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Incorporating the COBIT Framework for IT Governance in Accounting Education

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ABSTRACT

The Control Objectives for Information and related Technology (COBIT) is a framework of generally applicable IS security and control practices for information technology control systems. This framework is widely accepted by the profession and allows management to benchmark the security and control practices of the IT environment. One of COBIT’s significant components is the Maturity Model that enables management to evaluate and determine where on the internal control spectrum their controls are currently located. The current study aims to identify the discrepancy in the adoption of COBIT by academics and practitioners. The research includes an empirical study to test the faculty perception of the Maturity Model through measuring the accounting information system faculty’s opinion of the model components. The empirical results revealed that there is a disparity on the perceived value of the COBIT Maturity Model. The study indicates the necessity to reexamine the accounting curriculum to incorporate a significant IT governance discipline. It pointed out the discrepancy between the accounting academic programs and the accounting professional practices regarding the use of the COBIT framework for IT governance.

Keywords: COBIT, maturity model, IT governance, information technology, accounting.

INTRODUCTION

Enterprises consider information systems and related technology as vital factors necessary to be competitive and successful (Blili & Raymond, 1993). Information systems encounter serious security threats that may arise from the weakness of the internal controls and/or the nature of the competitive environment as the need and dependency on information increases (Hayale & Abu-Khadra, 2006).
Information security and governance have received increasing attention from both academics and professionals for the need to minimize information systems risk (Greenstein & Vasarhelyi, 2000).

The Sarbanes Oxley Act of 2002, section 404, requires both management and the external auditors to report upon the adequacy of the company’s system of internal controls, including those controls of the information system. However, the act did not specify the methodology to accomplish this goal. The Information Systems (IS) profession was ready for that; the Information System Audit and Control Foundation (ISACF) developed the Control Objectives for Information and related Technology (COBIT), which is a framework of generally applicable IS security and control practices of information technology control. COBIT was initially developed as an IT benchmark consisting of best practices, then it evolved to become a framework that could be applicable as a dual use framework by which organizations can achieve efficiencies in either operation and/or IT audits. This framework is widely accepted by the profession and allows management to benchmark the security and control practices of the IT environment. Additionally, it ensures that adequate security and controls exist (Lainhart, 2000).

On the other hand, the accounting profession started to consider seriously the IT governance concept as a part of the internal control system much later. The accounting profession’s interest heightened after the declaration of the Sarbanes-Oxley act in 2002 (Pauwels, 2006), and the release of the Public Company Accounting Oversight Board’s (PCAOB) Auditing Standard No. 2 (AS2) in 2004. The Committee of Sponsoring Organization of the Treadway Commission’s (COSO’s) issued an internal control- integrated framework. However, this framework is a highly abstract conceptual framework that does not identify control objectives at a level of specificity sufficient to design detailed audit tests. In addition, the general nature of COSO does not address the complexity and special risk inherent in the IT field. Therefore, organizations and auditors in computerized environments started looking for a suitable framework to supplement the COSO framework, such as COBIT and the Maturity Model as one of the COBIT’s testable constructs.

The Maturity Model enables management of a company to evaluate and determine where on the internal control spectrum their controls are currently located. This issue becomes more important with the increasing pressure on the senior managers to consider how well IT is being managed and what needs to be done in the future to reach an adequate level of control over IT functions (Tuttle and Vandervelde, 2007). The Maturity Model enables enterprises not only to benchmark their present IT performance but also to identify future targets for improvements.

