Development of an Information Technology Management Model for Madinat Zayed and Ruwais Colleges in Abu Dhabi, United Arab Emirates

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ABSTRACT

Most of the IT governance tools today were specifically designed with the business sector in mind. Their focus is to enable IT activities and the resources to meet their actual business needs. While there are researches applying some of these tools in educational institutions, there is a scarcity of research with regards to developing an IT management model specifically designed for the educational setting. This research attempts to bridge that gap by developing an IT management model for Madinat Zayed and Ruwais Colleges, both tertiary educational institutions.

The researcher focused on the IT procedures within the context of managerial functions of Planning, Organizing, Implementing and Controlling as applied to data, infrastructure, people and IT processes. The respondents of the research were all stakeholders who manage IT resources within the reach of the colleges. The researcher used the qualitative type of research specifically the structured interview and participant observation. It also used IT audit to assess the current IT infrastructure. Phase one of the research was an IT assessment of the current IT procedures. Phase two was choosing a dominant framework for IT procedures and Phase three was the IT Management modeling.

The output IT management model addressed the weaknesses of the current IT management setup of the colleges and at the same time serves as a guide in operationalizing the model itself. The model has four distinctive features; mainly it is procedure based, metric driven, management paced and resource oriented. The model's organizational emphasis is on the Information Technology Services (ITS) department's autonomy and the department's perceived mandate as being more than a service center but innovator of change. The model also underscored the alignment of IT goals to educational objectives and the importance of the metric "value" which according to the stakeholders should be seen through the "eyes" of the whole institution rather than a per department metric. Some IT procedures were also found to be equivocal to each other and the management paces do not necessarily follow a sequential order.

Keywords: IT Management, IT Procedures, IT Resources, IT Governance tools

1. Introduction

Educational institutions are similar to the business environment in the sense that they also need to manage resources, people, operations and organization. Information Technology is one of the resources that need to be managed carefully and prudently in order for educational institutions to

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achieve their specific goals and objectives. In the past, the job to manage IT has been left to IT experts, now managers should not relinquish their right to participate in information system decisions; otherwise they limit their business options (Pearlson and Saunders 2009). In other words, the time where managers just leave the analyzing of IT results to IT managers is over because IT now is so intertwined with almost all levels of management that it now affects the profit ratio or even the success of the company thus strategic management of information resources is now a paramount concern of every stakeholder.

But while there is a plethora of research studies focusing on the use of IT Management tools in the industry there is a dearth of studies on IT management models being designed specifically for educational institutions. Educational institutions are currently also heavily laden with IT resources. A case in point is the environment in which this research was conducted. The recipients of the output of this research are two fully computerized colleges: Madinat Zayed and Ruwais Colleges. They have a robust network architecture which supports both wired and wireless processing. They maintain their own intranet and have a complete set of hardware and software to support this network. At the core of its IT assets, the colleges possess the latest educational technology tools and transactional processing systems designed to facilitate learning and administrative transactions.

Having a range of IT resources at its disposal, IT management is indeed very important in the colleges. Presently, they do not follow any prescribed IT governance tool. This makes their IT management a "play by ear" type resulting to a reactive type of management. While it may work for the day-to-day transactional activities, it does not fully address the strategic alignment of IT goals, ensure optimization of utilization of IT resources nor does it establish quantifiable or qualitative value to the institution. For these reasons, there is indeed a need to establish an IT management model specifically tailor-made for Madinat Zayed and Ruwais Colleges. This model should not just provide a framework for managing IT resources but should also capture the unique characteristics of the college's managerial environment. The model should also be comprehensive in a sense that it covers all necessary IT procedures and resources needed and most importantly its development should include the participation and cooperation of all stakeholders in order for it to be successful.

2. Background of the Study

2.1 A Review on Management Concepts

Management has been around even before technology came into the picture. Many managers and academics have tried to turn management into a science. There were many approaches in management and right now most entities are using a hybrid of these styles. One model above others which resonates with the current research is the administrative approach of Fayol (Combs, 1995). Fayol viewed management into different managerial functions specifically planning organizing, commanding and coordinating and controlling. Fayol's approach was further simplified by Bateman and Snell (2007) into four phases Planning, Organizing, Leading and Controlling. The researcher used these four classifications in developing the theoretical framework of the study due to its applicability to the current research overall framework of management. When IT came into play, the focus shifted to how information technology affects the strategic and operational capability of business. This effect can be encompassing to the firm activities with the purpose of designing and developing products and services for maximum customer satisfaction, corporate productivity, profitability, and competitiveness.

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The exploration of the relationship of business objectives to information technology objectives has led to a lot of strategies. On the general level, we have the Porter model (Pearlson & Saunders, 2009) championed by Michael Porter, he said that the fundamental basis of above average performance in the long run is sustainable competitive advantage. He identified three primary states for achieving competitive advantage 1) cost leadership 2) differentiation 3) focus. The utilization of IT resources therefore should provide the company competitive advantage. The organizational strategy focuses on "how a company should organize itself to achieve goals and implements the business strategy" (Pearlson & Saunders, 2009, p. 34). Other strategies recognize other factors that can affect the organization such as values and beliefs. An example framework that exemplifies this is the business diamond where business process, structures, measuring systems and values are recognized and deemed important for an organization. (Pearlson & Saunders, 2009). A complementing framework can be found in Cash, Eccles, Nohria and Nonlan (1994) book which acknowledged other variables such as the combination of organization, control and cultural variables. Still another framework is the information system strategy triangle which espouses the principle that, "Successful firms have an overriding business strategy that should drive both the organizational and IS strategy" (Pearlson & Saunders, 2009, p. 23). The IS strategies should be designed therefore to complement the business strategy. Changes in the IS strategy must be accompanied by changes in the organizational strategy. IT strategy should be aligned with the business strategies in order for it be fruitful and provide the intended results. In summary, all these strategies emphasized the need to align business and information strategy. Porter model added the cost-efficiency concept.

