Journal of the Midwest Association for Information Systems (JMWAIS)

Volume 1
Issue 2 *Volume 2015, Issue 2, July 2015*

Article 2

2015

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Journal of the Midwest Association for Information Systems

Volume 2015 | Issue 2 Article 1

Date: 06-29-2015

Enhancing the Control Objectives for Information and Related Technologies (COBIT 5) Framework for Sustainable IT Governance

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Abstract

Given the increasing focus on dimensions of corporate social responsibility beyond a simple financial return to stockholders, IT Governance should also address additional sustainability factors. This study reviews a prominent IT governance framework, COBIT 5, to determine the extent to which it supports sustainability components, especially as related to the acquisition, use and disposal of IT assets. Based on our analyses, we conclude that COBIT 5 does **not** significantly address specific sustainability concerns facing organizations today. The drivers, benefits, risks, and practical considerations associated with sustainability in IT governance are explored in this discussion. We conclude our review with suggestions on how COBIT could be possibly be enhanced to remedy its present sustainability deficiencies

Keywords: IT Governance, sustainability, ISACA, COBIT, triple bottom line

1. Introduction

Sustainability is becoming increasingly important for organizations in today's business environment. Organizations are incorporating sustainability dimensions into the entity's governance structure on a frequent basis, for a variety of reasons. As this becomes more prevalent, organizations must ensure that information technology (IT) governance policies are aligned with their entity-wide governance position. This is especially important given the history of IT as an enabler of major organizational transformation. IT is also an enabler of green initiatives in organizations, and the inclusion of sustainability dimensions in IT governance is critical for success of such initiatives. There are several different governance frameworks available for organizations to adopt. Thus, analyses of such options to support sustainability goals can be beneficial for management. The main question driving this research is to assess how well the Control Objectives for Information and Related Technologies (COBIT 5) framework supports the governance of organizational sustainability initiatives.

In our discussion we provide a background on sustainability and COBIT 5. We conclude from our analyses of COBIT 5 that it fails to include much of a sustainability focus within its processes. We then detail why we believe COBIT 5 does not adequately address sustainability factors, as well as provide input as to how it could possibly be amended to remedy its present sustainability limitations.

2. Background

In its white paper on the topic, the Information Systems Audit and Control Association (ISACA) uses the classic definition of sustainability coined by the United Nations (1987); in this context, sustainability is defined as "meeting the needs of the present without compromising the ability of future generations to meet their needs." When taken in the context of information technology, sustainability factors into the entire life cycle of IT assets. Sustainable IT minimizes damage to our natural environment during the manufacturing, managing, using and disposing of IT assets (ISACA Sustainability White Paper, 2011). There has been an increased focus on the use and disposal phases of the IT asset life cycle as more information has come to light regarding the damage IT assets can have on the environment. The use of IT assets consumes a great deal of energy, which can be both costly to the organization and detrimental to the environment. IT assets also contain chemicals that can harm the environment if the assets are not disposed of properly (Schiller and Merhout, 2011).

According to ISACA, there are several different sustainability drivers (ISACA Sustainability White Paper, 2011). The economic goals behind sustainability represent the first driver. This incorporates the cost savings and product innovation associated with the use and development of green products. Sustainable IT assets consume less energy during usage, which in turn can lead to decreased energy costs for the organization. If the organization is able to develop new green products, there is potential to generate revenues from the sale of these green products. A new sustainability focus can likewise generate a competitive advantage by appealing to the organization's sustainability-minded stakeholders (Faris, Gilbert, LeBlanc, Ballou, and Heitger, 2013). The second driver is environmental survival. This means confronting the scientific theories that our environment is changing in a negative manner and very possibly due to human actions. The third driver of sustainability is social responsibility. This encompasses balancing long-term sustainability with short-term economic growth and profit generation. Corporate social responsibly thus evolves the traditional financial focus to a "triple bottom line" of economics, social, and environmental factors. Sustainability requirements imposed by legislation denote the fourth driver. This involves complying with sustainable practices imposed by national and international regulators and providing this compliance in a transparent manner.

The importance of sustainability to organizations has grown to a level such that many executives appear to recognize that it should be incorporated into an organization's enterprise risk management (ERM) scenario (ISACA Sustainability White Paper, 2011). It is also becoming a strategic priority for many companies due to the convergence of risks and opportunities associated with environmental, social, and economic performance. Consequently, organizations today are facing increased pressure from stakeholders to succeed in a manner that supports sustainability principles (Faris et al., 2013). However, incorporating these new sustainability dimensions into enterprise and IT policies and procedures brings many new risks and vulnerabilities to organizations.

