

IT Governance Frameworks and COBIT - A Literature Review

Completed Research Paper

George Mangalaraj
Western Illinois University
g-mangalaraj@wiu.edu

Anil Singh
University of Texas at Brownsville
anil.singh@utb.edu

Aakash Taneja
The Richard Stockton College of New Jersey
aakash.taneja@stockton.edu

Abstract

IT governance is one of the central areas of IS research. This study examines research on Control Objectives for Information and Related Technology (COBIT), a popular governance framework. COBIT is a comprehensive IT governance framework that provides guidelines to IT managers in managing and governing enterprise IT. This paper compiles and analyses extant research on COBIT. Our findings suggest that researchers have examined COBIT through multiple perspectives and that most papers either concentrate on overall framework development/comparison or certain pockets of interest within COBIT such as security, risk management, systems development, effectiveness and internal control. Our survey also indicates that many of the published papers are in the accounting domain. COBIT's scope has increased over the years and now it encompasses many of the mainstream IS related areas. Hence, suggestions for future research in IS with regard to COBIT is also articulated in this study.

Keywords

IT governance, COBIT, strategic alignment, control objectives.

Introduction

Information technologies play an important role in organizations. Over the years, IT has transitioned from providing transaction support to enabling competitive advantage to organizations. IT is critical to organizations in providing the agility needed to sense and respond to market and competitive forces. Growth in the use of IT within and across organizations has necessitated the need for various governance structures and processes. Research on IT governance has evolved considerably over a period of time.

Industry needs a comprehensive framework covering all aspects of IT management due to various reasons such as the need to align IT strategy with business strategy, deploy IT resources effectively, create appropriate internal controls, and prevent issues related to software errors. Frameworks provide standard practices that can help organizations in implementing various processes and procedures. Control Objectives for Information and Related Technology (COBIT), one of the comprehensive frameworks for governance of IT in an organization. Various surveys have indicated wide use of COBIT in industry (Smits and Hillegersberg 2013).

Achieving a better understanding of IT governance is important to both researchers and practitioners alike. This study reviews extant research on IT governance frameworks in general and COBIT in particular that appeared in journals and select conferences to ascertain the trends in the research. Findings of the study will also help in understanding the gaps in the literature and pointers for future research directions.

The next section presents concept of IT governance and COBIT and discusses its evolution. Following section discusses methods used in this study to gather research on COBIT. The subsequent section summarizes findings of past research on COBIT. Final section provides directions for future research and concludes the study.

IT Governance Frameworks

Research on IT governance has evolved over many years. Earlier studies considered the aspect of centralization versus decentralization of IT and its impact on various IT functions in an organization (for example: Olson and Chervany 1980). Further development of the field necessitated the need to consider alternate paradigms for managing IT functions in an organization. For instance, Zmud et al. (1986) articulated a governance mechanism modeled around the role of federal government with division of responsibility between central IT unit and business units. Later studies, introduced the concept of *IS governance* for first time to describe the locus of IT related decision making authority in organizations (Brown 1997; Sambamurthy and Zmud 1999). Since then many studies have appeared in extending the notion of IT governance.

After nearly two decades of research on IT governance by various researchers, Sambamurthy and Zmud (2000) observe that there is still wide discrepancy in the way IT is organized in practice from what is described in research. They propose platform logic to describe governance of IT by organizing that includes internal as well as external participants. Weill and Ross (2004) in their influential book on IT governance define IT governance to represent: “the framework for decision rights and accountabilities to encourage desirable behavior in the use of IT”. This view of IT governance borrows concepts from corporate governance area. Weill and Ross (2004) outline six governance classification called archetypes that include business monarchy, IT monarchy, feudal, federal, IT duopoly, and anarchy. Archetypes defined by them typically involved the area that made the decision. For instance, in IT monarchy the IT department made the decisions. They used the archetypes to explain decision making in five key areas that include IT decisions, IT principles, IT architecture, IT infrastructure strategies, business application needs, and IT investment and prioritization.

