

The Evaluation of Implementing IT Governance Controls

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ABSTRACT: The purpose of this paper is to report upon research to benchmark the implementation levels of 34 IT control processes of the Control Objectives for Information and Related Technology (COBIT) in companies across Iran. A mail survey, using a self-administered questionnaire, was conducted to explore the current status of IT control processes and to provide an empirical example of IT governance performance in the Iran context. A total of 198 valid questionnaires were collected and statistically analysed. It is interesting to note that the most surveyed organisations in this study have emerged as employing IT control governance; however, they are generally in the early stages of implementation. The results of the analysis indicate that the IT control processes were inadequately implemented. This study is one of the most comprehensive studies to explain IT control governance. It provides empirical information regarding the performance of COBIT processes for organisational policy makers and academics to understand the implementation phase in Iranian companies.

Key words: IT control processes; IT governance implementation; COBIT framework

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ORIGINAL ARTICLE

INTRODUCTION

A reliable system of governance is needed for effective and efficient operation and control of business functions. The internal control systems and corporate governance mechanisms as a legislative and regulatory environment have changed and updated to meet new business requirements. New information technology systems and applications have been developed and have resulted in a new business environment with new opportunities, risks and threats. In this new business environment, where the value and worth of intellectual assets are also significant, and where organisations' market value includes both tangible and intangible assets, boards of directors and executive managers should develop governance principles that set strategic aims and provide processes to direct, monitor and report on the situation and performance of the organisation's intellectual assets, information and IT (Calder, 2007).

The concept of IT governance has recently become more considered due to requirements for integrating IT issues into the conventional governance framework. Simply speaking, IT governance is the process by which the board of directors, senior management and others in charge of governance of a company ensure that IT systems and applications are used to achieve the company's objectives, and at the same time that the IT risks are appropriately managed (Grembergen, 2004). Generally, IT governance deals with two issues: the delivery of IT value to the business and the mitigation of IT risks. IT value delivery to the business is steered by IT and business alignment, and the embedding of accountability into the enterprise mitigates IT risks (ITGI, 2003). Companies commonly use governance control frameworks to establish and assess control processes. The use of frameworks for the construction and evaluation of IT controls results in more reliable and comprehensive control systems (Tuttle and Vandervelde, 2007). This study uses the COBIT control framework to evaluate the performance of IT control governance in Iranian companies.

Literature review

To improve the governance of IT, companies are employing best practice frameworks to assist the implementation process. One of these well-built IT governance frameworks is COBIT. COBIT presents guidance on what could be carried out within an IT organisation in terms of controls, measures and activities. It is a significant internal control framework that has an important support tool for recognising the value of IT assets in an organisation (Moeller, 2010). COBIT is an advanced multi-use business tool that is employed worldwide and is the most important and helpful tool for auditing (Singleton, 2006). It provides IT control processes and standards that are used as high-level IT governance (Hardy, 2006).

COBIT introduces an IT activities model within four domains (Plan and Organise, Acquire and Implement, Deliver and Support, and Monitor and Evaluate) covering the IT traditional responsibility areas of planning, building, running and monitoring (ITGI 2007a; Miroslav and Zdravko, 2008). COBIT's high level domains display the control points, the reasons



that the control points exist (to meet organisational requirements) and how the control points are measured and achieved (Marshall, 2011). The Plan and Organise domain refers to strategy and tactics, and involves establishing the best way that IT can contribute to the accomplishment of the business objectives. The Acquire and Implement domain addresses the identification and provision of solutions and applications that will meet business functional requirements. In addition, it responds to business and IT environmental changes. The Deliver and Support domain is concerned with the delivery and support of required services. It is involved in service levels and continuity, ensuring systems security and configuration, the management of performance and operation, third-party services, problems and help desk services and user training. The Monitor and Evaluate domain includes IT performance management, internal control evaluation, regulatory compliance and governance. The domains in turn are divided into 34 different control processes overall. Within each domain there are definite processes that organisations should address to achieve specific IT-related control objectives (Tuttle and Vandervelde, 2007). Each process encompasses detailed control objectives, activities, roles, different metrics and an incremental measurement scale. These four domains and 34 IT processes mainly provide the comprehensive dimensions of an organisation's IT processes, performance and capability that need to be managed (Tugas, 2009).

Despite the benefits of IT governance models, it is surprising that relatively few companies have started to utilise existing IT governance frameworks to assist them in their activities. A KPMG (2007) study identified that less than 20 per cent of companies were employing frameworks such as COBIT, ISO 17799 and ITIL to help their IT governance implementation (KPMG, 2007). A survey conducted in 2005 by Price Waterhouse Coopers on behalf of the ITGI demonstrated that, of those organisations currently utilising COBIT, 75 per cent realised it was either very useful or somewhat useful, with 15 per cent unsure and fewer than 10 per cent disclosing a negative response (Williams, 2006). The major negative issue recognised by the respondents was the perceived complexity of the framework (Williams, 2006).