This paper explores the gaps that exist in the use of COBIT for IT governance between the accounting academic programs in and accounting professional practices. It examines the level of coverage of COBIT in accounting textbooks and the level of support from accounting professors in utilizing the COBIT model in classroom. The researchers found that the COBIT coverage did not exceed 3% of the total Accounting Information Systems textbooks (see Table 1). Furthermore, based on the result of an empirical study, the researchers found that there is a lack of support for the COBIT model from professors in accounting.
On the other hand, the use of the COBIT model amongst accounting professionals is gaining popularity. The COBIT framework provides a method of application audit for companies’ business process and risk assessment (Che, Bu, Hou, & Shi, 2008). In several countries, accounting firms are anticipated to be proficient in several IT framework including COBIT in order assist in IT governance efforts and to be compliant with COSO report (Huang, Hsieh, Tsao, & Hsu, 2008). Furthermore, Lin, Guan, and Fang (2010) concluded the complex SOX can be achieved by adopting the COBIT framework.

The current study aims to test the faculty perception of the Maturity Model through measuring the accounting information system faculty’s opinion of the model components. The researchers

**Table 1: Accounting Information Systems Textbook Comparison.**

<table>
<thead>
<tr>
<th>Textbook</th>
<th>Authors</th>
<th>COBIT Listed in Index</th>
<th>Pages Devoted to COBIT</th>
<th>No. of Pages In Text</th>
<th>Percentage of Text Devoted to COBIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting Information Systems, 11th ed., Pearson, 2009.</td>
<td>Romney &amp; Steinbart</td>
<td>Yes</td>
<td>203, 204, &amp; 251-253</td>
<td>777</td>
<td>0.6%</td>
</tr>
<tr>
<td>Accounting Information Systems, 6th ed. South-Western, 2008.</td>
<td>Hall</td>
<td>No</td>
<td>None</td>
<td>837</td>
<td>0%</td>
</tr>
<tr>
<td>Accounting Information Systems, Cengage Learning, 2011</td>
<td>Heagy, &amp; Lehmann</td>
<td>Yes</td>
<td>170 &amp; 172</td>
<td>484</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

* Pages with COBIT coverage determined by using the textbook index.
chose to measure the components of the Maturity Model instead of asking the faculty about the measuring the model components enables the researchers to gain in-depth understanding of the faculty perceptions of the different aspects of the model. This study will contribute to the literature by providing insights into the opinions of AIS professors in regard to the COBIT Maturity Model.

The remainder of the paper is organized as follows. The next section outlines the research design. Section three contains the obtained survey results, while section four presents the results of hypotheses testing. Section five discusses the study limitations and future research, followed by concluding remarks in section six.

**RESEARCH DESIGN**

In this section, the researchers discuss the study hypotheses development, the data collection and questionnaire formulation as well as the statistical procedures used.

**Research Hypotheses**

The current research focuses on the AIS faculty opinion in regard to their COBIT Maturity Model support. This variable was measured by asking the faculty to indicate their agreement level with the Maturity Model’s effectiveness in ultimately enhancing the AIS/IS performance and success. Consequently the first null hypothesis is as follows:

**H₀₁:** The AIS educators do not consider the COBIT maturity model effective

The Maturity Model consists of six major aspects that include: (1) awareness and communication, (2) policies, plans and procedures, (3) tools and automation, (4) skills and expertise, (5) responsibility and accountability, and (6) goals and measurement. Thus, to gain in-depth understanding of the different aspects of the model the researchers examined the following null-sub-hypotheses:

1.1 The AIS educators do not consider the “IT awareness and communications” aspect effective.
1.2 The AIS educators do not consider the “IT Tools and Automation” aspect effective.
1.3 The AIS educators do not consider the “IT staff skills and expertise” aspect effective.
1.4 The AIS educators do not consider the “Responsibility and Accountability” aspect effective.
1.5 The AIS educators do not consider the “Goal Setting and Measurement” aspect effective.
1.6 The AIS educators do not consider the “Policies, plans and procedures” aspect effective.

**Sampling & Data Collection**

The study population consists of the seventy faculty members who were in attendance at the 2010 Accounting Information Systems Educators’ conference held in Estes Park, Colorado.

To achieve the study goal, the researchers used mainly the (El Shiek & Abu-Khadra, 2009) model that categorized the maturity model attributes into six major groups. The study
The questionnaire is divided into two sections; the first covers the respondents’ demographic characteristics.