3. IT Governance and COBIT 5 Overview

IT governance is a subset of corporate governance, and consists of policies, resources and a management structure that provides oversight for an organization's information assets and technology practices. Goals of IT governance include ensuring that investments in IT assets are made for strategic business purposes and complying with a myriad of regulations around data, such as privacy. The Control Objectives for Information and Related Technology (COBIT) 5 is the 5th edition of the IT framework created by ISACA to control the governance and management of information technology (ISACA, 2015a). COBIT 5 aims to provide a generally accepted set of IT control objectives for business managers and IT professionals in all types of industries. COBIT 5 is divided into five categories, referred to as domains. These domains each have unique processes, which are "a collection of practices influenced by the enterprise's policies and procedures that takes inputs from a number of sources, manipulates the inputs and produces outputs" (ISACA, 2012, p.19). These collections of practices are specifically worded to cover seemingly every possible responsibility of the IT function.

Examples of enterprises that have implemented COBIT include diverse organizations, such as E. I. du Pont de Nemours and Company (commonly referred to as DuPont), Yount, Hyde & Barbour (a mid-sized regional accounting firm), Tokio Marine & Nichido Systems (an IT services division for Tokio Marine Group, which is a global insurance corporate group), and New York State Government Agency (ISACA, 2015b). COBIT is designed to be flexible so that adopting organizations can utilize it as the model best fits the unique governance needs of the enterprise. For example, Nicho and Fahkry (2013) assert that COBIT 5's 37 management processes, because they are generic, can be mapped to control multiple security vulnerabilities.

In its current form, however, we believe COBIT 5 has sustainability limitations (see Figure 3). COBIT 5 fails to adequately consider the environmental and, partially, the social aspects of the triple bottom line. This failure is due mainly to the current absence of environmental and social stakeholder drivers, needs, and objectives within COBIT 5 (Moeller, Loeser, Erek & Zarnekow, 2013). If COBIT 5 wording is updated to include a sustainability focus, its revamped management processes could be mapped to even more vulnerabilities. Entirely new, sustainability-focused sets of practices and activities could also be created and implemented. Figure 4 illustrates some potential sustainability-focused additions to COBIT 5 we have created along with process details. These updates could help COBIT 5 be applicable to the difficulties brought about by the transformation of the existing technology infrastructure to support sustainability dimensions.

4. COBIT 5 Compared to Other Frameworks

In our research, we analyzed Molla, Cooper & Pittayachawan's (2011) model that assesses how prepared an organization is to manage the sustainability dimensions of its IT function. We then compared ISACA's COBIT 5 processes to Molla et al.'s G-Readiness model to determine how COBIT 5 incorporates sustainability considerations. From there we reviewed the 2011 ISACA Sustainability White Paper that discusses the drivers, benefits, risks, and security factors associated with sustainability. Subsequently, we again compared the COBIT 5 sets of practices and activities to the ISACA White Paper to determine which aspects of the White Paper are and are not currently covered by COBIT 5. After making these comparisons we created a matrix, located in Figure 1, which provides a side-by-side comparison of these three IT frameworks and sustainability resources. These analyses lead us to conclude that COBIT 5 does not adequately address enough of the specific sustainability concerns facing organizations today. We believe this analysis is a significant contribution to the eventual development of a generic, but comprehensive Sustainable IT Governance framework.

	Sustainable IT Attribute	COBIT 5	ISACA White Paper	G-Readiness Model
1	Emphasis on organization's attitude toward sustainability		X	X
2	IT policies surrounding the sourcing, use and disposal of IT assets take sustainability into account		X	X
3	Emphasis on application of sustainable IT policies in day-to-day operations		X	X
4	Emphasis on use of sustainable technology		X	X
5	Emphasis on governance and oversight of IT policy implementation	X	X	X

6	Economic importance of sustainable IT practices (cost savings, new product innovation, etc.)	X	X	X
7	Importance of sustainable IT practices for environmental safety		X	X
8	Responsibility of organization to society to act in sustainable manner		X	X
9	Importance of sustainable IT practices to remain in compliance with regulators	X	X	X
10	Creation of assurance measures that incorporate sustainability		X	
11	Emphasis on the interdependencies between the business and the environment in which it operates		X	
12	Sustainability viewed as a corporate management issue		X	X
13	Realization that implementation of sustainable IT strategy will involve transforming existing technology infrastructure	X	X	X
14	Identification of new risks and security concerns of sustainable IT practices	X	X	

Figure 1. COBIT 5 Compared to Other Sustainability in IT - Focused Resources

The sustainable IT attributes we outline in Figure 1, which are explained in Figure 2, are developed directly from the two sustainability-focused publications (the G-Readiness Model and the ISACA 2011 Sustainability White Paper).