Brown and Grant (2005) in their comprehensive review of research on IT governance identify two streams of research. The first stream focuses on the IT governance forms and the other streams focus on contingency factors that influence the choice of IT governance mechanisms. Along with the evolving body of knowledge on IT governance in the IS research, the ISACA (formerly, Information Systems Audit and Control Association) has progressively developed their COBIT framework.

Purpose of IT Governance

Initial studies on how to structure IT explored integration of IT with organizational strategy and structure (Allen and Boynton 1991). These studies primarily focused on the structure of IT within the enterprise and the associated contingency factors having an influence on it. Later studies stressed the importance of aligning IT with organizational strategies and objectives. The concept of IT governance derived from the underlying corporate governance objectives, and reflected the alignment of IT strategy with the organization strategy. For example, IT investment decisions and its alignment of strategic priorities was suggested to be one of the decision areas for IT governance (Weill and Ross 2004, pg. 48). Likewise, COBIT also stressed the need for the alignment to be one of the goals (ISACA 2012, pg. 17). Prior to this, alignment of IT strategy and business strategy was the domain of strategic IS planning research (for example: Hirschheim and Sabherwal 2001). Musson (2009) review unravels three ways in which IT governance is discussed in the literature a) a framework for audit process, b) IT governance as IT decision-making and c) IT governance as a branch of corporate governance. Both the decision making and corporate governance were related to the IS related research on IT governance. The audit process becomes an important area for organization's governance of IT due to the prevalence of information systems in the various business processes.

COBIT

Information is a critical resource for all enterprises. Technology plays an important role in collecting and processing data and information, its availability to the right people in the right format and right time to

support business decisions and strategic thinking, its storage, and lastly the destruction. Enterprises strive to optimize the cost of IT, maintain IT-related risk at an acceptable level, and comply with laws and regulations. Instead of IT simply playing a support function, business and IT must collaborate together, so that IT is included within the governance and management. “COBIT 5 provides a comprehensive framework that assists enterprises in achieving their objectives for the governance and management of enterprise IT” and “helps enterprises create optimal value from IT by maintaining a balance between realizing benefits and optimizing risk levels and resource use” (ISACA 2012). Figure 1 presents the development of COBIT over the years.

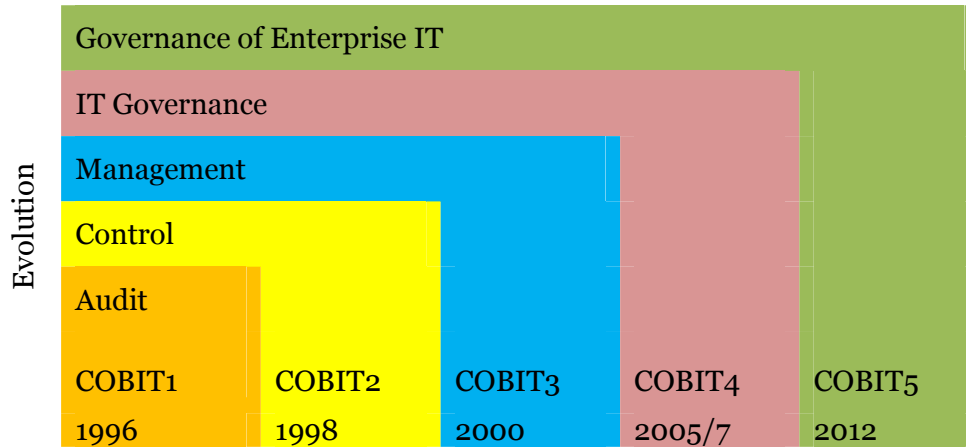


Figure 1. COBIT – The Evolution (Adapted from (ISACA 2012))

COBIT 5 has five key principles: a) Meeting stakeholder needs, b) Covering the enterprise end-to-end, c) Applying a single, integrated framework, d) Enabling a holistic approach, e) Separating governance from management (ISACA 2012). These key principles are further elaborated in the COBIT framework. For instance, enabling a holistic approach includes enablers such as 1) Principles, policies and frameworks, 2) Processes, 3) Organisational structures, 4) Culture, ethics and behaviour, 5) Information, 6) Services, infrastructure and applications, and 7) People, skills and competencies.