The second section of the questionnaire contains questions on the maturity model attributes per the following distribution:

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Question Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness and communications</td>
<td>Questions 1 through 3</td>
</tr>
<tr>
<td>Tools and automation</td>
<td>Questions 4 through 6</td>
</tr>
<tr>
<td>Responsibility and accountability</td>
<td>Questions 7 through 9</td>
</tr>
<tr>
<td>Skills and expertise</td>
<td>Questions 10 through 12</td>
</tr>
<tr>
<td>Goal setting and measurement</td>
<td>Questions 13 through 15</td>
</tr>
<tr>
<td>Policies, plans and procedures</td>
<td>Questions 16 through 25</td>
</tr>
</tbody>
</table>

Respondents were asked to indicate their level of agreement with which maturity model attributes participate positively in enhancement of both the AIS/IS performance and success. This question represents the definition of effectiveness that is used in the study hypotheses. The researchers circulated the questionnaire by email. Following the initial email of the questionnaire, two additional attempts were made to disseminate the questionnaire via email. As a result, twenty-eight responses were collected, and twenty-three of those responses were received in a usable format. This resulted in a response rate of 32 percent.

**Statistical Tools**

In the current study, some of the measures of central tendency were not used because they were not valid for questions that use the ordinal scale. Ordinal scale describe order, but not relative size or degree of difference between the items measured, also it is not realistic to assume that the distance between the ordinal scale levels are equal. Thus the mean can’t be defined or used.

Furthermore, the variance measure was not used because it is calculated using squared distances from the mean (Zikmund, 2003). Frequency distribution is a summary table in which the data is arranged into conveniently-established, numerically-ordered class grouping or categories. Hence, frequency is considered a valid measurement for the ordinal scale and was used in the current study. Due to the discrete nature of the collected data, the ordinal scale qualitative responses were converted to numerical values by coding the ordinal scales, where 1 equals strongly disagree and 5 equals strongly agree.

The materiality weights for the Maturity Model attributes were considered to be equal (Love & Klapper, 2002), because the materiality of each dimension is contingent upon a variety of internal and external factors related to each environment (Bowen, Cheung, & Pohde, 2007). Additionally, the researchers used the P value in order to test the sampling distribution normality using the following rule: “If the number of successes (X) and the number of failures are each at least five, the sampling distribution of proportion approximately follows a standardized normal distribution” (Berenson, Levine, & Krehbiel, 2002). For the major and minor hypotheses, the researchers used the Z-test for proportion that pertains to the population proportion P Maturity Model attributes effectiveness percentage by calculating the sample proportion Ps. Then the
values of this statistic were compared to the hypothesized value of the parameter P (Defined Norms) so that the decision could be made for each hypothesis. We used 80% to reflect stronger standard that consist achieving most of criteria in each of the research aspects.

RESULTS

Demographic Data

In order to test the eligibility, knowledge and experience of the respondents we examined the descriptive statistics in the demographic section of the questionnaire. The result shows that the 87% of the respondents have doctorate degrees, while only 13% of the respondents have master’s degrees. Almost 61% of the respondents have a CPA certificate while 9% of the respondents indicated that they have the CIA certificate, furthermore 13% of the respondents did not report having any type of certificate. The majority of the respondents (61%) had more than five years of experience in the IS/IT field, while 26% of the respondents were considered new to the IS/IT field. Overall, based on the demographic characteristics of the respondents, it can be concluded that the respondents to the questionnaire have an appropriate level of knowledge to participate in the study survey; this increases the credibility and reliability of their answers. The following sections focus on the statistical findings related to the maturity model dimensions.

Descriptive Results of Analysis

Awareness and Communications: To explore the awareness and communication dimension, the respondents were asked to indicate their level of agreement of the three procedures:

1. Management creates permanent communication channels with IT senior management in order to identify corporate strategy and goals;
2. Management receives mapping reports prepared by IT senior management illustrating the predefined current and future business needs on hand and the probable suitable information technology solutions on the other hand; and
3. Management receives continuous reports regarding IT alignment with organization strategy, regulatory obligations and laws, prospective risks and the value added from IT investments.