Implementing an IT management strategy in an organization involves a lot of concerns. As IT processes are still driven by human beings, human behavior still very much affects its outcome. It is in this context that IT governance was born. Governance is aligning the behavior with business goals through empowerment and monitoring (Pearlson & Saunders, 2009). According to Weill and Ross (2004, p. 8) "IT governance is specifying the decision rights and accountability framework to encourage desirable behavior in the use of IT" .Weil and Ross (2004) identified IT decision categories and political archetypes of IT organization. How the management sees the IT department affects the IT department very structure and goals. This was one of the concerns that shaped the IT management model of this research. For IT Governance to be effective however it must have some desirable characteristics. Galliers and Leidner (2009) identified eight factors. These factors are simplicity, transparency, a coherence of design, stability and all stakeholders should be fully educated on the IT Governance mechanisms.

The IT strategies techniques should not only produce the functionality requested but to be considered as a success they must add value to the business. There is a need to ensure that IT functions focus on managing IT for value delivery. IT must be transformed into business value by identifying what is relatively important in an IT project and service delivery and what is relatively unimportant (Aitken, 2003).

2.2 IT Governance Tools

The complexity of IT governance has given birth to a lot of existing governance tools used by the industry. Each model has its own advocacy and managerial leanings. The research examined eleven IT management models utilized in the past and in the present. At the forefront of this is Control Objectives for Information and related Technology (COBIT) and Information Technology Infrastructure Library (ITIL). The two are widely used all over the world. COBIT consists of a process based IT governance tools which contains thirty four processes (ITGI and OGC for COBIT 4.1, 2008). Major tools of COBIT are as follows; contains a set of performance measurement

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elements for all IT process, a list of critical success factors for each IT process and maturity levels to assist in "benchmarking" and decision making processes (Larsen, Pedersen & Andersen, 2007). As a process based IT governance model COBIT is more focused on enabling IT activities and the resources that support them to be properly managed and controlled. ITIL on the other hand is a service oriented model. ITIL main focus is to ensure that high quality services are provided. In order to do this it focuses on the critical business activities. All activities are categorized into two aspects namely Service Management and Service Delivery. ITIL approach defines IT quality as "the level of alignment between IT services and actual business needs" (Larsen, Pedersen & Andersen, 2007).

ValIT framework is another model which emphasizes value delivery and benefit realization. ValIT was designed to complement COBIT. ValIT contains guidelines, principles, processes and practices to help managers realize value from IT investments (ITGI for VaLIT extract, 2008). Another model is the Government Accounting Office (GAO) model which focuses on providing a framework for making sound IT investments. The model was developed by the US General Accounting Office and it identifies critical processes to ensure the success of IT investments. Particularly it divided IT investment into three phases namely, the selection of projects, control of projects and evaluation of projects (United States, General Accounting Office, 2000). The GAO model also has a segment on information security called Information Security Management that identifies critical issues to ensure an adequate management of IT security.

The Information Technology Control Guidelines (ITCG) were primarily designed for enterprise wide systems. It basically contains control structures that will help auditors in assessing systems. Among its notable characteristics is its emphasis on risk management. According to Trites (2001) the initiative for risk and assessment management should encompass the whole enterprise. It should become part of the corporate culture. ITCG also focuses on roles rather than positions. These roles are associated with specific activities that describe the function of each role (Kimton & Martin, 2001).

The Management Information System is a tool for evaluating how the strategic implementation of IT supports the organization's mission and improves its products and services (Kimton & Martin, 2001). Its framework can be summarized with the determination of the mission and vision and the development of the strategies in defining the direction of the organization, project management, managing performance, managing infrastructure and acquisition of goods and service (Kimton & Martin, 2001). Another model is the Systrust Principles and Criteria of System Reliability which provides a framework for evaluating the reliability of information system. In this framework the assessor evaluates the reliability of a system based on availability, security, integrity and maintainability. This model determines whether an information system is reliable based on its ability to function without significant error, breakdown and failure during a given period in a given environment (American Institute of Certified Public Accountants 2006, Trust and Service Principles). The Capability Maturity Model (CMM) is a methodology used to improve and upgrade an organization's software development process. The model describes five increasing levels as the organization progresses; i.e. the initial, repeatable, defined, managed and optimizing. Each of the levels has specific characteristics that describe a state (Larsen, Pedersen, Andersen, 2007). This maturity model provided the inspiration for the development of the maturity models for the 34 IT processes of COBIT, as published in the COBIT Management Guidelines in July 2000 (Kimton, & Martin 2001).