The COBIT 5 product family includes: i) COBIT 5 (the framework); ii) enabler guides, which discuss the governance and management enablers and include: Enabling Processes, Enabling Information, and other enabler guides; iii) professional guides, which include: COBIT 5 Implementation, Information Security, Assurance, Risk, and other professional guides; and iv) a collaborative online environment, to support the use of COBIT 5.

Underlying Principles of COBIT

COBIT relies on corporate governance perspective and defines governance as (ISACA 2012, pg. 14):

Governance ensures that stakeholder needs, conditions and options are evaluated to determine balanced, agreed-on enterprise objectives to be achieved; setting direction through prioritisation and decision making; and monitoring performance and compliance against agreed-on direction and objectives.

COBIT makes the distinction from the management of IT from the governance of IT. It defines management as (ISACA 2012, pg. 14):

Management plans, builds, runs and monitors activities in alignment with the direction set by the governance body to achieve the enterprise objectives.

In a way, many of the principles behind COBIT mirror the principles behind IT governance as articulated by Weill and Ross (2004). Some of the commonalities are a) separation of management of IT from governance of IT, b) reliance on corporate governance as the foundation, and c) alignment of business and IT strategies.

Importance of IT governance and COBIT for research and practice

Research on COBIT and the associated IT governance is important due to various reasons:

- IT is increasingly becoming central to business performance thereby justifying demand for governance (Wilkin and Chenhall 2010).
- Most businesses still have not established adequate control over IT (Hardy 2006).
- Organizations face a wide spectrum of external threats arising from IT including abuse, cybercrime, fraud, errors, and omissions (De Haes et al. 2013).
- Today's enterprises demand a high degree of compliance of business processes to meet diverse regulations and legislations (Elgammal et al. 2014).
- Ensuring software systems conforming to multiple sources of relevant policies, laws, and regulations is significant because the consequences of infringement can be serious (Tran et al. 2012).
- One of the most enduring problems faced by the IT function is how it should organize and structure itself (Schwarz and Hirschheim 2003).
- Growing gap between scholarly research and contemporary practice in IT governance (Sambamurthy and Zmud 2000).

Method

This study's objective is to review the existing literature on COBIT framework. It extends the work of Ridley (2004) who performed a literature review and provided a classification of studies. However, their study reviewed research that did not use COBIT or any other similar framework in their sample. Moreover, COBIT has also evolved to version 5 over the intervening period of time. Hence, it is high time that research on COBIT is reviewed to gain insights from the literature.

Based on suggestions by Webster and Watson (2002), first we systematically searched various databases to identify relevant research articles. We used online databases such as Business Source Complete, ABI-Inform, and ISI – Web of Science to identify COBIT related articles appeared in scholarly publications. We used keywords following keywords COBIT, control objectives, ISACA, IT governance, and combinations of them in these online databases. We also used AIS Electronic Library to search for research that was presented in AMCIS and ICIS conferences, and used *IEEEExplore* to determine the research presented in HICSS conferences. Authors first ascertained the focus of the article. If the focus of the paper was not explicitly on COBIT then it was excluded from the study. Owing to this, research publications that made passing reference to COBIT were excluded from further analysis (this was more pronounced in conference publications). In total 55 journal articles and 20 conference papers were finally included for review.

Next, two of the authors independently coded the articles on the research stream, research method, topical focus, and findings. Then these articles were categorized based on the research focus and further analyzed. Output of this task was used in arriving at the broad research themes present in the COBIT related research. Moreover, this also helped in articulating the future research directions for COBIT in the IS research.

In order to get an understanding on the nature of outlets that publish COBIT related research, we tabulated them based on the source. Table 1 provides a list of journals that published more than one paper on COBIT. As is evident, bulk of the research appears in outlets that are considered to be accounting oriented (e.g., *Accounting & Management Information Systems*, *Journal of Information Systems*). In the IS area, *Communications of the AIS and Information Systems Management* have published more than one COBIT related research articles during the study time period. It is also interesting to note that 31 of the papers were published in variety of other journals.