Approximately 82 percent of the respondents agreed that creating permanent communication channels with IT senior management will improve the effectiveness of the AIS/IS. Proper reporting by IT senior management, that illustrates and maps the business needs with IT solutions, received almost the same level of agreement. Alternatively, the third procedure in this group, continuous reporting on IT alignment, received a lower level of agreement (74%).

Tools and Automation: In order to investigate the level of agreement within the “tools and automation” aspect, respondents were asked about three procedures:

1. The company has software that can detect, validate and report unauthorized changes of policy on the IT infrastructure in real time, offering immediate and effective corrections;
2. The company has a database auditing tool that automatically monitors activities and detects control exceptions; and
3. An integrated software system that runs off a unified database such as an Enterprise Resource Planning System (ERP), allowing departments to share information and communicate easily with each other.

The highest level of agreement by AIS educators (78%) was found to be in the automation of auditing tools that monitor database activities and detect control exceptions. An agreement range of 65%-69% was found in the other two procedures.

**Responsibility and Accountability:** Respondents were asked to define at which level they agree with the following procedures that represent the “responsibility and accountability” aspect:

1. Management has clear identification of those employees responsible for the different IT activities such as IT principles, IT architecture, IT infrastructure, business application needs, and IT investment and prioritization;
2. Management develops clearly stated policies that describe honest and dishonest behaviors. Such policies are in a written form and are communicated to employees; and
3. Management requires a material dishonest behaviors log report and the corrective action taken for each incident.

The dishonest behaviors log received the lowest agreement rate with a percentage of (48%), while clear identification of employee responsibilities and a clearly stated dishonesty policy received agreement levels above eighty percent.

**Skills and Expertise:** Respondents were asked to define at which level they agree with the following procedures that represent the “skills and expertise” aspect:

1. Management has hiring requirements for sensitively positioned IT employees. Requirements include a background check, educational check, and confidentiality agreements;
2. Management requests from the IT department a continuous employee performance review, where employees must confirm their understanding of and compliance with the entity security policies; and
3. Management requests implementing a continuous employee training program to enhance employee’s knowledge and skills and provide opportunities for individual career growth.

The descriptive statistics revealed inconsistent results among the “skills and expertise” dimension. The study found that the continuous employee review procedures received the lowest level of agreement (39%) and the highest level of disagreement in this question group (34%), although the continuous training program achieved a higher rate of (48%). Finally, (73%) of the AIS educators believed that hiring requirements such as the background check may improve the effectiveness.

**Policies, Plans and Procedures:** In this section the respondents were asked to indicate their agreement level with ten procedures that represent the “policies, plans and procedures” aspect:
1. Management receives a report prepared by the IT department showing incident logs and potential significant security breaches in order to improve related security procedures;
2. Management sets and emphasizes policies prohibiting visitors from carrying cell phones, laptops, PDAs and other portable devices that could capture confidential information while touring the entities facilities;
3. Due to a new implementation or acquisition, management receives a report from the IT department on modifications to the existing physical and logical access security procedures and/or the development of new access procedures;
4. Management requests a periodic review report from the IT department regarding the appropriate use of internet resources (Trusted and un-trusted resources) within the organization;
5. Management requests a report prepared by the IT department periodically illustrating the required modification to internet security procedures such as, antivirus rules and firewalls;
6. IT frequently reports to management the audit trail record that detects material unauthorized network operations activity;
7. Management approves use of a DBMS that defines each type of data, the level of protection required for each type and to whom data is required;
8. The automated data infrastructure management system is approved by the management, the system standardizes IT operating procedures for maintenance, backups and upgrades for data libraries and directories;
9. Management requests periodic assessment reports from IT department on the effectiveness of control procedures concerning source data, data entry, data processing, data transmission and output controls; and
10. Management emphasizes using strong security procedures for manual external data transmission that concerns sensitive and confidential information.