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Henderson & Venkatraman model promotes that the company's strategic designs should be aligned with the IT operations and IT infrastructure. The model has two dimensions: the first focuses on how the organizational structure strategically fits with the external strategy. This means the two must work in consonance with each other. The second is the "functional integration" which is "the degree to which the IT related technological planning and business are aligned" (Assen, Berg & Pietersma, 2009, p. 181). Projects in Controlled Environments (PRINCE) is a project management method that includes management control and organization of projects. It covers a comprehensive approach on the different aspects of project management from planning to evaluation (Pincemaille, 2008).

2.3 Evaluating IT Processes

Part of IT governance tools is evaluating IT processes. The IT balance scorecard is a derivative from the original balance score card introduced by Kaplan and Norton in 1992. Basically the IT BSC 'tracks both the efficiency of IT activities and the effectiveness of contribution to organization" (Cram, 2007, Current Drivers section, para. 6). Another method in evaluating IT governance is doing an IT Audit, starting on an audit of the strategic plan of organizations. '(Ackerman et. Al, 2009). Auditing should also be extended to IT resources to optimize its performance. This is normally called an Internal Audit in which the purpose is usually to provide assurance to management that controls are in place and to promote these controls in order to find out the weaknesses of the IT resource and develop solutions to eliminate or minimize them (Davis, Schiller, & Wheeler, 2011). As part of knowing the current state of the IT resources of the colleges, the researcher conducted an internal audit which formed a part of the deliverable of Phase one of the research. To be able to protect IT resources, aside from establishing controls, the current literature also emphasizes the importance of risk management to a successful IT security program (Stonebummer, Goyuen, & Feringa, 2002). It should however encompass all IT processes. Risk management should be integrated in the organizations planning, operation, project management and resource allocation (Sneft and Gallegos, 2009). There is also a need to expand the scope of risk management which should include the objective to protect the organization and its ability to perform its mission, not just its assets. To be able to do this, risk management now is not only the concern of IT experts but is an essential management function of the organization. Risk analysis is not usually integrated in planning particularly in educational settings. They normally leave this aspect to IT managers. A good risk management plan connotes a proactive managerial approach rather than a reactive one. The risk management procedure of the output model clearly emphasized this need.

2.4 Implementation of IT Management Tools in Organizations

A lot of organizations have already used the different IT governance tools presented with a varying success. In the case of Novozymes A/S, a bio-tech company (Larsen, Pedersen, & Andersen, 2007), the question was what is the appropriate tool for IT governance with regards to the company needs. But while the result recommended the use of a governance tool it also recommended a combination of the tools suggesting that each tool is not enough to supplement the requirements of an organization. Another research involved implementing COBIT to a college in La Fayette Louisiana, USA (Council, 2006, Council, 2007). The study also proved that educational institution also needs IT governance tools. There are however some aspects that need to be tailor cut for educational institutions. Based on the same study, these implications were explored. For instance, it was established for an IT governance tool to succeed it needs the support of the top management and the bureaucratic structure of schools sometimes hinders this implementation. It was also found that the college is weak on protecting data. This is not surprising considering that in

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a school atmosphere a lot of sharing of data is involved. Some educational administrator believes that transparency involves making data accessible, an aspect that can be considered as a security weakness in a corporate setting. Accountability in a school setting may also have different meanings. Accountability as defined in an IT governance tool as a person who owns the process and is accountable in maintaining or initiating it. Accountability also denotes that failure in maintaining or initiating the process makes a person accountable. In a school setting some areas have shared accountability which makes accountability not a clear "cut and dried" concept. While the proceeding research has proven that existing IT management models can be used by schools it needs to be tweaked to a point in order to make it adaptable to the specific needs of the educational institution

2.5 Hybrid IT Governance Tools

The literature is also replete with examples of combining IT governance models with other tools. Foremost of these combinations are COBIT with ITIL or COBIT with ISO or a combination of the three. Getting the best practices from existing tools is not however a "plug and play" type of implementation. The starting point is tailoring specific procedures to ensure that "policies and procedures are effectively utilized" and a "standardized approach" is used to ensure that everyone follows the same set of "objectives, issues and practices" (ITCGI and OGC for Aligning COBIT, ISO and ITIL, 2008, p. 19). COBIT and ITIL have been considered as complementary by experts as COBIT outlines what the organization needs to do and ITIL provides the way to get there (Hill, 2006). A combination of COBIT, ITIL and ISO 1799 to specifically implement information security can provide organization with greater control over security processes (Walhoff, 2007). ISO 1799 specifically targets security standards by providing security controls but does not define how to implement and manage them.

The above articles clearly show that each governance tool has its strengths and weaknesses. Their combination is seen to provide a holistic IT governance tool. This is not surprising because some tools are made only to address particular IT governance aspects. COBIT may seem to be a unifying tool but some critic postulates that it lacks the "methodological alignment" with business strategies and its use of maturity models is not suited to a "comprehensive maturity level" of an organization or business unit. (Ahuja Suschit, 2009, p 29). This weakness makes COBIT adaptability to specific areas of organization difficult. To fully benefit from COBIT, the organizational structure should be COBIT friendly. Unfortunately this is easier said than done because organizational structures are already usually set. ITIL, while it focuses on the critical business processes and disciplines needed, does not provide the "how" part. It is a highly abstracted framework that shows what the important aspects of IT services delivery are to implement it effectively. One, however still needs an IT governance tool which will provide the structure.