Hardy (2006) argues that with Sarbanes–Oxley and other legislation, implementing IT control processes within a company has become law, and organisations need to employ a well-built governance framework to continuously support and manage IT investments. Hardy studied the implementation of COBIT control processes in a company and states that COBIT assisted the company to operate as an agile organisation with world-class effectiveness and efficiency. Council (2006) discusses the challenges of COBIT in medium-sized institutions. He investigated the difficulty and complexity of implementing COBIT's Systems Security by doing a case study in a higher education college to provide guidance to practitioners in implementing IT governance. The results revealed COBIT's Systems Security critical success factors, and implementation requirements were also identified. It was indicated that executives' and leaders' commitment are the most significant elements in the implementation of security systems.

To investigate the status of COBIT process implementation, an empirical survey was conducted by Abu-Musa (2008) in Saudi organisations. His empirical study proposes a roadmap for Saudi organisations that expect to be compliant with COBIT and implement IT governance principles. Guldentops, Grembergen and Heas (2002) used a maturity model to provide a self-assessment tool and to establish an actual reference benchmark on the IT governance and control maturity of organisations in the public and not-for-profit sector. This examination indicates the maturity levels of 15 of the most important processes of the COBIT framework. The analysis of the data, based on size, geography and type of industry, reveals some interesting differences. Large organisations, organisations in the finance sector or globally operating organisations demonstrated a higher maturity level than average (Guldentops, Grembergen and Heas, 2002).

Ribeiro and Gomes (2009) in their study conclude that COBIT is an appropriate model for the implementation of IT governance and to facilitate the achievement of the ISO 9001 certification standard. They present a case study using COBIT to demonstrate on one side the objectives of quality services certification and on the other side to implement efficient mechanisms of IT governance to control IT and IS. Their reported results show that under COBIT, the institution had enhanced its quality of services, controlled IS more efficiently, reduced task performance time, reduced failures in communications between services and users by about 90 per cent and helped to identify indicators to assess the performance of IT services as part of the implementation of COBIT. However, in order to achieve these benefits some preconditions must be guaranteed, such as continuous training on COBIT and the development of an IS to maintain the COBIT documentation. You-Dong and Satria (2011) conducted relatively similar research, and propose a theoretical framework to improve service quality along with the implementation of IT governance. They present a framework that provides an understanding of how the Six Sigma Method and COBIT can be used together to create synergy that improves governance and achieves quality improvement for an organisation.

Affiliating Six Sigma and COBIT will need more training and preparation for the company, but it is believed that the benefits will attract organisations to use and implement Six Sigma and align it with other popular applications such as COBIT (You-Dong and Satria, 2011).

MATERIALS AND METHODS

There are multiple theoretical studies and many institutions (for example ITGI) that issue a variety of guidelines and instructions in the area of IT governance; however, the number of field studies, especially involving exploratory research, is

inconsiderable. Moreover, geographically most research has been conducted in developed countries, and the proportion of developing countries such as Iran in these studies is negligible. In this study, the COBIT framework was used in order to achieve a comprehensive view of the current status of IT governance performance, and the research question investigates the implementation level of IT control processes in Iranian companies.

This study employed a self-administered questionnaire that was developed based on the 4.1 edition of the COBIT framework. A total of 650 copies of the questionnaires were randomly distributed and after excluding invalid questionnaires, the survey ended with 198 valid and usable questionnaires, representing a 30.4 per cent response rate. A reliability test was carried out using the Cronbach Alpha model. The results of the test indicate that the questionnaire's design is highly reliable, and the collected data are consistent (Table1).

Table1. Reliability analysis (Cronbach's coefficient alpha)

Variable Groups	Coefficient Alpha
Plan and Organise	0.889
Acquire and Implement	0.845
Delivery and Support	0.921
Monitor and Evaluate	0.715

RESULT AND DISCUSSION

The investigation of IT control implementation in this study was carried out in four sections according to COBIT's four domains as follows.

Plan and Organise

Figure 1 represents the distribution of process implementation in the Plan and Organise domain in Iranian companies. The distribution indicates that most control processes were inadequately implemented. However, attention has recently started to be given to IT controls, and companies have realised the importance of planning and organising IT control processes. This has happened due to the importance of IT to companies' performance and the links between business value and IT resources (Tuttle and Vandervelde, 2007).