Journal Title	Number of articles
Accounting & Management Information Systems	2
Australian Accounting Review	2
Communications of the Association for Information Systems	4
Computer Standards & Interfaces	2
Information Systems Management	2
International Journal of Accounting Information Systems	3
International Journal of Project Management	2
Journal of Information Systems	7
Other journals publishing one COBIT related research article	31
Total	55

Table 1. Journals and COBIT related research

Our search for the COBIT research that appeared in IS related conferences yielded 115 articles. However, upon further analysis only 20 articles had COBIT as the primary focus (see table 2). It appears COBIT related research are more prominent in IS conferences than in IS journals.

Conference	Preliminary Results	Included for this review
Americas Conference on Information Systems	95	16
International Conference on Information Systems	16	0
Hawaii International Conference on System Sciences	4	4
Total	115	20

Table 2. Select IS conferences and COBIT related research

Findings

Researchers have examined COBIT through multiple perspectives. In general, many studies are either descriptive or conceptual in nature. Very few studies are empirical in nature. This section reviews some of the major themes in COBIT related scholarly research. Figure 2 shows some of the key areas in which COBIT has been studied.

Framework Comparisons

Ever since its appearance as a framework, COBIT, has been compared and contrasted with other similar frameworks. Since there are many competing/complementing frameworks such as COSO, ITIL, ISO 38500, etc. researchers have examined different frameworks to provide guidance to practice. Some of the very first scholarly works on COBIT involved its comparison to CICA and COBIT (Hunton 2000). Likewise, in the IT area, service management framework such as ITIL has been compared to COBIT in some of the studies (Bauset-Carbonell and Rodenes-Adam 2013; Winniford et al. 2009).

Security

Analyzing the research in this area, we could see two streams of research. First stream focused on the overall management of security in an organization. These studies focused on the applicability COBIT for security governance. For example, Von Solms (2005) compares and contrasts COBIT with ISO 17799 and

state that COBIT as a 'high' level reference framework in which Information Security governance and use ISO 17799 as a 'lower' leveled guideline. Likewise there are studies that used COBIT for policy formulation (Parrish et al. 2008), and the development of security management lifecycle (Choobineh et al. 2010). The second stream of research focused on the applicability of COBIT for specific IT area. These studies dealt on how COBIT could be used in the management of security for Web services (Charuenporn and Intakosum 2012) and information assets in government (Hawkins et al. 2003).

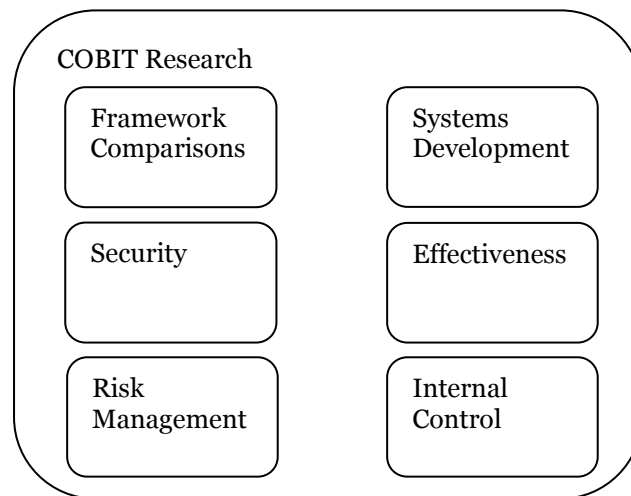


Figure 2. Scholarly Research on COBIT

Risk Management

Risk management with COBIT has been examined both at the macro and micro level. At the macro level, Năstase and Unchiasu (2013) use COBIT and related concepts to analyze operational risk at banking institutions. At the micro level, risk management for individual technologies are the focus of study. For example some of the studies have examined the role of COBIT in managing IT risks in general (Lainhart 2000; Wickboldt et al. 2011). Furthermore some of the studies have also examined the use of COBIT in the management of risk in specific IT technologies such as Web 2.0 applications (Rudman 2011).