The preceding discussion above emphasized that in adapting IT governance models, one should first tailor it to the organizational needs of the company. Tailoring, however, has its limit which means the flexibility of an IT Governance tool can only be stretched in so far as it can allow. If an organization has a specific unique need that the IT governance tools cannot give them, either it will not be able to use the tool or it will adapt another tool which can answer its needs. Adapting another tool if there is already an existing IT governance tool will require additional analysis. The tool to be adapted should not be diametric to the thrust of the first tool. In other words their relationship should be complementary. As whole IT governance models existing today might be directive in nature to provide a more generic approach but it comes short in providing managerial decisions, an area which is unique to each organization

ISSN: 2304-1013 (Online); 2304-1269 (CDROM)

2.6 The Research Theoretical Framework

The theoretical framework of the study was based on different existing frameworks. As a starting point the researcher used Bateman and Snell's (2007) classification of management. This theory originated from Fayol's administrative approach of management (Combs, 1995). Bateman and Snell (2007) classified management into Planning, Organizing, Leading and Controlling. This approach was considered applicable to the research as it was aimed to create a management model. However, realizing that the focus of this research is in IT, the researcher consulted the COBIT model of classification which is Plan and Organize, Acquire and Implement, Deliver and Support and Monitor and Evaluate (ITCGI and OGC for COBIT 4.1, 2008). Mapping the two classifications, the research came up with Planning and Organizing which is equivalent to the Planning in Snell and Bateman's classification. Acquiring and Implementing to Organizing and Monitoring while evaluating represents the controlling parts. The Leading part in Bateman's model, although having some similarities with COBIT's deliver and support concept, have different underpinnings with the COBIT model. Leading in Bateman's view is providing direction, communication and motivation while Deliver and Support in COBIT are more on the implementing part of the IT process hence reconciling the two the researcher used Planning, Organizing, Implementing and Controlling as the final management classification.

The next question would be: what do we plan, organize, implement and control? In answering this question, the researcher looked at two approaches namely Mike Sisco's and the COBIT approach. According to Mike Sisco (2001), there are four technology areas that need managing, namely business applications, infrastructure, IT staffing, and IT process. In COBIT, the researcher once again went back to the COBIT framework of IT governance areas which includes Resource Management (ITGI and OGC for COBIT 4.1, 2008).

Following its cue from the COBIT IT governance focus there are four types of resources: Infrastructure, Applications, Information, and People. The researcher combining the two approaches ended up with People, Data, Infrastructure, and IT processes. These classifications are closely associated with the COBIT. For the fourth one, the researcher chose the fourth technological area as identified by Sisco. This is more appropriate because IT processes also need to be utilized, allocated, and "consumed." The researcher applied the four managerial functions with the four IT resources identified.

The researcher then identified different procedures per managerial classification, per IT resource. The IT procedures identified were based on the current IT processes being done in the colleges. Seeking to provide a comprehensive view COBIT was used as a starting point in identifying the processes. The processes were also chosen using the four managerial phases as guidelines. A total of twenty processes which in the study's operational term are called procedures were identified.

The next question to be answered in the researcher's point of view would be: how are we going to make sure that these procedures are really doing their intended purposes? In finding the metrics for this area, the researcher looked at two frameworks. The first framework is the framework provided by Iain Aitken (2003). Aitken divided IT functions into two: Supply and Demand Sides. In the supply side, he identified cost-efficiency and effectiveness as key characteristics. In the demand side value added and quality are his key characteristics. The Aitken model focuses on "Value" of the IT services. Taking cue for his model, the researcher named three

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metrics for the IT procedures: effectiveness, quality, and value. The researcher considered cost efficiency as already embedded in the value part. The second framework the researcher used is the ValIT framework. According to this framework, "Value is the end business outcome(s) expected from an IT-enabled business investment where such outcomes may be financial, non-financial or a combination of the two" (ITGI for ValIT extract, 2008, p 13). This definition is highly appropriate since in schools, the approach is usually for IT to service the pedagogy not necessarily to increase "profit." The researcher adapted this meaning for the term value.

2.7 Research Questions

As stated in the introduction, this research is intended to develop an IT management model for Madinat Zayed and Ruwais Colleges. Specifically it sought to answer the following research questions:

1. What are the current issues of the academic and non-academic departments in terms of IT with regard to the current IT management practices in the context of the following?
   - 1.1 Planning
     - 1.1.1 Organization and Structure
     - 1.1.2 IT Resource Acquisition and Procurement
     - 1.1.3 IT Strategic Planning
   - 1.2 Organizing
     - 1.2.1 IT Asset Management
   - 1.3 Implementing
     - 1.3.1 IT Projects
     - 1.3.2 Service Management
     - 1.3.3 Change Management
     - 1.3.4 Problem and Incident Management
     - 1.3.5 Security Management
   - 1.4 Controlling
     - 1.4.1 Quality Control Management

2. What is the current state of the IT resources specifically on infrastructure, data, IT processes, and people as assessed by the IT.S personnel?