The results in Figure 1 indicate that PO9 and PO10 have gained the most adequate implementation percentages (44 per cent and 38 per cent respectively). The widespread use of IT has brought about a significant operational risk and the nature of threats is more diverse than ever. Therefore, the systematic analysis of IT risks and the implementation IT risk assessment processes have become more significant and are being used more broadly (Salmela, 2008). Moreover, IT investments should be made in an economical manner. This can be realised by, among other things, optimising project management solutions (Guldentops et al., 2002).

PO8 applies to the concerns of IT product quality (Salle and Rosenthal, 2004) and is necessary to ensure that IT is delivering value and continuous improvement to the business (ITGI, 2007a). PO5 deals with how IT investment decisions are made and what the decision-making processes are for proposing, reviewing, approving and prioritising investments (Symons et al., 2005). The results demonstrate that the companies surveyed paid the lowest attention to the implementation of these processes (18 per cent and 22 per cent respectively). Debreceeny (2006) asserts that PO8 requires systemic change and monetary investment to attain higher levels, and it seems that Iranian companies have not adequately involved themselves in IT investment management, and have made only preliminary efforts in the implementation of PO5. PO3 is also interconnected with IT investment management and determines the technological infrastructure plan to support the business (ITGI, 2007b). The results show that the 34 per cent of the companies surveyed are adequately involved in the implementation of this control process. Lientz and Rea (2001) note the necessity of IT skills management (PO7) for the creation of a dynamic electronic business environment. IT development has caused a shortage of IT human resources and a chronic problem for companies (Myloni et al., 2004). Iranian companies have also been confounded by a shortage of IT human resources and skills; therefore only 28 per cent of companies could adequately implement PO7.

PO4 deals with requirements for staff, skills, functions, accountability, authority, roles and responsibilities and supervision for IT, PO2 is involved with accountability for the security and integrity of data and the improvement of control of sharing information and data across applications and companies, while PO1 requires the management and direction of all IT resources in line with the business strategy and priorities (ITGI, 2007a). Figure 1 demonstrates that the percentage of companies adequately involved in PO4, PO2 and PO1 was almost identical, at 27 per cent. PO6 was also found not to be at the appropriate level of implementation, so that the percentage of companies adequately undertaking this process was 25 per cent.

PO6 is an ongoing communication process implemented to connect the mission, service objectives, policies and procedures of a company, and so on (ITGI, 2007a).

