading for all items in the questionnaire were beyond the acceptable level which 50% cut -off points.

3.3.2.3. Validity of Content

The content validity of the study was assessed using factor analysis through Kaiser-Meyer-Olkin (KMO) and Bartlett's test. KMO value indicates the sampling

adequacy of the study and KOM value should be above the bare minimum of .50 for all variables. The Bartlett's test also indicates the test of sphericity and significance level of the measurement instrument at $p < .50$. The KMO and Bartlett's test result are summarizes in the Table 3.

The KMO value of all variables is above the proposed cut-off level of KMO greater than .50 and the Bartlett's test of all variables of the study are 0.000, which are

highly significant at $P < .001$. Therefore, the sample of the study was considered as adequate.

Table 3. Content Validity

	KMO for sampling adequacy	Chi-Square (Approx)	Degree of Freedom	Sig.
ICT Strategic Alignment	0.681	1084.342288	276	0.000
ICT Performance Management	0.572	245.7586731	45	0.000
ICT Resource Management	0.783	301.8262671	45	0.000
ICTG Mechanisms	0.773	1476.775102	325	0.000

3.4. Data Analysis

The study adopted Descriptive statistics, Pearson's Correlation Coefficients and Multiple Regressions analysis to reduce, summarize, organize, evaluate and interpret the collected data. However before the statistical techniques were employed, the data collected was prepared. This was achieved through editing of data to detect errors, corrections done where possible edited, then, coded before being entered into computer software SPSS 16.0 for use with the quantitative techniques listed.

4. Findings and Discussion

4.1. Descriptive Analysis

The demographic features of the respondents was the general information in the study and included the gender, job position, and the duration the respondent has held the job position. The results obtained with their relevance to the study are discussed as follows:

4.1.1. Gender Distribution

The gender distribution of the respondents is illustrated in Table 5, and shows that most of the respondents were male representing 77.78% and the females representing 22.22%. This is true because females, since long, have been under represented in many disciplines despite the national policy of having at least 30% of women in all sectors in Rwanda.

Table 4. Gender Distribution

	Frequency	Percent
Female	18	22.2
Male	63	77.8
Total	81	100.0

In terms of gender distribution in relation to the job positions, results in Table 5 shows that among the 3 top authorities, there were no females; among the 5 senior authorities, 40% were women, while women represented 20% among the middle managers. For the academic and ICT staff, women respondents were 19.04% and 26.08% respectively.

Table 5. Females distribution per Job position at UR

	Job position at UR					Total
	Top Authority	Senior Authority	Middle Manager	Academic staff	ICT staff	
Female	0 0%	2 40%	6 20%	4 19.04%	6 26.08%	18 22.22%
Male	2	3	24	17	17	63
Total	2	5	30	21	23	81

4.2. Descriptive Cross-Tabulation Analysis

Cross-tabulation analysis was used to get a better understanding on how responses differed when considering the current job position against ICT strategic alignment, ICT performance management, ICT resource management and ICT governance mechanisms.

4.2.1. ICT Strategic Alignment

The experience of the respondents with ICT strategic alignment which comprised ICT strategy, principles and policies; alignment and communication between ICT/UR

strategies; stakeholder's involvement; and top and middle managers support; and ownership posted the following results.

a) ICT strategy, Policies and principles

At the basic level of understanding and awareness, findings from Table 6 indicated that 98.76% agreed that the University should have an ICT Strategy or equivalent document. However, only 32% of total respondents indicated that they were aware about the University ICT strategy or equivalent document and 67.9% indicated that they either strongly disagreed, disagreed or they don't know about the university strategy or equivalent document, as shown on Table 7.

Table 6. ICT Strategy per Job Position

	The University should have an ICT strategy or equivalent document			Total
	Disagree	Agree	Strong Agree	
Top Authority	0	0	2	2
Senior Authority	0	0	5	5
Middle Manager	1	9	20	30
Academic Staff	0	4	17	21
ICT Staff	0	9	14	23
Total	1	22	58	81

The results from Table 7 is an indication that there might be a university ICT direction, but the challenge or problem may be how such a direction is communicated to

different stakeholders or how stakeholders are involved or are participating in its development.

Table 7. ICT Strategy Awareness per Job Position

	Staff who are aware about the University ICT strategy or equivalent document					Total
	Strongly Disagree	Disagree	Don't know or N/A	Agree	Strongly Agree	
Top authority	0	0	0	1	1	2
Senior Authority	0	0	3	0	2	5
Middle manager	4	4	10	8	4	30
Academic staff	4	7	9	1	0	21
ICT staff	3	5	6	8	1	23
Total	11	16	28	18	8	81

With regards to knowing whether the ICT strategy had been approved by appropriate organs, we found that 96.3% strongly disagreed, disagreed or didn't know if the ICT strategy had been approved. This finding is tabulated in Table 8, and the findings confirmed the absence of a formally written ICT strategy. However we found that there was a draft of ICT strategic plan under development by a team of ICT professionals from different colleges

under the leadership of the ICT Coordinator. This was corroborated by the documentation review as stated out in the report documented by [33]. The ICT strategic plan was initiated by ICT professional but not yet approved by the highest authorities and it needs further elaboration. The report continued to state that an active participation of heads of the colleges and administrative department should be included.