3. What are the Director and IT.S head's preferred procedures and metric criteria of IT management in planning and organizing IT resources in terms of the following?
   - 3.2 Data
   - 3.3 Infrastructure
   - 3.4 People
   - 3.5 Process

4. What are the ITS head's, personnel's, and IT faculty's preferred procedures and metric criteria of IT management in implementing and controlling IT resources in terms of the following?
   - 4.2 Data
   - 4.3 Infrastructure
   - 4.4 People
   - 4.5 Process

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5. What IT management model is applicable to Madinat Zayed and Ruwais Colleges?

6. What proposed acceptability checklist can be used to validate the institutions' acceptance of the IT management model?

3. Research Methodology

Finalizing all the influences from research theoretical framework, the following figure summarizes the theories and provides the study's conceptual framework.

Figure 1- The Conceptual Framework

The constructs in center circle represent the core metric characteristics by which all the managerial functions will be assessed. The four managerial functions can be viewed in a progressive order, thus planning leads to organizing, organizing leads to implementing and implementing leads to controlling, controlling results in further planning. The four managerial approaches in the context of this research can be considered as a cycle by which IT management is facilitated.

The theoretical and conceptual paradigm provided the basis by which the structure of the IT management model will be culled. The next question would be how will the management model be formulated?

In describing the necessary data in order the answer the research questions, the researcher mainly used the qualitative research design. These include using in depth interviews and participant observation based on the emic and etic principles of ethnography. "Emically" means, the researcher seeks the "native point of view" relying on the "local people" to provide insider's information (Kottak, 2006, p. 53). This is exemplified in the research by the fact that since there was no current IT management tool being used, the research bank on the current practices as interpreted by the stakeholders. At the same time, the researcher is also qualified to "etically" observe from the outside and provide an objective outsider's point of view (Kottak, 2006, p. 53). This is possible since the researcher is also an IT practitioner himself and equipped with the knowledge of the

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different IT procedures and different IT models. Another approach the researcher used was the IT audit approach, which essentially is a combination of interviews and observations. IT audit evaluates computer systems in terms of effectiveness and quality with the goal of determining the vulnerabilities and with the endpoint of removing or minimizing dangers and risks. IT audit relies on controls which are policies and tools that ensure everything is working properly (Davis, Schiller, Wheeler, 2011). Secondary data analysis of the relevant documents was used to supplement and augment the primary data.

The research was conducted at Madinat Zayed and Ruwais Colleges both are government owned schools. The colleges were chosen for the following reasons: First it has state of the art IT resources available in a school setting and it utilizes these resources in all areas of the school management. Second the colleges do not follow any specific IT management tool hence their management is more on the "play it by the ear" type. In addition, there was no institutionalized method to insure that IT goals are congruent with the institutional objectives. There were also no formal metrics to evaluate and measure the effectiveness, quality and value of IT resources utilization. This makes the colleges an ideal research ground for the model making because it will have no bias on a specific management tool. Third, all the IT personnel, faculty and managers of the colleges are qualified in giving their point of views not only because they are all involved in the IT processes but all of them were chosen from all parts of the world using a rigorous process of recruitment and lastly based on the flow of procedures and management of the IT department, all of them were able to cover the different functions of management, making the study more relevant, meaningful and needed. While there are two colleges which are 150 kilometers apart, there is only one organization that manages both. This means, in terms of organizational structure, it is considered as one, having only one director and all supervisors manage both colleges. Faculty members also teach on both campuses. The department that is primarily in charge in IT management is the Information Technology Services or commonly referred to as ITS department.

The research methodology is mainly divided into three phases. Phase one involves an examination and evaluation of the current IT management. This is to provide the data of what is happening right now with regards to the different IT management phases. For Phase one, the researcher interviewed all the department heads, including the director, I.T.S coordinator and Finance and Human Resources coordinator. Faculty members representing different departments were also interviewed. This included two English teachers and one faculty member from each of the math, IT and business departments. The faculty members here were used to narrate the typical IT management processes they are involved with, comment and also evaluate the current services of the I.T.S department. The interviewees were chosen based on their position to manage, assess and influence IT management processes. Students were not included because they are just the recipients of the IT processes and do not have any say in the strategic alignment of these processes. All the I.T.S personnel were also interviewed as they have firsthand knowledge on the current IT processes being done in the colleges. The researcher did not just rely on interviews to assess the current IT management. An IT audit was also conducted on all current IT resources of the colleges. Secondary data such as strategic plans of each department, feedback reports of the I.T.S department and incident reports were also examined. The whole purpose of phase one was to give a comprehensive view of the colleges IT management state.

In Phase two, the interviewees were expected to provide the IT management preferred procedure, taking into consideration the weaknesses revealed by the first phase thus all the interviewees of the second phase were given a briefing of the results of Phase one to give them insights in their choices on how the IT procedures will work best in the colleges and to ground their

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views on reality. The interviewees in Phase two were chosen based on their direct relevance to the different IT procedures. These included the director, the I.T supervisor, the six I.T.S personnel, the four IT faculty members and the I.T.S coordinator. The four I.T faculty members served as the point of view of the "customers" but at the same time they are of course, qualified on commenting on the different IT procedures being IT practitioners themselves. As part of the qualification to become an IT teacher in the colleges is to have industry experience thus all IT faculty members are also established IT industry professionals.