Attribute 1 - One of the 5 components of an organization's G-Readiness score is its attitude toward eco-sustainability. According to the G-Readiness Model, Green IT Attitude is defined as "an organization's IT people sentiment toward climate change and ecosustainability" (Molla et al., pg. 10). This framework places a direct focus on an organization's attitude toward sustainability.
Attribute 2 - One component of an organization's G-Readiness is the frameworks (policies) an organization puts in place to apply environmental criteria in its IT-related activities. The policy section of the G-Readiness Model defines "the extent to which Green issues are encapsulated in organizational procedures guiding the sourcing, use, and disposal of the IT technical infrastructure" (Molla et al., pg. 11).
Attribute 3 - Both the Policy and Practice components of the G-Readiness framework cover the use of IT in a sustainable manner. The Practice component describes examples of companies banning screen savers, issuing energy-efficient laptops to employees and retiring inefficient IT equipment to reduce energy usage and CO2 emissions.
Attribute 4 - The Technology component of the G-Readiness score "refers to technologies and IS for (a) reducing the energy consumption of powering and cooling corporate IT assets (such as data centers) (b) optimizing the energy efficiency of the IT technical infrastructure (c) reducing IT induced greenhouse gas emissions (d) supplanting carbon emitting business practices and (e) analyzing a business's total environmental footprint" (Molla et al., pg. 11). The ISACA White Paper describes both the economic and environmental benefits of using sustainable technology solutions.
Attribute 5 - COBIT 5.0 has several processes (EDM01, EDM04, APO02) that discuss the governance and oversight of IT policy implementation. One component of G-Readiness is governance. This section "defines the administration of Green IT initiatives" (Molla et al., pg. 11) and discusses the importance of assigning responsibility to key executives over Green IT initiatives. The ISACA White Paper discusses how existing governance frameworks need to be updated to reflect sustainability objectives.
Attribute 6 – Per ISACA, "there are distinct advantages to taking sustainability into account, including cost efficiencies, competitive pricing…" (ISACA, 2011, pg. 7). The White Paper discusses numerous business benefits that can be achieved through the implementation and consistent use of sustainable IT practices.
Attribute 7 – Per ISACA, "sustainable IT minimizes damage to the environment in the process of manufacturing, managing, using and disposing of IT assets" (ISACA, 2011, pg. 5). The White Paper also discusses the need to deal with the "inconvenient truth" that humans are likely causing rapid environmental change.
Attribute 8 – Per ISACA, "enterprises need to think beyond their own organizations to include their entire extended enterprise or stakeholder network" (ISACA, 2011, pg. 7).

Attribute 9 – Per ISACA, "noncompliance issues and violation of rules are risky behaviors and some companies have learned hard lessons by not taking their responsibilities seriously" (ISACA, 2011, pg. 7).
Attribute 10 – Per ISACA, "from an assurance perspective, the enterprise's strategic objectives, goals and targets must be considered in the context of sustainability as a factor fully integrated into governance and accountability practices and the enterprise risk management (ERM) program" (ISACA, 2011, pg. 12).
Attribute 11 – Per ISACA, "they are inextricably linked with the society in which they operate," referring to enterprises today (ISACA, 2011, pg. 7).
Attribute 12 – Per ISACA, "sustainability is a corporate management issue and should be included in the ERM scenario" (ISACA, 2011, pg. 7).
Attribute 13 – Per ISACA, "the development and implementation of a sustainable IT strategy will involve a transformation of the existing technology infrastructure to support sustainability objectives" (ISACA, 2011, pg. 8).
Attribute 14 - The White Paper discuses four classes of risks associated with sustainability: Financial, Operational, Customer and Strategic. It also discusses numerous security concerns that come with implementation of sustainable IT practices (ISACA, 2011).

Figure 2. Development of Sustainable IT Attributes

5. COBIT 5 Sustainability Limitations

In addition to the two main resources we used to create the 14 attributes for comparison purposes, we draw from some additional literature to reinforce our contentions about the opportunities for enhancement to COBIT to incorporate sustainability governance. We discuss each of these limitations below and summarize them in Figure 3.