Table 8. Approved ICT Strategy per Job Position

	ICT strategy has been approved by the appropriate institutional ICT governance committee and by the Senior Management					Total
	Strongly Disagree	Disagree	Don't know or N/A	Agree	Strongly Agree	
Top Authority	0	2	0	0	0	2
Senior Authority	1	1	3	0	0	5
Middle Manager	13	2	14	1	0	30
Academic Staff	8	3	10	0	0	21
ICT staff	11	5	5	1	1	23
Total	33	13	32	2	1	81

b) Alignment and Communication between ICT/UR strategies

It is essential for the ICT strategy to be supported by and communicated to key stakeholders, and it should include and articulate the university objectives. Top and senior management should in turn communicate the university direction to which ICT should be aligned. We found that 100% of top and senior manager confirmed that the university direction to which ICT should be aligned is

effectively articulated and communicated; while 54.3% strongly disagreed, disagreed or don't know about the direction to which ICT should be aligned, as summarized in Table 9. At the same time, 88.88% of respondent confirmed that the ICT strategy is not visible nor communicated across the university. This finding is tabulated in Table 10, a result that confirms the direction of ICT is not yet written and approved by appropriate organs.

Table 9. ICT Strategy is Articulated and Communicated

	Senior management articulates and communicates the University direction to which ICT should be aligned					Total
	Strong Disagree	Disagree	Don't know or N/A	Agree	Strong Agree	
Top Authority	0	0	0	1	1	2
Senior Authority	0	0	0	4	1	5
Middle Manager	14	2	4	8	2	30
Academic Staff	4	2	7	7	1	21
ICT Staff	5	4	2	7	5	23
Total	23	8	13	27	10	81

c) Stakeholders involvement

To become a success, the implementation of ICT strategy requires the engagement of stakeholders with clear roles, goals and a shared understanding of the common agenda. Findings from the study tabulated in Table 11 indicated that 90.12% strongly disagreed,

disagreed or didn't know whether the ICT strategy and policies are communicated to internal or external stakeholders. In this context more effort should be put in place to engage all stakeholders in the development and implementation of ICT strategy and policies.

Table 10. ICT strategy is visible.

	ICT strategy is visible and clearly communicated across the institution to all personnel responsible for its deployment					Total
	Strongly Disagree	Disagree	Don't know or N/A	Agree	Strongly Agree	
Top authority	0	2	0	0	0	2
Senior Authority	3	1	0	1	0	5
Middle manager	17	10	2	1	0	30
Academic staff	11	5	3	2	0	21
ICT staff	5	7	6	3	2	23
Total	36	25	11	7	2	81

Table 11. Stakeholders Involvement

	Strategy and Policies are communicated to internal as well as external stakeholders					Total
	Strongly Disagree	Disagree	Don't know or N/A	Agree	Strongly Agree	
Top authority	0	1	0	0	1	2
Senior Authority	2	3	0	0	0	5
Middle manager	12	10	5	2	1	30
Academic staff	5	12	3	1	0	21
ICT staff	6	10	4	3	0	23
Total	25	36	12	6	2	81

4.2.2. ICT Performance Management

The ability of the University to manage ICT performance is based on how well the university addresses short-term and long-term ICT projects, decisions and control mechanisms. We sought to find out the experience of respondents in project management methodology and effective performance management strategy at the University.

a) Good project management methodology

Regular monitoring of key ICT projects is a prudent management practice, and often requires regular progress reports from concerned project managers. Our findings

from the study, and summarized in [Table 12](#) indicated that only 35.8% of respondents agreed or strongly agreed that senior management obtained regular progress reports on major ICT projects while 64.2% have strongly disagreed, disagreed or didn't know that senior management obtained regular progress reports on major ICT projects. The distribution of the 35.8 % that reported positively to this question was as follows:100% of top authorities, 60% of senior authorities and 56.5% of ICT staff. These results show that more efforts have to be made to institute an ICT performance measurement framework where project management methodology should guide the university into evaluating and monitoring of ICT project implementation.

Table 12. Good Project Management

	Senior Management obtains regular progress reports on major ICT projects.					Total
	Strongly Disagree	Disagree	Don't know or N/A	Agree	Strongly Agree	
Top Authority	0	0	0	0	2	2
Senior Authority	0	2	0	2	1	5
Middle Manager	3	5	12	9	1	30
Academic staff	0	2	18	1	0	21
ICT staff	1	3	6	12	1	23
Total	4	12	36	24	5	81

4.2.3. ICT Resource Management

ICT strategic planning is required to manage and direct all ICT resources in line with the business strategy and priorities. ICT resources include financial, skilled staff and infrastructure.

a) Sufficient Financial Resource

Allocation of financial resources is important for successful ICT projects. The study found out that 53.1% of the respondents confirmed that there was sufficient financial support from executive. On the other hand 46.9% strongly disagreed, disagreed or didn't know about the

financial support from the executive. Of the 46.9%, we found 4 out of 5 senior authority level respondents who were of the same opinion with regards to ICT projects not having sufficient financial support from executive.

b) Skilled staff and infrastructure are made available.