Based on the results of the second phase, the researcher built the IT management model using qualitative analysis of data. The IT management model identified the ideal characteristics of the IT management as stated by the interviewees, the general framework, the tone and set of steps in managing the different IT procedures and the criteria in measuring these IT processes

The researcher used different data gathering tools. In the first phase structured interview questions were prepared to get the data required. The questions were aimed to capture what is happening in the different areas of IT management such as strategic alignment of goals, technology dependency, support and service quality and other IT issues. An IT audit checklist based on the common auditing principles was also prepared to assess the utilization of IT resources. To help the interviewees in Phase two, the researcher prepared a framework procedure list based on the different IT management tools presented in the literature. The framework procedure list contained the different management styles and concepts as applied to the different IT procedures and as categorized based on the management functions of planning, organizing, implementing and controlling. This list served as a guide for the interview questions in Phase two. Secondary data coming from departmental plans and programs, I.T.S minutes of the meetings, documented IT policies, student and faculty survey of I.T.S services and help desk reports were collected and factored in the IT assessment report.

All the phases mainly used qualitative analysis of data. In the first phase the researcher used a narrative report format incorporating frequency theme analysis as applied to the answers of the interviewees. However since it is an assessment report, the researcher did not only present the issue with the most number of frequencies but also other issues as well. The result of the IT audit checklist was also summarized. In phase two a frequency analysis was used in treating the data. The results showed the dominant framework and metrics chosen by the interviewees. These tables are further analyzed as input for Phase three.

In Phase three, which is the model building, the number of thematic occurrences over the number of respondents was used to determine the emerging theme. A theme with a percentage of more than 50% was adopted. If there were equal frequency counts the researcher tried to reconcile the main idea in both themes. If they were reconcilable both were adopted. If they were not, clarifying interviews were conducted in an effort to find the dominant theme. Aside from the dominant framework concept inputs for the model were also based on Phase one results. The model also contained a proposed acceptability checklist tools based on the IT management model itself.

4. Results and Discussion

Phase one essentially answered research question one and two. The deliverables of this phase are the IT assessment report and the IT audit of the infrastructure. In accordance to the conceptual framework, the assessment used four phases in management namely planning, organizing, implementing and controlling. Each management phase has different procedures. Notable observations of Phase one are: 1) I.T.S is mainly seen as a service provider based on the

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answer of all interviewees but at the same time nine percent sees it also as an enabler of business objectives, innovator of services and initiator of changes as well 2) Not enough formal processes for proposing IT investment, solicitation of I.T.S services and proposing changes 3) Not enough procedures to align I.T.S goals with departmental IT intensive goals 4) Not enough inventory controls as applied to IT consumables 5) No formal delineation of responsibilities with regard to projects 6) No documentation procedures for classification of changes, levels of responses, problems and quality controls. 7) Inadequate problem reporting mechanisms 8) Quality and planning and consciousness are not integrated in strategic planning. 9) Inadequate documentation on backup and recovery plans and accountability matrix for security. The interviewees also consider lack of man power as the primary challenge I.T.S is facing at present followed by training needs and responsiveness to requests. Topping suggested improvement of I.T.S includes ensuring all equipment are working especially in the classroom followed by a quicker and more efficient response to help desk calls and training of personnel to make them more competent. The two challenges somehow complement the two improvements being suggested: training and more adequate responsiveness to service calls. The IT Infrastructure assessment covered different infrastructure areas such as data centers, routers, switches, firewalls, VLAN's, Operating systems, Databases, Storage, Virtual Servers, WLAN, Mobile devices and services, Application and Educational technology tools. The following are the summary of findings: 1.) There are no documented policies in account creation. This includes granting rights and privileges and removing rights and privileges. This observation is applicable to data centers, windows operating system, database, storage and virtual Servers. 2) There are no documented policies for password management. This is applicable to data Centers, windows operating System, database and applications. 3) There are no documented policies for back up, recovery and disaster planning. This is applicable to data centers, storage and WLAN 4) There are no documented policies of capacity planning integration. This is applicable to data centers, database and storage 5) There are no documented polices for periodic monitoring of performance. This is applicable data centers, windows, database and storage.

The results of Phase one clearly justified the need for an IT management model. The inclusion of the managers' viewpoints enriched the IT assessment process as formerly only IT managers and personnel were doing such. This is clearly in line what the modern world demands where managers have to participate in IT decisions otherwise they risk limiting business options (Pearlson and Saunders, 2009). The IT assessment report and IT Infrastructure audit ferret out the challenges and issues facing IT management in the colleges. It made all the research participants aware of questions that they have not asked in the past such as: "Are our IT goals strategically aligned with the institutional goals? Are we optimizing the use of our IT resources? It became clear for them that if these issues are not met they will result in infrastructure degradation and dissatisfaction of the "customers". Armed with this knowledge, Phase two interviewees chose an IT framework procedure which they think would be applicable in the context of the college's environment. The interviewees had to go through twenty two IT procedures as earlier identified in the conceptual framework of the study. These twenty two IT procedures were categorized based on IT resources: Data, Infrastructure, People and IT processes.