The results were consistent among the respondents; all of the procedures received response rates greater than 60% except one. This indicates that there is agreement among the respondents prohibiting visitors from carrying PDAs and any other portable devices, which could capture confidential information, is acceptable. Management’s emphasis on using strong procedures over manual data transmission received the highest level of agreement (83%).

HYPOTHESIS TESTING

Study Hypotheses Testing

Next, the statistical result of the Z-test for proportion that is used to test the study’s major and minor hypotheses is presented for the six aspects of the study. In using the Z-test statistical tool the norm was defined to be 80%. The developed norms are used as cutoff points for the minimum acceptable percentages, where the respondent is considered as agreeing with the maturity model aspect if its evaluation percentage exceeds the norm. The researchers tested for
significant differences between the applied percentages and this norm using the Z test for proportion.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Norm</th>
<th>S %</th>
<th>Population Size (N)</th>
<th>Z-test</th>
<th>P Value</th>
<th>S*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness and Communications</td>
<td>80%</td>
<td>70%</td>
<td>23</td>
<td>-1.2510</td>
<td>.8945</td>
<td>A</td>
</tr>
<tr>
<td>Tools and Automation</td>
<td>80%</td>
<td>70%</td>
<td>23</td>
<td>-1.2510</td>
<td>.8945</td>
<td>A</td>
</tr>
<tr>
<td>Responsibility and Accountability</td>
<td>80%</td>
<td>70%</td>
<td>23</td>
<td>-1.2510</td>
<td>.8945</td>
<td>A</td>
</tr>
<tr>
<td>Skills and Expertise</td>
<td>80%</td>
<td>43%</td>
<td>23</td>
<td>-4.3788</td>
<td>.9999</td>
<td>A</td>
</tr>
<tr>
<td>Goal Setting and Measurement</td>
<td>80%</td>
<td>61%</td>
<td>23</td>
<td>-2.2937</td>
<td>.0981</td>
<td>A</td>
</tr>
<tr>
<td>Policies, Plans and Procedures</td>
<td>80%</td>
<td>43%</td>
<td>23</td>
<td>-4.3788</td>
<td>.9999</td>
<td>A</td>
</tr>
<tr>
<td>Overall</td>
<td>80%</td>
<td>48%</td>
<td>23</td>
<td>-3.8575</td>
<td>.9999</td>
<td>A</td>
</tr>
</tbody>
</table>

* S: Success of Hypothesis  
** R: Rejected  
*** A: Do not reject

**Table 2: Z-Test for Percent Differences for all Respondents.**

Based on the statistical findings in Table 2, the p-value appears to be more than 0.05 for awareness and communications, tools and automation, responsibility and accountability, skills and expertise, goal setting and measurement and policies, plans and procedures dimensions. The Z-value for all of the Maturity Model aspects is lower than 1.96, which means it falls in the acceptance area. Consequently, it was concluded that the AIS educators do not consider the Maturity Model to be an effective tool for improving AIS/IS performance.

Based on the abovementioned results, the study is unable to reject the main null hypothesis that stated: The AIS educators do not consider the COBIT Maturity Model effective. In addition the study was unable to reject any of the minor hypotheses. The initial conclusion that the main null hypothesis was unable to be rejected when performing the statistical analysis on the twenty-three respondents as one pool is significant. Based on this finding we pursued further statistical analysis on the sub-pool of the fourteen respondents who identified themselves as being experienced by having five or more years of experience in the IT field. The analysis of the nine respondents, having less than five years IT experience, was not included since it did not meet the Z-test requirements that were summarized in the methodology section of the paper.