The availability of ICT infrastructure and skills to support ICT projects is an enabler of successful implementations. As illustrated in [Table 14](#), our findings were that 83.9% strongly disagreed, disagreed or didn't know whether skilled staff and infrastructure were made available to meet the required university strategy.

Table 13. Financial Resource

	ICT projects are getting sufficient financial support from Executive.					Total
	Strongly Disagree	Disagree	Don't know or N/A	Agree	Strongly Agree	
Top Authority	0	0	0	1	1	2
Senior Authority	1	1	0	2	1	5
Middle Manager	5	4	5	14	2	30
Academic Staff	5	6	2	7	1	21
ICT Staff	1	4	4	12	2	23
Total	12	15	11	36	7	81

Table 14. Skilled Staff and resource available

	ICT infrastructures and ICT skills are made available to meet the required University strategic objectives					Total
	Strongly Disagree	Disagree	Don't know or N/A	Agree	Strongly Agree	
Top Authority	0	1	0	0	1	2
Senior Authority	1	3	0	1	0	5
Middle Manager	9	12	1	8	0	30
Academic Staff	4	12	5	0	0	21
ICT Staff	6	11	3	2	1	23
Total	20	39	9	11	2	81

4.2.4. ICT Governance Mechanisms

a) Structure Mechanisms

The study findings in Table 15 showed that 81.5% strongly disagreed, disagreed or didn't know about institutionalization of structures that ensure accountability and flexibility to the ICT organizational needs, while only 18.5% strongly agreed or agreed that there were structures

that ensure accountability and flexibility to the ICT organizational needs. Further, 18 96.3% of respondents confirmed that the CIO is not Board member, while 77.8% of respondent confirmed that there was no ICT organization structure and 93.8% of respondent confirmed that there was no ICT steering committee at the University of Rwanda.

Table 15. Structure Mechanisms

	Strongly Disagree	Disagree	Don't know or N/A	Agree	Strongly Agree
The UR has instituted structures that ensure accountability and flexibility to the ICT organizational needs.	22	30	14	11	4
The CIO is on Board	35	16	27	3	0
There is an ICT organization structure at the UR.	20	16	27	17	1
There is an ICT steering Committee at the UR	33	16	27	5	0

b) Process Mechanisms

The use of industry accepted ICT governance processes and tools was also assessed, and the results summarized in Table 16. The study found out that 97.5% of respondent strong disagreed, disagreed or didn't know about the ICT performance measurement using ICT Balanced Scorecard,

in the same line 96.3% confirmed that ICT Governance Frameworks like COBIT or ITIL are not implemented and 96.3% of respondent strong disagreed, disagreed or didn't about any periodic assessment of ICT governance maturity at the University of Rwanda.

Table 16. Process Mechanisms

	Strongly Disagree	Disagree	Don't know or N/A	Agree	Strongly Agree
ICT Performance Measurement using ICT BSC	18	20	41	2	0
ICTG Frameworks like COBIT or ITIL are implemented.	19	21	38	3	0
ICTG maturity is assessed after a certain period.	43	9	26	3	0

c) Relational Mechanisms

Stakeholders' participation in ICT projects has been said to improve commitment and motivation for success. Our analyzed results depicted by Table 17 showed that 75.3% of respondent strong disagreed, disagreed or didn't know about the participation and collaboration between all stakeholders. Meanwhile 79.01% of respondent confirmed that informal meeting about general activities and directions were used between UR and ICT executives.

Further the results revealed that trainings are given to UR staff about ICT services at a rate of 68% of respondents while 66.7% of respondent strong disagreed, disagreed or didn't about the trainings given to UR ICT staff about UR direction. Finally, 90.2% of respondent strong disagreed, disagreed or didn't know about systems which were in place to share and distribute knowledge about ICTG framework and responsibilities.

Table 17. Relational Mechanisms

	Strong Disagree	Disagree	Don't know or N/A	Agree	Strong Agree
There is an active participation and collaboration between all stakeholders	13	41	7	19	1
There is a use of informal meeting between University and ICT executive/senior management about general activities and directions	3	2	12	46	18
Trainings are given to UR staff about ICT services	4	9	13	49	6
Trainings are given to UR ICT staff about the UR direction	11	18	25	26	1
Systems are in place to share and distribute knowledge about ICTG framework and responsibilities	23	32	18	6	2

d) ICT infrastructure

Results for general knowledge about ICT infrastructure enabling ICT governance are illustrated in Table 18, and showed that 97.5% of respondent strongly agreed or agreed that ICT infrastructure is part of overall ICT

governance but 82.7% of respondent strongly disagreed, disagreed or didn't know about standardized and integrated ICT infrastructure and systems that are in place to optimize costs and information flow across the UR

Table 18. ICT Infrastructure

	Strongly Disagree	Disagree	Don't know or N/A	Agree	Strongly Agree
ICT infrastructure is part of overall ICT governance	0	0	2	27	52
Standardized and integrated ICT infrastructure and systems are in place to optimize costs and information flow across the UR	42	16	9	9	5