Internal Control

One of the very earliest paper in this area was presented at AMCIS 1999 on the use of COBIT for IT control (Fedorowicz and Gelinaz 1999). This study used survey data from the purchasers of COBIT to highlight the importance attributed to IS/IT control through COBIT. However, many of the papers included in this review pertained to internal control for accounting. Kerr and Murthy (2013) examined the importance of IT controls in achieving reliable financial reporting and found the following IT process to be critical a) ensure system security, b) manage changes, c) assess risk, d) manage data, and e) assess internal control adequacy. Tuttle and Vandervelde (2007) analyzed the conceptual model of COBIT framework pertinent to auditing (including operational, compliance, and financial auditing) and found it to be internally consistent and useful when applied to auditing IT controls. To comply with Sarbanes-Oxley Act section 404, auditors are required to select and implement a suitable internal control framework to assess IT control (Huang et al. 2011). Owing to this, many studies have also examined the role of COBIT in meeting the needs of compliance (Mishra and Weistroffer 2007; Panko 2006; Smith and McKeen 2006).

Systems Development and Project Management

Many of the studies in IS research on COBIT have focused on systems development and project management. Two streams of research are evident in this area. The first stream focuses on the overall governance of IT projects. For example, Walser (2013) examine IT project management governance

through the lens of COBIT. A case study of Swedish Federal government project was used to highlight the importance of IT project governance. In a similar fashion, Marnewick and Labuschagne (2011) use COBIT and its related concepts in the use for IT project governance in South African organizations. The second stream of research looks at the role of COBIT in ensuring control for systems development projects. For instance, Martinez et al. (2010) use requirements engineering perspective in examining data protection audits through case studies. Likewise, Mishra and Weistroffer (2007) propose the use of COBIT for control purposes in development systems.

COBIT and Effectiveness

IT effectiveness with the use of COBIT has been studied sparsely. Phillips (2013) examined the impact of COBIT practices and perceptions of IT effectiveness to be influenced by perceptions IT value. Tugas (2010) in his study of Philippine food, beverage, and tobacco organizations found that overall, there exists no significant correlation between IT maturity index as measured through COBIT maturity and earning per share, return on assets, and return on equity. However, the study used data from only 21 organizations. Abu-Musa (2009) in a large scale survey in Saudi Arabia found COBIT practices are deemed to be useful by many of the survey recipients.

Discussion and Future Research Directions

Accounting and IS are the predominant domains related to COBIT. With so much work in accounting being done with IT artifacts, it is evident to see research on COBIT among accounting researchers. Most COBIT related research in the accounting domain was found in the area of internal control and auditing where frameworks and guidelines are put into practice. Frameworks such as COBIT are regularly covered in CPA and CMA exams. The accounting discipline, with its emphasis on control appears to be at the front runner in the research on more detailed aspects of COBIT. Their concentration, however, was only one aspect of COBIT. Primary focus of IS research on COBIT differs greatly from the research in the accounting area. Hitherto, IS research has concentrated on few areas such as security, systems development, and risk management. Hence this research has more technical focus. Moreover, very few articles have appeared in mainstream IS journals.

Future Research Directions

Though COBIT is in existence for nearly two decades, there is only limited focus on it in IS research. As per findings of this study, vast majority of the research on COBIT is found in accounting literature. This could be attributed to nature of initial versions of COBIT that revolved around internal control and compliance. However, latest iterations of COBIT has clearly expanded the domain of its applicability. Therefore it is time for IS researchers to examine this important framework as research on COBIT is highly relevant to IS as its principles directly match with IT governance. Mainstream IT governance research in IS area can immensely contribute in the shaping and enriching COBIT.

De Haes et al. (2013) in their recent commentary on COBIT 5 outline many interesting areas for future research on COBIT. However, their focus is on accounting related future research opportunities. IS researchers can bring unique perspective on this far reaching framework on IT governance in organizations. Here are some potential research opportunities in COBIT in the IS domain. The outlined research directions in a way address the gaps that were found in the existing COBIT related research in the IS area.