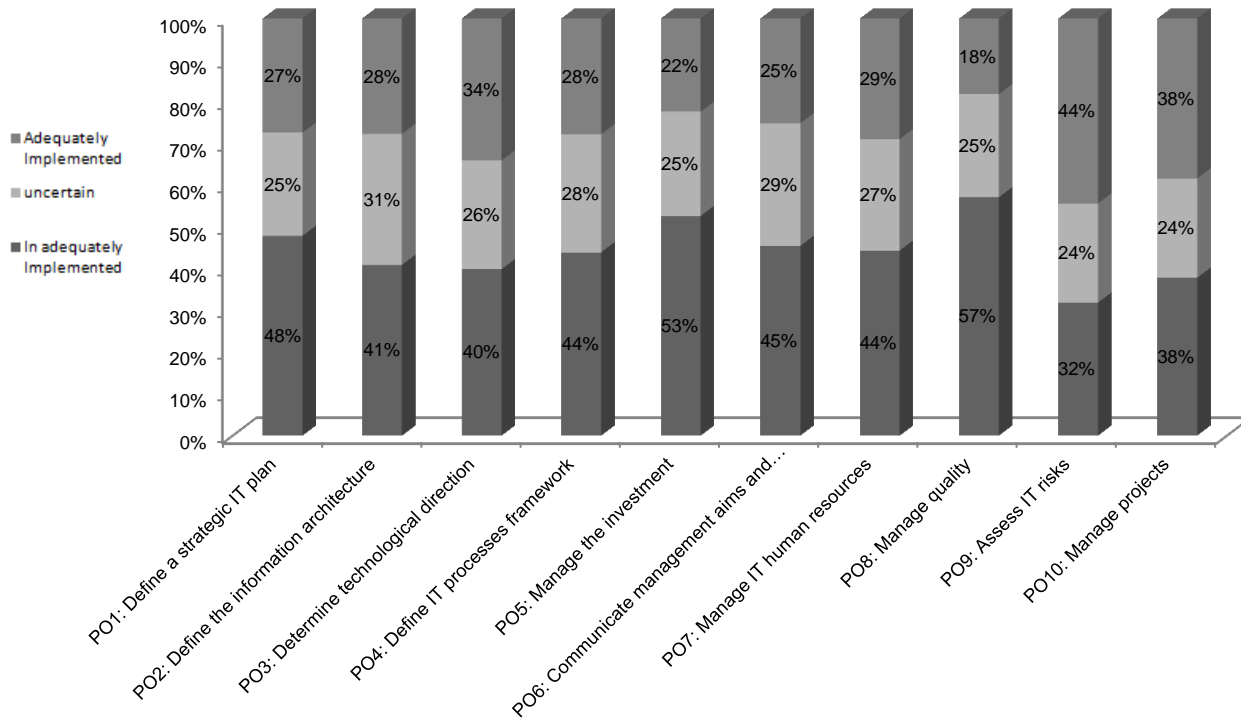


Figure 1. Implementation of IT processes in the Plan and Organise domain

Acquire and Implement

The second domain in COBIT is Acquire and Implement. The respondents’ views regarding the implementation level of its seven IT control processes in Iranian companies is displayed in Figure 2. While the processes of this domain are involved in IT acquisition and ensuring the life cycle of implemented IT systems (Brand and Boonen 2010; Moeller, 2007) that are essential for business performance, Figure 2 reveals that these control processes were totally inadequately accomplished, and Iranian companies engaged insufficiently in the Acquire and Implement domain. The results indicate that AI2 is at the top of the adequately employed processes, and the respondents confirmed that 29 per cent of companies adequately implemented this. AI2 refers to controls over the IT process of acquiring and maintaining application software that provides automated functions which effectively support the business process.

According to Figure 2, AI7, AI6 and AI1 are the next adequately implemented processes, with almost the same percentages of implementation (26 per cent, 25 per cent and 25 per cent respectively). AI7 includes appropriate testing in a dedicated environment and a post-implementation review. This ensures that operational systems are in line with agreed expectations and outcomes. AI6 coordinates and controls changes to the IT infrastructure, such as new business requirements, new regulations or incidents. AI1 considers technological requirements, economic feasibility, risk analysis and cost-benefit analysis to make decisions about the acquisition of a technological solution (ITGI, 2007a).

There is no denying that an effective and efficient technology infrastructure affects shareholder value (Damianides, 2005). AI3 has the control objective of infrastructure acquisition, maintenance and upgrading, and sets out that there should be a strategy and plan for the infrastructure, including periodic reviews against business requirements, upgrade strategies, risk assessment and security requirements (Nunes and Correia, 2010). This process was adequately implemented in 24 per cent of the companies surveyed. The next most implemented control process, with 21 per cent adequate implementation, is AI5, which can improve a company’s ability to negotiate good deals and obtain value for money (Frank et al., 2007). Its implementation ensures that the company attains the required IT resources in a timely and cost-effective manner. The final IT control process in this domain is AI4, and the results show that 19 per cent of the companies surveyed implemented it to a satisfactory level. AI4 involves the production of documentation and manuals for users and provides training to ensure the appropriate use and operation of applications and infrastructure (ITGI, 2007a).