Surprisingly, even when the analysis excluded those respondents having less than five years’ experience in the IT field the results of the Z-test for proportion failed to reject the null hypothesis, see Table 3. These findings were consistent with those that were found in the analysis of the overall population. Furthermore, there was a higher level of agreement >70% for the following aspects of the study: awareness & communications, tools & automation, and responsibility & accountability.
Table 3: Z-Test for Percent Differences for Respondents with More Than 5-Years’ Experience.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Norm</th>
<th>S %</th>
<th>Population Size (N)</th>
<th>Z-test</th>
<th>P Value</th>
<th>S*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness and Communications</td>
<td>80%</td>
<td>71%</td>
<td>14</td>
<td>1.6448</td>
<td>0.788866</td>
<td>A</td>
</tr>
<tr>
<td>Tools and Automation</td>
<td>80%</td>
<td>71%</td>
<td>14</td>
<td>1.6448</td>
<td>0.788866</td>
<td>A</td>
</tr>
<tr>
<td>Responsibility and Accountability</td>
<td>80%</td>
<td>71%</td>
<td>14</td>
<td>1.6448</td>
<td>0.788866</td>
<td>A</td>
</tr>
<tr>
<td>Skills and Expertise</td>
<td>80%</td>
<td>36%</td>
<td>14</td>
<td>1.6448</td>
<td>0.99998</td>
<td>A</td>
</tr>
<tr>
<td>Goal Setting and Measurement</td>
<td>80%</td>
<td>57%</td>
<td>14</td>
<td>1.6448</td>
<td>0.98375</td>
<td>A</td>
</tr>
<tr>
<td>Policies, Plans and Procedures</td>
<td>80%</td>
<td>29%</td>
<td>14</td>
<td>1.6448</td>
<td>1.00000</td>
<td>A</td>
</tr>
</tbody>
</table>

LIMITATIONS AND FURTHER RESEARCH AGENDA

As with all research, this study is subject to any number of limitations that might be explored in future research. The study adopted the quantitative approach to test the study hypotheses, thus limiting the choice of methodology to a cross-sectional survey between different groups of respondents. A questionnaire survey was adopted in this study and the researchers were not able to question the respondents to ascertain in more details the exact nature of the responses. Therefore, extra care and caution is essential when interpreting questionnaire findings. However, the problems relating to questionnaire surveys can be minimized by undertaking post-questionnaire interviews. However, due to time constraints and the availability of interviewees for a significant amount of time constrained the researchers from undertaking any interviews. Furthermore the current study is considered as an exploratory one; consequently future research work might be explored using different and more developed instruments which may take into consideration of new factors. Despite the limitations that have been identified, this study has provided several important insights into issues relating to IT governance and the disparity between AIS academicians and IT professionals. Future research can be done to investigate and analyze the actual content of AIS curriculum within universities. Also, a survey of accounting and information systems professionals to determine their opinions in regard of the relevant curriculum could be undertaken.

CONCLUSIONS

COBIT recognizes the need to “allow managers to bridge the gap with respect to control requirements, technical issues and business risk, and communicate that level of control to the stakeholders.” (COBIT 4.1, page 8) Furthermore, COBIT identifies among the components of the IT structure that there is a need for the IT processes to be measured. Among the three measures identified by COBIT is the Maturity Model. Therefore, the professors should value the COBIT model in general and the Maturity Model specifically. Hence, the researchers did not expect to find the disparity in the questionnaire results regarding the opinions of the accounting professors concerning the value of the Model. The disparity in opinions may be partially explained by the lack of emphasis on the COBIT Model in the Accounting Information Systems textbooks. Furthermore, a search for papers on either COBIT or the Maturity Model for the
annual Accounting Information Systems Educators conferences for 2008, 2009, and 2010 revealed that there were no papers presented on either of these topics. The lack of focus in accounting textbook support, faculty support and research in spite of the well cited interest due to the Sarbanes Oxley Act, leads to the following realization that COBIT is an IT governance framework and did not emerge from traditional accounting principles. As such, the need to incorporate COBIT in accounting education requires the reexamination the accounting curriculum, a curriculum that will merge a significant IT discipline that may require the participation of IT faculty and the adoption of IT textbooks.

REFERENCES