Strategic Alignment

Strategic alignment of IT and business strategy has been examined in the past through multiple perspectives in the mainstream IS research. One of the stated objectives of COBIT is strategic alignment. Research on the role of COBIT in furthering strategic alignment in organizations is of utmost importance as it can explain the effect of frameworks in effecting it. Longitudinal studies and case studies could be carried out in organizations that have adopted COBIT. Findings of these studies will greatly help in understanding the importance of COBIT as a general IT governance framework.

Adoption of COBIT

Adoption of innovations is an enduring research area in IS. Adoption and use of COBIT could be examined to find the motivations for organizations to use it. There may be many reasons for organizations to pursue COBIT. For example, organizations may be motivated by either internal and performance orientated considerations or external and compliance oriented considerations. Moreover there may be other motivations such as need for better control over various facets of the organizations. Hence, studies focusing on the motivations for adopting COBIT can greatly help in furthering our understanding on COBIT.

Challenges in implementing COBIT

Past research in business process reengineering has shown that process changes are fraught with challenges. Implementing COBIT may be radical or incremental change to an organization depending on prior frameworks or lack thereof, used by the organization for IT governance. Nevertheless, process change is not easy to accomplish as there will be internal resistance for change. Stakeholders may feel that their status quo is getting affected by the new controls and processes put forth due to COBIT. Hence, case studies on actual implementation of COBIT in organizations can help in getting a rich perspective on the change phenomenon and can help organizations as they move forward with COBIT.

COBIT effectiveness

COBIT has been proposed as a means for effective governance of IT in organizations. However, there are not many studies that have looked at the effectiveness of COBIT. Effectiveness of COBIT could be analyzed in multiple perspectives. For instance, researchers can look at the effect of COBIT on IT decision making, stakeholder satisfaction, etc. Moreover, longitudinal studies can also help in further understanding the benefits of COBIT. Studies in this area can help organizations realize the benefits of COBIT as they plan on adopting frameworks for IT governance.

Framework Tailoring

Literature on COBIT indicates that organizations can use COBIT along with other frameworks. COBIT documentation also discusses the complementary nature of various other frameworks (ISACA 2012). However, there are no clear guidelines on how and when to select complementary frameworks along with COBIT. IS researchers in the past have examined the tailoring of methods in software development while using agile software development methods. Similar research in the context of COBIT will be of great interest to both researchers and practitioners.

Conclusion

COBIT framework is often used as a reference point by IS professionals looking for guidelines regarding managing IT in an organization. For example, the COBIT maturity model can be used to assess the development of management processes in an organization. The COBIT framework can also be used to understand and manage all significant IT risk types. The framework also provides a platform to exchange experiences on best practices in the industry. While CIOs can look at the holistic view provided by COBIT, frontline employees can look at specifics related to their discipline. Despite many arguments supporting the importance of research in IT governance frameworks such as COBIT, it does not appear to get the priority it deserves. Survey of past studies reveals the direction and depth of research in COBIT. However, bulk of the research is in the Accounting area. This study, implores the need to do more IS research on COBIT, a crucial framework for governing and managing IT in organizations.

REFERENCES

- Abu-Musa, A. 2009. "Exploring the Importance and Implementation of COBIT Processes in Saudi Organizations," *Information Management & Computer Security* (17:2), pp. 73-95.
- Allen, B. R., and Boynton, A. C. 1991. "Information Architecture: In Search of Efficient Flexibility," *MIS Quarterly* (15:4), pp. 435-445.