In the development of the model, the researcher used six categories to crystallize the model; these are purpose, goals, personality involvement, the scope, the procedures and the review process. Additional terminology such as related procedures and outputs were also added. The four major characteristics of the model were extracted from the conceptual framework itself. The model is basically management oriented as it was based on the simple classification of Bateman's model which consists of planning, organizing, leadership and controlling (Bateman, Snell, 2007). Instead

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of leadership, the researcher used "implementing" as the term is more aligned with an IT procedure. The controlling part does not only concern ensuring all procedures serve their purposes but that they will also clearly show accountability. This makes delegation easy to team members, clear accountability for managers with regards to actions of their subordinates and timely feedback of employee's performance (Allen G, 1998). The model is also resource oriented as it was divided into four resources namely: Data, People, Information and I.T process. These classifications were loosely based on the COBIT model where there are Application, Information, People and Infrastructure (ITCG and OGC for COBIT 4.1, 2008). The model is also procedure based. There are twenty two procedures identified in the model. The procedures were chosen because they are generic and they reflect what is currently being done. The model is metric driven as each procedure is assessed based on effectiveness, quality and value. The metrics were influenced by Aitken's point of views such as effectiveness being a characteristic where services should be practiced to produce the best outcome, quality is addressed by customer satisfaction and most importantly value which measures how much value the IT function is "adding" to the institution (Aitken, 2003). The results were in agreement with Aitken's principles as the participants understood each metric as follows: Effectiveness is seen on the functionality of the process itself and is usually determined by the I.T.S department. Quality is seen from the point of view of the beneficiaries of the procedures and value is seen from the point of view of the institution as a whole. Value is not just value that can be measured but value that is also intangible. The participants understood value as both a qualitative and quantitative concept. Most importantly according to the participants value also depends on the perception of the stakeholders, a concept that is also present in current IT management models such as VaLIT (ITCGI for VaLIT extract, 2008). The figure graphically represents the general framework of the resulting model.

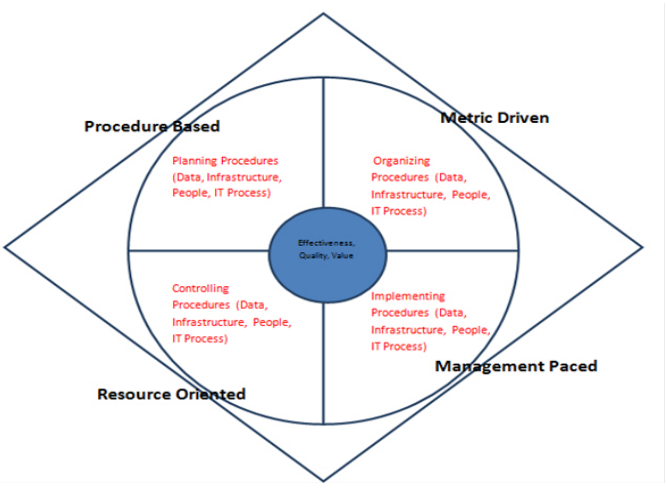

Figure 2- Madinat Zayed and Ruwais IT Management Model

The outer shape, which is a rhombus or a diamond shape, was used to emphasize the equanimity of the four different major characteristics of the model. These four permeate the entire model. This is represented in the rhombus whose four sides all have the same length. Just like the rhombus which has opposite angles that are equal, the characteristics also reflect each other in equal measure, thus a procedure can always be traced to management pace, resource, and it always has review measures.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM)

The circle inside the rhombus represents the original working model which presupposes the sequential nature of the management paces. The researcher, after having gone through phases one and two of the research, found out that each phase does not run in a cyclical order but as an equivocal phase with the other management phases. This is based on the actual scenario in which some procedure can run without inputs from the other procedure. Some procedures in the *implementing* can run even without necessary input from the *planning*. For example change management can be invoked even if IT Strategic Planning is not done. Another finding is that some procedures have encompassing properties. An example of this is risk management and assessment of IT processes. To reflect this result, the management phases are represented as pieces of the circle which emphasize that they are in a sense a world of their own. The middle circle represents the review metrics used for all the procedures in the management phase.

The general characteristics of the model were gleamed on the four different IT procedures defined that influence this aspect. These IT procedures are: Defining the I.T.S role in the Organization, Defining the IT Internal Organizational Structure, Identification of Job Description and Skill required and handling employee movement. Applying the dominant thematic analysis the following are the results: 1) The ITS is deemed to be an autonomous unit at par with other departments whose primary purpose is service and support to the institution through maintenance of infrastructure and maintenance and promotion of educational technology. 2) The I.T.S department is expected to hire personnel who will satisfy the IT needs of the organization. 3) The I.T.S department believes in the principle of maximization of productivity through learning various skills. Learning various skills is also part of the I.T.S personnel professional growth. 4) The I.T.S recognizes the criticality of the I.T.S function to the organization especially with its personnel who are handling responsibilities significant to the organization's operations. 5) The I.T.S department is expected to provide and maintain the technology to support the various processes of the organization. 6) As a provider of service, the I.T.S department is expected to deliver these services with customer satisfaction as one of its primary objectives. 7) The I.T.S department aside from providing support and service is also seen as an innovator of changes. 8) The I.T.S department is expected to equip itself with the necessary skills needed for it to carry out its basic functions. The participants are in unison in saying that skills or competencies of the I.T.S personnel are connected to the success of the IT procedures and maintenance of the IT infrastructure. This observation is similar to one of the underpinnings of the Strategic Alignment Model which relates competencies to processes and IT infrastructure. (Assen, Berg, Pietersma, 2009).