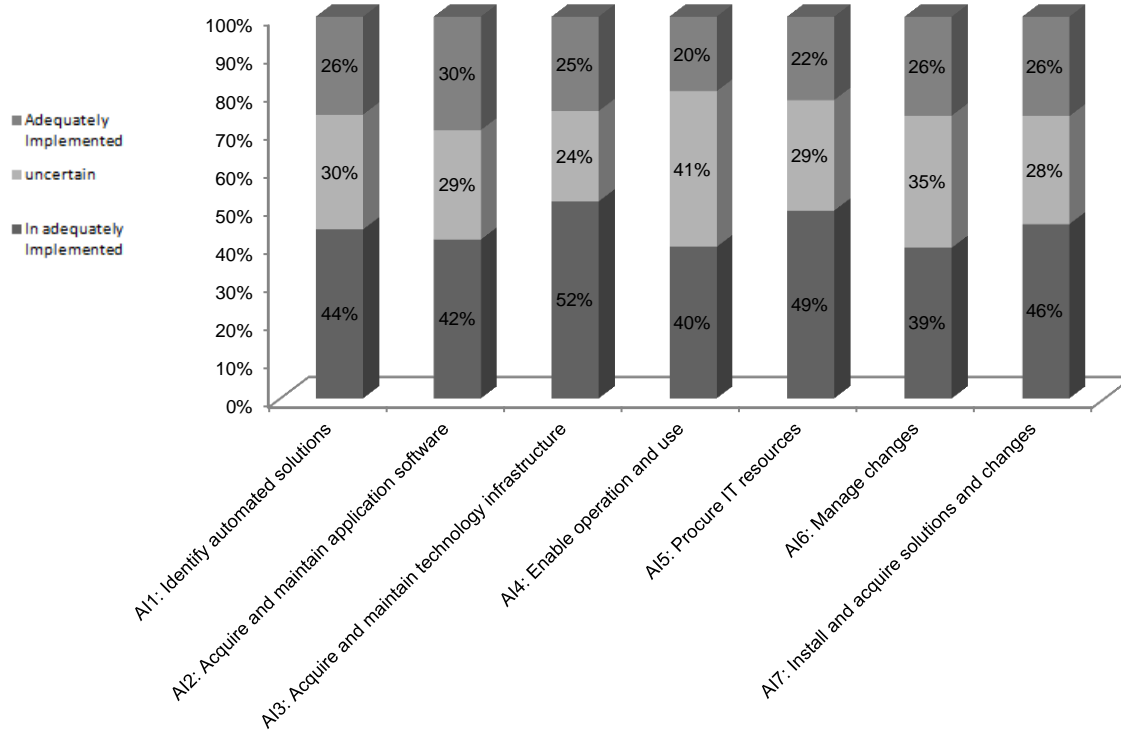


Figure 2. Implementation of IT processes in the Acquire and Implement domain

4.3. Deliver and Support

Figure 3 demonstrates the IT control processes in the Deliver and Support domain with their performance distribution in the Iranian companies surveyed. The distribution of data in Figure 3 indicates that the inadequate level contains the higher percentages of data in the majority of control processes except DS3 and DS5. DS3 gained the first place in adequate implementation with 43 per cent of companies implementing it adequately. DS3 defines a performance plan and the capacity of the technological infrastructure components in order to assure the quality of the services provided by the IT (Ribeiro and Gomes, 2009). DS5 is in second place, with 41% of companies adequately implementing this process. The focus of DS5 is to determine IT security standards and procedures and to monitor, report and solve weaknesses (Ribeiro and Gomes, 2009).

DS11, DS2, and DS4 are the next most adequately implemented control processes, with 35 per cent, 31 per cent and 30 per cent of companies implementing them adequately, respectively. DS11 focuses on maintaining completeness, accuracy, availability and protection of data. Effective data management ensures the quality, timeliness and availability of business data (ITGI, 2007a). DS2 establishes bilateral relationships and responsibilities with third party services. Its control objective is achieved by monitoring quality service delivery, identifying and mitigating third party risk and measuring third party performance to ensure compliance with determined agreements (Knolmayer et al., 2011). DS4 specifies a plan to guarantee the continuity of services to minimise the probability of service interruption in the processes (Ribeiro and Gomes, 2009).

Figure 3 shows that 29 per cent, 28 per cent and 27 per cent of Iranian companies surveyed adequately implemented DS10, DS9, and DS12 respectively. DS10 describes how IT-related problems are captured, analysed and communicated (Debreceeny, 2006). It aims to ensure that problems and incidents are resolved and the root causes investigated to avoid any reappearance (Salle and Rosenthal 2004). One of the important problems in IT organisation is the failure of systems that are associated with configuration. DS9 relates to the set of the information of the component configurations in the technological infrastructure (Ribeiro and Gomes 2009). DS12 provides and maintains a suitable physical environment to protect IT equipment from access, interference or theft. Effective management of the physical environment decreases business disruptions due to damage to IT equipment and personnel.

DS7, DS6 and DS13 gained comparatively similar percentages of adequate implementation at 26 per cent of companies surveyed. DS7 deals with the recognition of IT training needs for users, the execution of an appropriate training strategy and the measurement of training results. DS6 is a complete representation of accurate IT costs. It introduces an approved and fair cost allocation system, and reporting systems for cost allocation. DS13 includes procedures that determine the staging of the

operations related to technological infrastructure components. For instance, it sets out the staging for backups, backup restoration and assessing security (Ribeiro and Gomes, 2009).

Iranian companies had little interest in implementing DS1 and DS8, in that only 19 per cent of companies implemented them adequately. DS1 addresses service level agreements, both for in-house and outsourced environments (Knolmayer et al., 2011). It identifies service requirements and monitors each quality service achievement. DS8 provides a professional service desk function with quick response. Timely and effective response to IT user enquiries and problems requires a well-managed service desk and incident management process (ITGI, 2007a).