- Bauset-Carbonell, M.-C., and Rodenes-Adam, M. 2013. "Information Technology Services Management: A Value-Added Applied Model Based on ITIL and ISO/IEC 20000," *Profesional De La Informacion* (22:1), pp. 54-61.
- Brown, A. E., and Grant, G. G. 2005. "Framing the Frameworks: A Review of IT Governance Research," *Communications of the Association for Information Systems* (15).
- Brown, C. V. 1997. "Examining the Emergence of Hybrid IS Governance Solutions: Evidence from a Single Case Site," *Information systems research* (8:1), pp. 69-94.
- Charuenporn, P., and Intakosum, S. 2012. "Qos-Security Metrics Based on ITIL and COBIT Standard for Measurement Web Services," *Journal of Universal Computer Science* (18:6), pp. 775-797.
- Choobineh, J., Anderson, E., and Grimaila, M. R. 2010. "Security Management Life Cycle (Smlc): A Comparative Study," *Americas Conference on Information Systems*, Lima, Peru.
- De Haes, S., Van Grembergen, W., and Debreceny, R. S. 2013. "COBIT 5 and Enterprise Governance of Information Technology: Building Blocks and Research Opportunities," *Journal of Information Systems* (27:1), pp. 307-324.
- Elgammal, A., Turetken, O., van den Heuvel, W.-J., and Papazoglou, M. 2014. "Formalizing and Appling Compliance Patterns for Business Process Compliance," *Software & Systems Modeling*), pp. 1-28.
- Fedorowicz, J., and Gelinas, U. 1999. "Adoption and Usage Patterns of an IT Audit and Control Framework," *Americas Conference on Information Systems*, Milwaukee, WI, pp. 729-731.
- Hardy, G. 2006. "Using IT Governance and COBIT to Deliver Value with IT and Respond to Legal, Regulatory and Compliance Challenges," *Information Security technical report* (11:1), pp. 55-61.
- Hawkins, K. W., Alhajjaj, S., and Kelley, S. S. 2003. "Using COBIT to Secure Information Assets," *Journal of Government Financial Management* (52:2), p. 22.
- Hirschheim, R., and Sabherwal, R. 2001. "Detours in the Path toward Strategic Information Systems Alignment," *California management review* (44:1).
- Huang, S.-M., Hung, W.-H., Yen, D. C., Chang, I. C., and Jiang, D. 2011. "Building the Evaluation Model of the IT General Control for Cpas under Enterprise Risk Management," *Decision Support Systems* (50:4), pp. 692-701.
- Hunton, J. E. 2000. "Discussant's Comments on Presentations by John Lainhart and Gerald Trites," *Journal of Information Systems* (14:1), p. 33.
- ISACA. 2012. "COBIT 5: A Business Framework for the Governance and Management of Enterprise IT." Kerr, D. S., and Murthy, U. S. 2013. "The Importance of the COBIT Framework IT Processes for Effective Internal Control over Financial Reporting in Organizations: An International Survey," *Information & Management* (50:7), pp. 590-597.
- Lainhart, J. W. 2000. "COBIT: A Methodology for Managing and Controlling Information and Information Technology Risks and Vulnerabilities," *Journal of Information Systems* (14:1), p. 21.
- Marnewick, C., and Labuschagne, L. 2011. "An Investigation into the Governance of Information Technology Projects in South Africa," *International Journal of Project Management* (29:6), pp. 661-670.
- Martinez, M. A., Lasheras, J., Fernandez-Medina, E., Toval, A., and Piattini, M. 2010. "A Personal Data Audit Method through Requirements Engineering," *Computer Standards & Interfaces* (32:4), pp. 166-178.
- Mishra, S., and Weistroffer, H. R. 2007. "A Framework for Integrating Sarbanes-Oxley Compliance into the Systems Development Process," *Communications of the Association for Information Systems* (20), pp. 712-727.
- Musson, D. 2009. "IT Governance: A Critical Review of the Literature," *Information Technology Governance and Service Management: frameworks and adaptations. Hershey: Information Science Reference*).
- Nastase, P., and UnchiaşU, S. F. 2013. "Implications of the Operational Risk Practices Applied in the Banking Sector on the Information Systems Area," *Accounting & Management Information Systems* (12:1), pp. 101-117.
- Olson, M. H., and Chervany, N. L. 1980. "The Relationship between Organizational Characteristics and the Structure of the Information Services Function," *MIS Quarterly* (4:2), pp. 57-68.
- Panko, R. R. 2006. "Spreadsheets and Sarbanes--Oxley: Regulations, Risks, and Control Frameworks," *Communications of the Association for Information Systems* (17), pp. 2-50.
- Parrish, J., James L., Kuhn, J., John R., and Courtney, J. F. 2008. "Mindful Administration of Is Security Policies," *Americas Conference on Information Systems*, Toronto, Canada.