4.2.5. Summary of Descriptive Results

The aim of the descriptive cross-tabulation analysis was to get a better understanding on how responses from respondents differ when considering their current job position. It has been shown that there is no formal written ICT strategy, but from the findings the university has a clear direction as it has been confirmed by top as well as senior authorities. The absence of a formal written and approved ICT strategy should not affect the ICT governance at the University of Rwanda if there was any. By having a strategic perspective, top and senior authorities should build up mechanisms of cascading the ICT strategy downward to middle managers as the one in charge of its deployment and implementation. Moreover, to become a success the ICT strategy during its implementation should have involvement of all stakeholders. Furthermore, findings have clearly shown that there is no sign of ICTG implementation or development at the University of Rwanda. Any of the ICTG arrangements are at the stages of development.

variance in the overall ICT governance which is the dependent variable. This value is significant as indicated by the F-value and the significance (**F=56.709, p=000**). F ratio helps to assess the statistical significance of the overall regression models. The larger the ratio, the more the variance of the dependent variable is explained by the independent variable. The ratio found in this study indicates a low significant at **.000** levels. This level means that the chances that the results of regression model are due to random events instead of true relationship between variables are **0.0%**. This level is far lower than the standard level of **5%**.

4.3. Multiple Regression Analysis

Multiple regression analysis was carried out in order to test the extent of impact of independent variables on the dependent variable. Thus, this multiple regression analysis was performed to address the stated hypothesis of this study, that are, to find out whether ICT alignment has a positive influence on ICT governance or not; ICT performance management has a positive influence on ICT governance or not; ICT resource management has a positive influence on ICT governance or not and whether ICT strategic alignment together with ICT performance management and ICT resource management have a positive influence on ICT governance or not.

H1: ICT Strategic alignment has a significant positive influence on ICT Governance

To assess the influence of ICT Strategic alignment on ICT Governance, linear multiple regression analysis was carried out. The result of the regression model is summarized in Table 19, and the ICT strategic alignment being the independent variables explains **41.8%** of the

Table 19. Regression on H1

1. Model summary					
Model	R	R Square	Adjusted R Square	F	Sig.
1	.646 ^a	.418	.411	56.709	.000 ^a
2. Beta coefficients					
Model 1	Un-standardized		Standardized	t	Sig.
	B	Std. Error	Beta		
(Constant)	.657	.264		2.491	.015
ICTSA	.676	.090	.646	7.531	.000
Dependent Variable: ICTG					
a. Predictors: (Constant), ICTSA					

This implies that the relationship between ICT strategic alignment and ICT governance is weak at **95%** which is the confidence level. From the results in Table 19; ICTSA is positively influencing the ICT governance with better coefficient $\beta > 0$. Regression result show that ICT Strategic Alignment has a direct positive (**beta=0.676**) impact on ICT Governance.

Therefore, the first hypothesis (H1) of the study is accepted, which implies, the more there is an ICT Strategic Alignment at the University the more the effective ICT governance.

H2: ICT Performance management has a significant positive influence on ICT Governance.

To assess the influence of ICT Performance Management on ICT Governance, linear multiple regression analysis was carried out. The result of the regression model is summarized in Table 20 where the

ICT Performance Management (independent variable) explains **34.0%** of the variance in the overall ICT governance(dependent variable). This value is significant as indicated by the F-value and the significance (**F=40.681, p=000**). The **F** ratio found in this study indicates a low significant at **.000** levels. This level means that the chances that the results of regression model are due to random events instead of true relationship between variables are **0.0%**. This level is by far lower than the standard level of **5%** as defined by the probability of F in SPSS. This implies that the relationship between ICT performance management and ICT governance is weak at **95%** which is the confidence level. From the same results in [Table 20](#); ICTPM is positively influencing the ICT governance with better coefficient $\beta > 0$. Regression result show that ICT Performance Management has a direct positive (**beta=0.617**) impact on ICT Governance. Therefore, the second hypothesis (**H2**) of the study is accepted, which implies, the more there is an ICT Performance Management at the University the more the effectiveness of ICT Governance.

Table 20. Regression on H2

1. Model summary					
Model	R	R Square	Adjusted R Square	F	Sig.
1	.583 ^a	.340	.332	40.681	.000 ^a
2. Beta coefficients					
Model1	Un-standardized		Standardized	t	Sig.
	B	Std. Error	Beta		
(Constant)	.899	.273		3.288	.002
ICTPM	.617	.097	.583	6.378	.000
Dependent Variable: ICTG					
a. Predictors: (Constant), ICTPM					

H3: ICT Resource management has a positive significant influence on ICT Governance.

To assess the influence of ICT Resource Management on ICT Governance, linear multiple regression analysis was carried out. The result of the regression model is summarized in [Table 21](#) where the ICT Resource Management (independent variable) explains **47.4%** of the variance in the overall ICT governance (dependent variable). This value is significant as indicated by the F-value and the significance (**F=71.206, p=000**). The **F** ratio found in this study indicates a low significant at **.000** levels. This level means that the chances that the results of regression model are due to random events instead of true relationship between variables are **0.0%**. This level is by far lower than the standard level of **5%** and implies that the relationship between ICT resource management and ICT governance is weak at **95%** which is the confidence level.