The first sustainability shortcoming of COBIT 5 we found is the lack of emphasis on the organization's attitude toward sustainability. Molla et al. (2011) argue that the attitude of top management (including the board of directors) towards sustainability is critical to the organization, as this mindset will trickle down and permeate the rest of the company. Turel and Bart (2014) state that, given the importance of IT governance, it should include significant board involvement. Employees will be much more likely to act in a sustainable manner if they know it is part of the organization's philosophy. Faris et al. (2013) argue that sustainability should be embedded into all organizational strategies, and this begins with the tone at the top of an organization.

The second sustainability weakness of COBIT 5 is that IT policies surrounding sourcing, use and disposal of IT assets fail to take sustainability into account. Organizations need an IT framework that provides formalized policies to ensure sustainable actions are taken throughout the life cycle. For example, purchasing sustainable IT assets can help ensure the assets have a minimized impact on the environment over its entire life cycle (Molla et al., 2011). Many organizations are already being asked by customers to provide a life cycle assessment of their products (Faris et al., 2013) It is logical to conclude that other stakeholders could soon begin to demand this information from companies. Updated COBIT 5 processes could help organizations through this process.

The third sustainability limitation of COBIT 5 is the lack of emphasis on application of sustainable IT policies in the daily operations of an organization. Day-to-day operations are where the organization actually impacts the environment through the use of its IT assets. As such, these operations should implement the sustainability practices outlined in its IT policies (Molla et al., 2011). Stakeholders are also demanding information on how organizations will improve the environmental footprint of its products and processes (Faris et al., 2013). This supports our proposition of the need for updated processes. These updates could enhance an organization's ability to report on improvements in these areas.

The fourth sustainability insufficiency of COBIT 5 is the lack of emphasis on the importance of sustainable Information Technology practices to ensure environmental safety. Organizations need to realize and appreciate the impact Information Technology is having on the environment and act accordingly (ISACA 2011). There is an absence of environmental stakeholder drivers, needs and objectives in COBIT 5 as it currently is specified. COBIT 5 does not address factors such as energy efficient data center infrastructure, energy efficient hardware or virtualization of servers (Moeller et al., 2013).

The fifth sustainability imperfection of COBIT 5 is its failure to consider the responsibility of the organization to society to act in a sustainable manner. Organizations have a responsibility to the societies in which they operate to consider the consequences of its actions on those communities, and to act accordingly (ISACA 2011; Moeller et al., 2013).

The sixth sustainability limitation of COBIT 5 is the lack of assurance considerations with a sustainability focus.

These new policies and procedures that are developed to incorporate sustainability must be reviewed to ensure that the organization is following through on the new sustainability concerns. If sustainable practices are a key part of the organization's public image, the public is entitled to know if it acts on its word in regard to sustainability practices (ISACA, 2011). An increasingly large number of organizations are issuing sustainability reports, and more than 50% of these reports get some form of third party assurance (Faris et al., 2013). COBIT 5 processes that incorporate assurance considerations with a sustainability focus could provide a standard for assurance reporting.

The seventh sustainability shortcoming of COBIT 5 is the lack of emphasis on the interdependencies between the business and the environment in which it operates (ISACA 2011). It has been widely documented that businesses have a significant impact on the environment in which they operate. This impact can come from emissions into the atmosphere from daily operations as well as the use and disposal of the business's assets. Businesses are also dependent on the environments where they operate. A business depends on the resources of its environment as well as the customers that live in that environment. Faris et al., (2013) argue that it is essential to connect a company's internal environment to the world in which it operates to fully account for the interaction and interdependencies of internal and external forces.

The eighth sustainability inadequacy of COBIT 5 is its failure to consider sustainability as a corporate management issue. As noted previously, sustainability has gained enough importance that it requires attention from the organization's top executives, not just IT personnel. In today's environment sustainability must be incorporated into entity-wide policies as well as IT-specific policies (ISACA 2011). It must be integrated into division, business unit and operations planning activities to be truly effective (Faris et al., 2013). Moeller et al., (2013) argue that an organization's policies must reflect the drivers, needs and objectives of all stakeholders. This is similar to the sustainability drivers described in the 2011 ISACA Sustainability White Paper. The needs of all stakeholders must be considered from all perspectives, not solely from an economic perspective.

The ninth sustainability weakness of COBIT 5 is its failure to support the control and implementation of sustainable information management (Moeller et al., 2013). If COBIT 5 is updated to include a focus on sustainability, it could potentially support the control and implementation of a sustainable information management system. This update would include changing the current wording to include a focus on sustainability as well the creation of new sustainability-focused processes.