The following are the results of the thematic analysis for the other IT procedures as stated by the participants. The IT management model is a detachable deliverable that can be viewed separately but for brevity purposes only the highlights were included.

1. IT strategic planning should include not just the I.T.S personnel inputs but of all stakeholders. The main goal is that IT strategic plans are aligned to the institutional objectives. It is only after an IT strategic plan is established where technological infrastructure planning should commence. All technological infrastructure plans should be traced to institutional strategic plans and fully communicated to stakeholders.

2. Data Management and data requirements should also be traceable to the IT strategic plans and its focus should be helping managers and other stake holders in their decision making. Metrics for this should be integrity, flexibility, functionality, cost, accessibility, effectiveness, timely, secured and resiliency to failure.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM)

3. It was emphasized that data security is not just the responsibility of the I.T.S but of all stakeholders. Data security should emphasize quality management, establish accountabilities, and conduct reviews, threat assessment and application assessment.

4. Purchase of IT assets should support institutional objectives and that an evaluation of the clear benefit and value the asset is providing to the institution should be done before and after purchasing. These evaluations should serve as input to other processes such as strategic planning, risk management and change management.

5. Computer operations should include policies to schedule jobs, monitor infrastructure and practice risk management. All I.T.S personnel must be able to know their tasks and are expected to provide standard quality service. Providing computer service should also include insurance of none or less disruption of infrastructure performance and prevent degradation of the hardware.

6. Establish a robust change management that classifies the type of changes and minimize the impact of change through proper planning and response.

7. Periodic reviews should be established for infrastructure, forecasting of future needs and capacity building. Each IT process can be measured using key process indicators to gauge its success or failure.

8. Risk management should be incorporated to strategic planning, computer operations, data security, change management, assessment of system performance and project management and just like data security risk management is not just the responsibility of the I.T.S personnel but of policy makers, department heads and system owners as well.

9. The I.T.S department is expected to conduct a training needs analysis to determine the IT skills required by the necessary stakeholders. They are also expected to design and implement an effective skill acquisition training program.

10. Budgeting of IT resources is relegated to a higher level. This is due to the belief that budgeting on a departmental level stifles creativity. All departments can submit their IT project proposals without the element of cost analysis. This part will be done by the committee formed to evaluate the viability of the project proposal.

5. Conclusions and Recommendations

The current state of IT management in MZC and Ruwais Colleges is indeed a fertile ground for the development of an IT management model. It has a techno-savvy culture where IT is very much used with full support of the management. This situation, coupled with the autonomy the I.T.S department is enjoying, puts it in a position where it can actually do beyond being just a service provider but as the other stakeholders enunciated, be a business enabler, initiator of change and innovator of services as well. To be able to do this however, it must overcome its current challenges by adapting the IT management model which will streamline its processes and ensure its effectiveness. Emphasis should be given to: a) Systematic ways of doing things through the installation of policies and proper documentation. b) Ensuring the effectiveness and quality of the procedures through relevant metrics to measure their success and periodic reviews. c) Ensuring the success of the procedures by providing the necessary resources they need. d) Incorporating risk

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management to prevent further problems. e) Emphasis on data security and integrity but at the same time not inimical to collaboration.

In developing plans, policies, and designing information architectures, the interviewees emphasized the need for alignment to institutional goals, inclusion of stakeholders' input, establishing accountability and conducting reviews. All of these lead to one thing: value. This ensures the benefits the organization will get from these procedures and at the same time because of the inclusion of the inputs of all affected, provides a sense of ownership and pride to everyone in the colleges.

One of the observations that can be deduced from the research is that value, as defined in this research, is seen from the point of view of the institution as a whole. The interviewees have found it difficult to answer this question because they only see the value of their department; value is the collective view or the end result of the collective view. There is however a strong emphasis on an effective I.T management, which emphasizes benefit realization. The researcher believes that this route will result in a sense of collective awareness of satisfaction, trust and confidence in the I.T.S department.

In the developed IT management model, it has been found out that:

1. The management phases are not strictly sequential but can be iterative at times. This means that anytime if needed a management phase can go back to other management phases. Organizing can go back to planning or implementing can go back to organizing or assessing can go back to implementing if the need arises.

2. Each management phase is equivocal with other phases. As a result, some procedures inside each phase can be implemented without requiring inputs from other procedures. This makes these procedures more manageable, and I.T.S can implement them using less time and at the same time produce more results.

The following are the notable recommendations of the research. 1) Operationalize the model in order for the I.T.S to reap the benefit of managing IT resources prudently. 2) Implement the model in all its life cycle, from planning to assessing, and do an analysis using the Acceptability checklist as an evaluation springboard. Tweak the model accordingly based on the results. 3) Carry out further research by applying the model to other institutions similarly situated with the circumstances of this research. 4) For future researchers standardized a model for Educational Institution in tertiary education level using this research as a baseline. Most of the recommendations here are in effect operational underpinnings of the IT Management model; thus the foremost recommendation is to include it in the operational aspect of the model.

As a whole, the study fills the gap in the area which the researcher believes should be given importance as well. This area is the development of an IT management model designed specifically for Educational Institutions. Educational institutions have specific needs that are different from business institutions. This model which was designed with the education sector in mind from the beginning can be considered as one of the opening salvo to spur studies in this area.

ISSN: 2304-1013 (Online); 2304-1269 (CDROM)

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