Table 21. Regression on H3

3. Model summary					
Model	R	R Square	Adjusted R Square	F	Sig.
1	.689 ^a	.474	.467	71.206	.000 ^a
4. Beta coefficients					
Model1	Un-standardized		Standardized	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.073	.188		5.712	.002
ICTPM	.607	.072	.689	8.438	.000
Dependent Variable: ICTG					
a. Predictors: (Constant), ICTRM					

Further from the findings listed in [Table 21](#); ICTRM is positively influencing the ICT governance with better coefficient $\beta > 0$. Regression result show that ICT Resource Management has a direct positive (**beta=0.607**) impact on ICT Governance. Therefore, the third hypothesis (**H3**) of the study is accepted, which implies that, the more there is ICT Resource Management at the University the more the effectiveness of ICT Governance.

H4. ICT Strategic alignment together with ICT Performance management and ICT Resource management they have a significant positive influence on ICT Governance.

To assess the combined influence of ICT Strategic Alignment together with ICT Performance Management and ICT Resource Management on ICT Governance, multiple regression analysis was carried out and the result of the regression model summarized in [Table 22](#) where the combined effect of ICT Strategic Alignment together with ICT Performance Management and ICT Resource Management explains **56.0%** (**R=.748, R²=.560**) of the variance in the overall Structure mechanism. This value is highly significant as indicated by the F-value and the significance (**F = 32.601, p=000**). The **F** ratio found in this study indicates a low significant at **.000** levels. This level means that the chances that the results of regression model are due to random events instead of true relationship between variables are **0.0%**. This level is by far lower than the standard level of **5%** and implies that the relationship between the combined effect of ICT strategic alignment together with ICT performance management and ICT resource management and ICT governance is weak at **95%** which is the confidence level. Further, from the results listed in [Table 22](#) the combined effect of ICTSA together with ICTPM and ICTRM is positively influencing the ICT governance with beta coefficient $\beta > 0$. Multiple regression result shows that the combined effect of ICTSA together with ICTPM and ICTRM has a direct positive impact on ICT Governance.

Table 22. Regression on H4

5. Model summary					
Model	R	R Square	Adjusted R Square	F	Sig.
1	.748 ^a	.560	.542	32.601	.000 ^a
6. Beta coefficients					
Model1	Un-standardized		Standardized	T	Sig.
	B	Std. Error	Beta		
(Constant)	.449	.244		1.842	.069
ICTSA	.371	.128	.355	2.903	.005
ICTPM	.016	.133	.015	.123	.903
ICTR	.411	.088	.466	4.662	.000
Dependent Variable: ICTG					
a. Predictors: (Constant), ICTSA, ICTPM, ICTRM					

Therefore, the fourth hypothesis (**H4**) of the study is accepted, which implies that, the more there is a combined effect of ICTSA together with ICTPM and ICTRM at the University the more the effectiveness of ICT Governance. Results further indicate that ICTRM ($\beta = .411$) are a better predictor of ICTG than ICTSA ($\beta = .371$) and ICTPM ($\beta = .016$).

To summarize the findings on the hypothesis formulated, both the correlation and regression analysis was employed and the summary findings illustrated in [Table 23](#).

Table 23. Summary on Hypothesis

Hypothesis	Results	Status
H1: ICT Strategic alignment has a significant positive influence on ICT Governance.	Correlation: There is a significant positive relationship between ICT strategic alignment and ICT Governance ($r=.646$; sig. $p<.01$). Linear Regression: ICT Strategic Alignment has a direct positive impact on ICT Governance at $R^2=41.8\%$ and $Beta=0.676$.	Accepted
H2: ICT Performance Management has a significant positive influence on ICT Governance.	Correlation: There is a significant positive relationship between ICT Performance Management and ICT Governance ($r=.583$; sig. $p<.01$). Linear Regression: ICT Performance Management has a direct positive impact on ICT Governance at $R^2=34.0\%$ and $Beta=0.617$.	Accepted
H3: ICT Resource Management has a significant positive influence on ICT Governance.	Correlation: There is a significant positive relationship between ICT Resource Management and ICT Governance ($r=.689$; sig. $p<.01$). Linear Regression: ICT Resource Management has a direct positive impact on ICT Governance at $R^2=47.4\%$ and $Beta=0.607$	Accepted
H4: ICT Strategic alignment together with ICT Performance Management and ICT Resource Management they have a significant positive influence on ICT Governance.	Correlation: there was a significant positive relationship between ICT Strategic alignment together with ICT Performance management and ICT Resource Management and ICT Governance ($r=.730$; sig. $p<.01$). Multiple Regression: ICT Strategic Alignment together with ICT Performance Management and ICT Resource Management have a direct positive impact on ICT Governance at $R^2=56.0\%$ and $Beta =.355, .015, .466$ respectively for ICTSA, ICTPM and ICTRM.	Accepted

5. Discussion

The presentation of the discussion is arranged in line with the objectives and findings of the study as follows:

1. To examine the relationship between ICT Strategic Alignment and ICT Governance

ICT Strategic alignment exists when business organization's goals and activities are in harmony with the information systems that support them. To address the alignment challenges, it is important for an organization to have a clear and in-depth view regarding its business goals and how IT goals and IT processes support those goals [7]. The findings do concur with the works of [34] who said that; the organization with the lower business-IT alignment results clearly had a lower IT governance implementation status, compared to the organization with the highest business-IT alignment. Extant literature has shown that ICT strategic alignment has identified success factors that are: mutual understanding of both business and ICT strategies between business and ICT managers and incorporation of this understanding into ICT planning and development [35]. Findings from [36] also showed that respondents were largely positive about IT alignment with the goal of the institution, with their study results showing that aligning IT goals with institutional goals and promoting an institutional view of IT were the most cited as drivers for pursuing IT governance; while the barrier is the lack of participation of all parties among others. The results of the University of Rwanda reported in this study in Table 11 also disclosed that 100% of top and senior manager confirmed that the university direction to which ICT should be aligned is effectively articulated and communicated. This implies that there is an involvement and a support from top and senior authorities. These findings are in line with those from literature stating that the support and the involvement of senior management can be achieved by instituting a senior management role in the IT decision making and monitoring process, demonstrating viable business value proposition from IT to gain the support of senior management, and motivating senior management to use IT actively [37]. However the results illustrated in Table 9, Table 10 and Table 11, whereby 54.3% strongly disagreed, disagreed or didn't know about the direction to which ICT should be aligned

on one hand; and on the other hand, 88.88% of respondent confirmed that the ICT strategy was not visible nor communicated across the university and that 90.12% strongly disagreed, disagreed or don't know whether the ICT strategy and policies are communicated to internal or external stakeholders indicate communication gaps across management levels. Thus more efforts should be put in place to engage all stakeholders in the development and implementation of ICT strategy and policies as it concurs with results that revealed that the stakeholders involvement can be achieved by establishing key stakeholders' responsibilities in the IT decision making and monitoring process and developing a common understanding among key stakeholders on shared IT/business goals and imperatives [37]. Therefore connected and integrated planning not only makes explicit what is important for both UR and ICT, but also helps to see how ICT can support future UR strategies and how future ICT developments can enable business decisions.

2. To examine the relationship between ICT performance management and ICT governance

The study's findings disclosed the existence of a significant positive relationship between ICT performance management and ICT governance as demonstrated in section 4.3. This implies that existence of ICT Performance Management at the University will result into an effective ICT Governance and lack of ICT Performance Management results into poor ICT Governance. Results from the survey showed that 100% of top authorities, 60% of senior authorities and 56.5% of ICT staff forming 35.8% of total respondents agreed or strongly agreed that senior management obtain regular progress reports on major ICT projects. These results show that more efforts have to be made to institute an ICT performance measurement framework where project management methodology should guide the university to evaluate and monitor ICT projects implementation. This is in line and supported by the conclusion that there is a benefit to organizations for implementing a tailored project management methodology and suggests that the greater the level of project management methodology tailoring, the greater the level of project success [38]. [39] continue arguing that using the data gathered, the following key points were observed: Projects managed without a defined project management methodology reported project success only 66% of the time while

projects managed with a defined project management methodology reported project success at an average of 74%; while organizations using a fully tailored, or customized, methodology reported an 82% project success rate. Literature has also revealed that project success is measured based on “the triple constraints” or “the iron triangle” of time, cost and scope of objectives. These elements are mutually dependent; therefore, a change in one will have a resultant effect on at least one other element [40]. Furthermore [40] continue arguing that; project success should be measured in terms of completing the project within the constraints of scope, time, cost, quality, resources, and risk as approved between the project managers and senior management. Therefore ICT performance management should impact budget allocation. UR need to monitor and measure the performance of their ICT investments and use this as a guide for ICT budget allocation decisions.

3. To examine the relationship between ICT resource management and ICT governance

The study’s findings illuminated the existence of a significant positive relationship between ICT resource management and ICT governance as demonstrated in section 4.3. This implies that existence of ICT resource management at the University will result into an effective ICT Governance and lack of ICT Performance Management results into poor ICT Governance. IT budget refers to IT spending or investment where with low investment, organizations do not expect immense progress in IT governance. The size of an IT function is characterized by number of IT employees. As demonstrated in the IT innovation literature, size of an IT department predicts IT adoption and the need to effectively manage IT resources so that they can enhance the business value of firms makes ICTG an important issue and yet an uneasy task [41]. Results from Table 133 have shown that 53.1% of respondents confirmed that there is a sufficient financial support from executive while results from Table 144 have revealed that 83.9% strongly disagreed, disagreed or didn’t know whether skilled staff and infrastructure are made available to meet the required university strategy. Furthermore findings from literature also have confirmed that the most highly rated barriers to ICTG include lack of resources, lack of knowledge and skills and lack of awareness. Lack of time, human and financial resources remain the most salient factor among all organizations. The lack of knowledge and skills are more apparent in public sector organizations [42], and while the results were mixed, there is clear need for UR to be visibly seen in committing resources to ICT projects and communicate the decisions for stakeholder awareness.