A final sustainability shortcoming we draw attention to is identified by Moeller et al., 2013. These authors argue that because COBIT 5 is so broad, it is only applicable to a certain extent when it comes to supporting the control and implementation of a holistic, sustainable information system. They contend that the broad nature of COBIT 5 limits the extent to which an organization can actually use it. While this is a valid point, we argue that the broad nature of COBIT 5 is what makes it such a robust framework that any type of organization can adapt and employ. Moreover, there are over 300 sub-processes to support the 37 management processes, which provides significant details from which to start to develop a sustainable IT governance model.

	COBIT 5 Sustainability Limitations
1	Lack of emphasis on the organization's attitude toward sustainability.
2	IT policies surrounding sourcing, use, and disposal of IT assets fail to account for sustainability.
3	Lack of emphasis on application of sustainable IT policies in an organization's daily operations.
4	Lack of emphasis on the importance of sustainable IT practices to ensure environmental safety.
5	Failure to consider the responsibility of the organization to society to act in a sustainable manner.
6	Lack of assurance considerations with a sustainability focus.
7	Lack of emphasis on the interdependencies between the business and the environment in which it operates (ISACA 2011).
8	Failure to consider sustainability as a corporate management issue.
9	Failure to support the control and implementation of a sustainable information system (Moeller et al., 2013).

Figure 3. COBIT 5 Sustainability Limitations

Although COBIT 5 does arguably have sub-processes that are tangentially related to sustainability, such as activities that support BAI09.03 and EDM01.01, we clearly see significant opportunities for a new domain and related processes that directly address sustainable IT practices. We offer our suggestions in Figure 4.

Suggested New COBIT Sustainability Processes	
Domain: Manage Sustainable IT Practices	
MSP01: Ensure sustainable IT asset disposal practices	Analyze the asset disposal process to ensure that all IT assets are disposed of in a manner that prevents harmful chemicals from being released into the environment.
MSP02: Manage energy consumption of IT assets	Seek to minimize energy consumption of IT assets by embracing technologies that allow for reduced energy use. Use energy efficiently by turning off power to applicable assets when not in use.
MSP03: Ensure sustainable IT goals are incorporated into enterprise's ERM scenario	Utilize sustainability-focused IT practices in the enterprise's ERM scenario to help achieve strategic goals and stay aligned with the organization's risk appetite.
MSP04: Manage cost savings	Generate cost savings through the implementation of sustainable IT practices, such as reduced energy consumption and the reuse or recycling of IT assets.

Figure 4. New COBIT Sustainability Processes

6. Summary and Conclusions

None of the five domains of COBIT 5 relate directly to sustainability. Hence, the only way it could presently apply to sustainability is if the organization specifically adds more unique sustainable practices to its entity-wide governance and management structure. It is our opinion that this is not ideal. COBIT 5 should serve as an authoritative framework that guides organizations to incorporate sustainability into the use and management of its IT assets and practices. This is especially true considering that one of COBIT 5's principles is "applying a single integrated framework" (ISACA.org). A framework that is applicable to all types of organizations across every industry, and that successfully integrates sustainability features could create a positive impact for many different organizations.

Sustainability is becoming increasingly important in today's ever-changing business environment. As these changes have been made, IT governance and management frameworks have failed to keep pace with the businesses that utilize these models. Our analysis details COBIT 5's sustainability dimensions, or lack thereof. We conclude that COBIT 5 fails to include a sufficient level of sustainability focus. Moreover, we find it curious that COBIT 5 has such significant deficiencies with respect to IT governance over sustainability given that it was updated from COBIT 4.1 roughly two years after ISACA published its White Paper about addressing sustainability in assurance activities. Thus, we assert that the existing COBIT processes should be updated soon to include a sustainability emphasis. New, sustainability-focused practices, similar as the ones we propose in Figure 4, should also be created and implemented into COBIT 5's processes.

We recognize that COBIT is just one of several possible IT governance frameworks that organizations could choose to implement. Our analyses did not consider the Information Technology Infrastructure Library (ITIL) nor the ISO/IEC 27000 series of standards for information security, for example. Future research might also compare these frameworks in a manner similar to Figure 1 to see how they address the IT sustainability attributes we developed in Figure 2. Moreover, the conceptual discussion in this study could possibly be empirically tested by a case study of an organization which has adopted COBIT and now wants to extend its governance to sustainability dimensions. Knowledge from such a study could help IT governance professionals enhance their organizations' triple bottom line efforts to the extent that these "green" strategic initiatives are supported by IT, which is generally very significant for most industries and enterprises.

7. Acknowledgement

An earlier version of this research was presented at the Tenth Midwest Association for Information Systems Conference in Pittsburg, Kansas in May, 2015. We thank the conference reviewers and participants for their feedback.

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