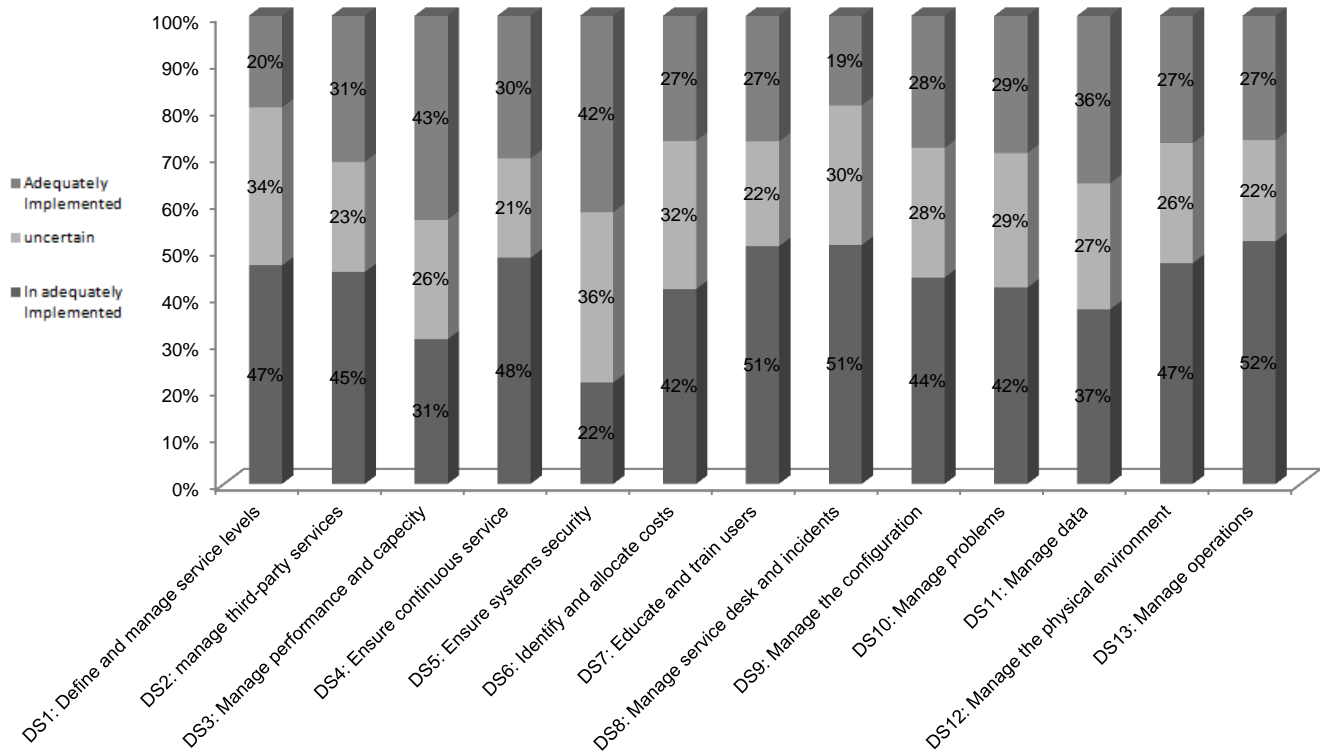


Figure 3. Implementation of IT processes in the Deliver and Support domain

Monitor and Evaluate

The final domain in the COBIT framework is Monitor and Evaluate. Figure 4 demonstrates the distribution of this domain’s process performance by Iranian companies. The comparison of data percentages between adequately and inadequately implemented levels reveals considerable differences between them and shows that higher percentages of data fall into the inadequately implemented level for all control processes.

According to Figure 4, ME3 is the most adequately implemented process, and 33 per cent of companies adequately apply this process. ME3 includes control processes that identify compliance requirements and obtain assurance that the compliance requirements have been performed (ISACA, 2010). It requires a reliable description of the necessary information to collect and the reporting format to comply with all regulatory reporting (Wallace and Larry, 2010). The results show that 28 per cent of companies are adequately involved in ME2. It provides the establishment of an effective internal control programme for IT, which needs a well-defined monitoring and reporting process (Wallace and Larry, 2010).

The second most adequately performed process is ME1, with 26 per cent of companies. It deals with the concept of performance management. In essence, this process observes the performance of all of the other processes and evaluates their performance based on targets set for them (ITGI, 2006). ME1 involves defining performance indicators, regular and opportune performance reporting and quick action against deviations. Finally, the last IT control process is ME4. It is different from the other processes in evaluating the implementation of the entire IT governance structure. ME4 follows an IT governance framework that guarantees IT services align with business requirements (Wallace and Larry, 2010). The results show that 20 per cent of companies implemented this process at an adequate level.