4. To examine the relationship between ICT Strategic alignment together with ICT Performance management and ICT resource management and ICT governance

The study found the existence of a high significant relationship of the combination of ICT strategic alignment together with ICT performance management and ICT resource management and ICT governance as demonstrated in section 4.3. This implies that existence of ICT Strategic Alignment together with ICT Performance Management ICT Resource Management at the University will result into an effective ICT Governance and lack of them results into poor ICT Governance. As isolated

component, results from section 4.3 showed that each component (ICT strategic alignment together with ICT performance management and ICT resource management) had a significant influence on ICT governance. Thus the University has to find ways to allocate ICT-related resources and to ensure ICT alignment for increased business value [43].

6. Recommendation

The UR needs to focus on putting in place ICT governance structures and respect them: to ensure that plans are developed and priorities set collectively; to ensure that all ICT related actions taken are consistent with university wide shared values, strategies and objectives; to ensure that risks are properly mitigated; and to ensure that investments made return the value expected. ICT governance should involve policies, plans, projects and priorities. ICT governance structures define roles, who does what in ICT and when, who advises those who make decisions and how and where that advice is provided. As a strategic and critical resource, ICT governance should be situated at multiple levels in the UR. On strategic level where the board and top as well as senior authorities are involved, on management level with involvement of middle managers and operational level with ICT and University management. This implies that at all these levels, UR community and ICT people need to be involved in the ICT governance process and be made to understand their individual roles and responsibilities. ICT performance measurement should include activities to ensure that the University’s goals are consistently being met in an effective and efficient manner. Balances Scorecard is the appropriate one as it focuses not only on financial perspective but also on the customer perspective, internal operations and Innovation and learning. Last but not least, monitoring and assessing the adequacy of ICT resources (people, applications, technology, facilities and data) to ensure that they are capable of supporting the current and proposed ICT strategy is a key aspect of IT Governance at the University. Therefore, to achieve the above, the university should not only get the support from top, senior and middle managers but also involve all key stakeholders.

Acknowledgement

I would like to thank the University of Rwanda; the mother institution for funding this research through Swedish International Development Agency; and the School of Computing and Informatics, University of Nairobi where this research was carried out under the guidance of the Dr. Agnes Wausi, a senior faculty member of the School, and was involved in the study’s design, data analysis and manuscript writing for this article.

References

- [1] Gartner, "Executive Report Series Winning Asset Management Strategies, 8.0 IT Spending:How Do You Stack Up?," 2003 Gartner, Inc. and/or its affiliates, 2003.