- Phillips, B. 2013. "Information Technology Management Practice: Impacts Upon Effectiveness," *Journal of Organizational & End User Computing* (25:4), pp. 50-74.
- Ridley, G. Y., J. ; Carroll, P. . 2004. "COBIT and Its Utilization: A Framework from the Literature " *Proceedings of the 37th Annual Hawaii International Conference on System Sciences*, Hawaii: IEEE.
- Rudman, R. J. 2011. "Using Control Frameworks to Map Risks in Web 2.0 Applications," *Accounting & Management Information Systems* (10:4), pp. 495-515.
- Sambamurthy, V., and Zmud, R. W. 1999. "Arrangement for Information Technology Governance: A Theory of Multiple Contingencies," *MIS Quarterly* (23:2), pp. 261-290.
- Sambamurthy, V., and Zmud, R. W. 2000. "Research Commentary: The Organizing Logic for an Enterprise's IT Activities in the Digital Era—a Prognosis of Practice and a Call for Research," *Information systems research* (11:2), pp. 105-114.
- Schwarz, A., and Hirschheim, R. 2003. "An Extended Platform Logic Perspective of IT Governance: Managing Perceptions and Activities of IT," *Journal of Strategic Information Systems* (12:2), pp. 129-166.
- Smith, H. A., and McKeen, J. D. 2006. "Developments in Practice xxi: IT in the New World of Corporate Governance Reforms," *Communications of the Association for Information Systems* (17), pp. 2-33.
- Smits, D., and Hillegersberg, J. V. 2013. "The Continuing Mismatch between IT Governance Theory and Practice: Results from a Delphi Study with CIO's," *Americas Conference on Information Systems*, Chicago, IL.
- Tran, H., Zdun, U., Holmes, T. I., Oberortner, E., Mulo, E., and Dustdar, S. 2012. "Compliance in Service-Oriented Architectures: A Model-Driven and View-Based Approach," *Information and Software Technology* (54:6), pp. 531-552.
- Tugas, F. C. 2010. "Information Technology Maturity Index and Profitability in the Philippine Food, Beverage and Tobacco Industry," *International Journal of Business Research* (10:1), pp. 186-190.
- Tuttle, B., and Vandervelde, S. D. 2007. "An Empirical Examination of COBIT as an Internal Control Framework for Information Technology," *International Journal of Accounting Information Systems* (8:4), pp. 240-263.
- Von Solms, B. 2005. "Information Security Governance: COBIT or ISO 17799 or Both?," *Computers & Security* (24:2), pp. 99-104.
- Walser, K. 2013. "IT Project Governance - Why IT Projects in Public Administration Fail and What Can Be Done About it," *Proceedings of the 13th European Conference on E-government*), pp. 543-550.
- Webster, J., and Watson, R. T. 2002. "Analyzing the Past to Prepare for the Future: Writing a Literature Review," *MIS Quarterly* (26:2), pp. 13-23.
- Weill, P., and Ross, J. W. 2004. *IT Governance: How Top Performers Manage IT Decision Rights for Superior Results*. Harvard Business Press.
- Wickboldt, J. A., Bianchin, L. A., Lunardi, R. C., Granville, L. Z., Gaspary, L. P., and Bartolini, C. 2011. "A Framework for Risk Assessment Based on Analysis of Historical Information of Workflow Execution in IT Systems," *Computer Networks* (55:13), pp. 2954-2975.
- Wilkin, C. L., and Chenhall, R. H. 2010. "A Review of IT Governance: A Taxonomy to Inform Accounting Information Systems," *Journal of Information Systems* (24:2), pp. 107-146.
- Winniford, M., Conger, S., and Erickson-Harris, L. 2009. "Confusion in the Ranks: IT Service Management Practice and Terminology," *Information Systems Management* (26:2), pp. 153-163.
- Zmud, R. W., Boynton, A. C., and Jacobs, G. C. 1986. "The Information Economy: A New Perspective for Effective Information Systems Management," *ACM SIGMIS Database* (18:1), pp. 17-23.