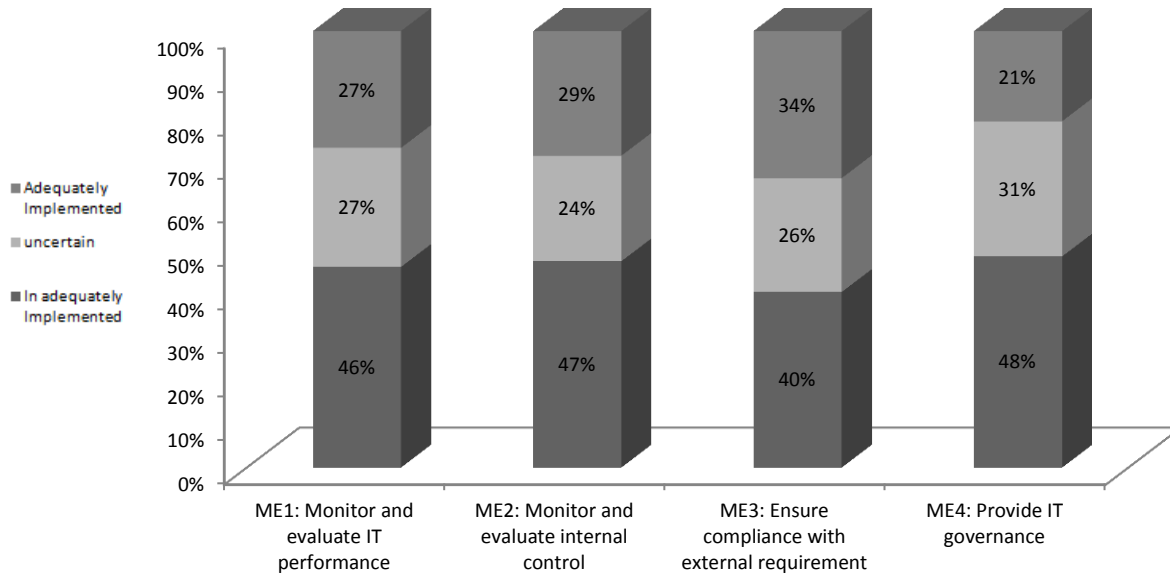


Figure 4. Implementation of IT processes in the Monitor and Evaluate domain

CONCLUSION

This study provides an overview of IT governance performance. It aims to set out the implementation level of IT governance by using the COBIT framework. According to the results of this study, there is a general awareness of IT governance issues in Iranian companies. IT governance activities and performance indicators are under development. Selected IT control processes can be identified, but they are at the early stages of implementation. Findings from the study show that Iranian companies should develop better governance of their IT in order to ensure that companies’ IT strategies support the business strategy, and that IT improves the company’s ability to utilise opportunities and increase benefits.

The study contributes to the limited existing knowledge on how Iranian organisations pursue IT governance decisions, given that implementing effective IT governance has become a necessity as many Iranian companies have developed critical dependencies on IT. One of the strong points of this study relates to the fact that it gathers empirical evidence from a new cultural context, as this is the first study reported on IT governance decisions in Iranian companies. It is hoped that this research will encourage academics and researchers to carry out further theoretical and empirical studies about IT governance in order to clarify the complexity and confusion that accompanies the implementation of IT governance.

The concept of benchmarking seems an important aspect in the implementation of IT governance. This empirical study provides benchmarking for the implementation of the COBIT model to compare and understand Iranian companies’ IT governance performance. It offers practical information for companies’ board members, executives, IT managers and auditors to understand the implementation of IT control processes. The results of the study will enable practitioners in the Iranian business environment to better employ and manage IT governance and champion IT systems and applications for their business success.

REFERENCES

Abu-Musa, A.A. 2008, "Exploring the importance and implementation of COBIT processes in Saudi organizations: An empirical study", *Information Management & Computer Security*, vol. 17, no. 2, pp. 73-95.

Brand, K. & Boonen, H. 2010, *IT Governance based on COBIT 4.1*, Third edn, Van Haren Publishing.

Calder, A. 2007, *IT Governance: A Pocket Guide (Pocket Guides: Practical IT Governance)*, Kogan Page Limited, UK.

Council, C.L. 2006, "Implementing COBIT in Higher Education: Practices that Work Best", *Information Systems Control Journal*, vol. 5.

Damianides, M. 2005, "Sarbanes-Oxley and IT Governance: New Guidance on IT Control and Compliance", *Information Systems Management*, vol. 22, no. 1, pp. 77.

Debrecey, R.S. 2006, "Re-engineering IT Internal Controls: Applying Capability Maturity Models to the Evaluation of IT Controls", *Proceedings of the 39th Hawaii International Conference on System Sciences*.

Frank, B., Salie, E., Scheiwiller, T. & Plahl, G. 2007, *Internal Control System and Risk Management as Value Enhancing Tools in the GRC Environment*, Price Water House Coopers.