- [2] Trusted_Advisor, "What would be a basic framework or model for establishing an effective IT Governance function?," David Consulted Group, 2013.
- [3] Weill Peter, "Don't just Lead, Govern: How Top-Performing Firm Govern IT," CISR Working Paper No. 341, 2004.
- [4] A. Al-Hatmi, *Public IT Investment: The Success of IT Projects*, Singapore: Pertridge Publishing, 2014.
- [5] R. Bhatia, "IT Governance Implementation Formulating and Presenting Practical Business Cases," ISACA JOURNAL VOLUME 1, 2013.
- [6] Weill Peter & Ross Jeanne W, *IT Governance: How Top Performers Manage IT Decision Rights for Superior Results*, Harvard business School Publishing, 2004.
- [7] De Haes S. & Van Grembergen W., "An Exploratory Study into IT Governance Implementations and its Impact on Business/IT Alignment," *Information Systems Management*, vol. 26., pp. 123-137, 2009.
- [8] Mohamad H. & A. Simon & N. Letch, "A Network Analysis of IT Governance Practices: A Case Study of an IT Centralisation Project," 23rd Australasian Conference on Information Systems Geelong, 2012.
- [9] B. Latour., *Resembling the Social: An Introduction to Actor Network Theory*, New York: Oxford University Press Inc., 2005.
- [10] Whittle A. & Spicer A., "Is actor network theory critique?," *Organization Studies*, 29(4), pp. 611-629, 2008.
- [11] A-Ritzer, "ACTOR NETWORK THEORY," *Encyclopedia.qxd*, 2004.
- [12] Mohamad H. H.& Letch N.& Simon A., "The Role of IT Governance and IT Infrastructure in the Process of Strategic Alignment," 24th Australasian Conference on Information Systems, 2013.
- [13] & M. A. S. Majed Alyahya, "A Conceptual Model for Business and Information Technology Strategic Alignment from the Perspective of Small and Medium Enterprises," *International Journal of Business, Humanities and Technology Vol. 3 No. 7*, 2013.
- [14] Luc Kordel, "IT Governance Hands-on: Using COBIT to Implement IT Governance," *Information Systems Audit and Control Association: All rights reserved. www.isaca.org.*, 2004.
- [15] Henderson & Venkatraman, "Strategic Alignment: Leveraging information technology for transforming organizations," *IBM Systems Journal*, Vol. 32, No. 1., pp. 4-16, 1993.
- [16] Handerson & Venkatraman, "Strategic alignment: Leveraging Information technology for transforming organisations," Reprinted from *IBM System Journal Vol38 No 2&3*, 1999.
- [17] Luftman J., "Assessing Business Alignment Maturity," *Communications of AIS*, Volume 4, Article 14, 2000.
- [18] J. B.-Z. T. D. R. & R. E. H. Luftman, "IT governance: An alignment maturity perspective.," *International Journal on IT/Business Alignment and Governance*, 1(2), pp. 13-25, 2010.
- [19] Peterson R. R, "Information Strategies and Tactics for Information Technology Governance.," *Strategies for Information Technology Governance*, ed. W. Van Grembergen, Idea Group Publishing, Hershey, pp. 37-80, 2004.
- [20] ITGI, "Board Briefing on IT Governance," On-line available at www.itgi.org, 2001.
- [21] ITGI, "Board Briefing on IT Governance 2nd Edition," www.itgi.org and www.isaca.org, 2003.
- [22] VAN GREMBERGEN W, "Introduction to the Minitrack: IT Governance and its Mechanisms.," *Proceedings of the 35 Hawaii International Conference on System Sciences (HICCS)*, IEEE., 2002.
- [23] Van Grembergen W.& S. De Haes & E. Guldentops., *Structures, Processes and Relational Mechanisms for IT Governance*, Van Grembergen, W. (Ed.), Pennsylvania, USA: Strategies for Information Technology Governance, Idea Group Publishing, 2003.
- [24] W. & D. H. S. Van Grembergen, "A research journey into enterprise governance of IT, business/IT alignment and value creation.," *International Journal on IT/Business Alignment and Governance* 1(1), pp. 1-13, 2010.
- [25] Steve Clarke., *Information Systems Strategic Management an integrated approach*, London: Routledge, 2001.
- [26] P. G. J. H. Acklesh Prasad., "ON IT GOVERNANCE STRUCTURES AND THEIR EFFECTIVENESS IN COLLABORATIVE ORGANIZATIONAL STRUCTURES," *International Journal of Accounting Information Systems*, vol. 13, no. 3, pp. 199-220, 2012.
- [27] Samuel D. L. & Aris B. S., "INFORMATION TECHNOLOGY GOVERNANCE: THE EFFECTIVENESS IN BANKING SECTOR," *The Proceedings of The 7th ICTS*, Bali., 2013.
- [28] ISACA, "COBIT 5 ISACA's New Framework for IT Governance, Risk, Security and Auditing: An Overview.," *COBIT @ ISACA*, 2012.
- [29] Sherry Lee Price, *Performance Management Strategies: A Competitive Advantage for High Technology Firms. A Study in the Okanagan Valley Region of British Columbia.*, In partial fulfillment of the award of Doctor of Business Administration, Faculty of Business, University of Southern Queensland , 2006.
- [30] Wayne W. Eckerson, "performance management strategies: How to Create and Deploy Effective Metrics," *First quarter 2009, TDWI best practices report*, www.tdwi.org, 2009.
- [31] Abel Gitau Mugenda, *Social Science Research Theory and Practice*, Nairobi: Applied Research and Training Services, 2011.
- [32] & R. R. G. Joseph A. Gliem, "Calculating, Interpreting, and Reporting Cronbach's Alpha Reliability Coefficient for Likert-Type Scales," in *Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education*, Columbus, 2003.
- [33] TUDelft, "Assessment of the ICT status at University of Rwanda," *UR SIDA*, Kigali, 2015.
- [34] Steven de Haes et Al, "IT Governance and Business-IT Alignment in SMEs," *ISACA Journal Volume 6*, pp. 38-44, 2010.
- [35] Shankar B. C. at Al, "How Does Alignment of Business and IT Strategies Impact Aspects of IT Effectiveness?," *International Journal of Applied Management and Technology Volume 12*, Issue 1., p. 1-15, 2013.
- [36] Ronald Y. & Judith B. C., "Process and Politics: IT Gogernance in Higher Education," *EDUCAUSE CENTER FOR APPLIED RESEARCH*, pp. 1-10, 2008.
- [37] Nkufa E & Rusu L., "Critical Success Factors for Effective It Governance in the Public Sector Organizations in Developing Country: The Case of Tanzania.," In *proceedings of the European Conference on Information Systems.*, 2010.
- [38] U. Sekaran, *RESEARCH METHODS FOR BUSINESS: A Skill-Building Approach*. Fourth Edition, Danvers: Hermitage Publishing Services, 2003.
- [39] Sean Whitaker, "The Benefits of Tailoring Making a Project Management Methodology Fit," *Project Management Institute*, Inc, pp. 1-24, 2014.
- [40] Karessa C. & David W., "Improving performance in project-based management: synthesizing strategic theories," *International Journal of Productivity and Performance Management*, pp. 1-17, 2014.
- [41] Van Grembergen W & De Haes S, "A research journey into enterprise governance of IT, business/IT alignment and value creation.," *International Journal on IT/Business Alignment and Governance* 1(1), pp. 1-13, 2010.
- [42] Mohd Fairuz & Taizan Chan., "Barriers to Formal IT Governance Practice – Insights from a Qualitative Study," *46th Hawaii International Conference on System Sciences*, pp. 1-10, 2013.
- [43] Jerry Luftman et al, "IT governance: An alignment maturity perspective.," *International Journal on IT/Business Alignment and Governance*, 1(2), pp. 13-25, 2010.