- Grembergen, W.V. 2004, *Strategies for Information Technology Governance*, IDEA Group Publishing.
- Guldentops, E., Grembergen, W.V. & Heas, S.D. 2002, "Control and Governance Maturity Survey: Establishing a Reference Benchmarking and a Self Assessment Tool", *Information Systems Control Journal*, vol. 6.
- 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*, vol. 11, no. 1, pp. 55-61.
- ISACA 2010, *Monitoring Internal Control Systems and IT*, ISACA.
- ITGI 2007b, *IT Assurance Guide: Using COBIT*, ITGI.
- ITGI 2007a, *COBIT 4.1*, ITGI.
- ITGI 2006, *COBIT Mapping: An Overview of International Guidance*, second edn, ITGI, USA.
- ITGI 2003, *Board Briefing on IT Governance*, second edn, ITGI.
- Knolmayer, G., Helfenstein, L. & Sini, V. 2011, "The Treatment of Temporal Data in Web-based Reservation Systems: An Inspection-Based Evaluation", *The Working Papers of the Institute of Information Systems-University of Bern*, .
- KPMG 2007, *IT Governance and the Audit Committee: Recognizing the Importance of Reliable and Timely Information*, KPMG.
- Lientz, B.P. & Rea, K.P. 2001, *Dynamic E-Business Implementation Management*, Academic Press.
- Liu, Q. & Ridley, G. 2005, "IT Control in the Australian Public Sector: An International Comparison", *Thirteenth European Conference on Information Systems Germany*.
- Marnewick, C. & Labuschagne, L. "An investigation into the governance of information technology projects in South Africa", *International Journal of Project Management*, vol. In Press, Corrected Proof.
- Marshall, C. 2011, *The executive Guide to IT Processes Automation*, Realtime Publishers.
- Michael, J.J. 2008, "Internal control, accountability and corporate governance: Medieval and modern Britain compared", *Accounting, Auditing & Accountability Journal*, vol. 21, no. 7, pp. 1052-1075.
- Miroslav, M. & Zdravko, K. 2008, "Innovation Through ICT-The Management View ", *Central European Conference on Information and Intelligent Systems 19th International Conference 2008 Proceedings*, pp. 235.
- Moeller, R.R. 2007, *COSO Enterprise Risk Management: Understanding The New Intergrated ERM*, John Wiley & Sons, Canada.
- Moeller, R. 2010, *IT Audit, Control and Security*, John Wiley & Son, New Jersey.
- Myloni, B., Harzing, A. & Mirza, H. 2004, "Human Resource Management in Greece Have the Colours of Culture Faded Away?", *International Journal of Cross Cultural Management*, vol. 4, no. 1, pp. 59-76.
- Nunes, S., & Correia, M. 2010, "Web Application Risk Awareness with High Interaction Honeypots", *Web Application Security*.
- Ribeiro, J. & Gomes, R. 2009, "IT Governance Using COBIT Implemented in a High Public Educational Institution - A Case Study", *Computing and Computational Intelligence*, , pp. 41-52.
- Ridley, G., Young, J. & Carroll, P. 2004, "COBIT and Its Utilization: A Framework from the Literature", *Proceedings of the 37th Hawaii International Conference on System Sciences Hawaii*.
- Salle, M. & Rosenthal, S. 2004, "Formulating and Implementing an HP IT program strategy using CobiT and HP ITSM", *Proceedings of the 38th Hawaii International Conference on System Sciences*.
- Salmela, H. 2008, "Analysing Business Process Losses Caused by Information Systems Risk: A Business Process Anlaysis Approach", *Journal of Information Technology*, vol. 23, no. 3, pp. 185-202.
- Singleton, T.W. 2006, "COBIT - A Key to Success as an IT Auditor", *Information Systems Control Journal*, vol. 1.
- Symons, C., Cecere, M., Young, O. & Lambert, N. 2005, *IT Governance Framework; Structure, Processes, and Communication*, Forrester.
- Tugas, F.C. 2009, "Assessing the Level of Information Technology Processes Performance and Capability Maturity in the Philippine Food, Beverage, and Tobacco (FBT) Industry using the COBIT Framework", *Proceedings of the Academy of Information and Management Sciences AIMS, Las Vegas*, pp. 68.
- Tuttle, B. & Vandervelde, S.D. 2007, "An empirical examination of CobiT as an internal control framework for information technology", *International Journal of Accounting Information Systems*, vol. 8, no. 4, pp. 240-263.
- Wallace, M. & Larry, W. 2010, *IT Governance: Policies and Procedures*, Aspen Publishers.
- Weill, P. & Ross, J.w. 2004, *IT Governance; How Top Performers Manage IT Decisions Rights for Superior Results*, Harvard Business School Press, USA.
- Williams, P. 2006, "A Helping Hand with IT Governance", *Computer Weekly*, vol. 19, pp. 26-27.
- You-Dong, W. & Satria, R.D. 2011, *Improving IT Governance and Service Process Quality in E-Government Using Six Sima and COBIT*.