E*l*CIA: Integrated Information Audit Framework for Electricity Companies

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ABSTRACT

Information audit has become one of the key activities for large organisations in the current business environment. A study exploring the current practices of information audit in electricity companies was conducted, where two main electricity companies in Malaysia were chosen as the case companies. Empirical data showed that information audit is a new concept to these companies and hence, none of them had conducted any information audit exercise. This study proposed information audit framework, ElCIA, specifically tailored to electricity industry environment. ElCIA is hoped to help electricity companies in conducting information audit effectively.

Keywords
Information audit, electricity industry

1.0 INTRODUCTION

Information has become a valuable asset to many organisations in the current business environment (Karapetrovic & Willborn, 2000; Ragu-Nathan et al, 2001; Croteau & Bergeron, 2001; Wagner, 2004; Meyer, 2005). It can also be observed that information determines the sustainability and profitability of businesses as "… over the last 25 years, the industrialised world has been making transition from an industrial economy to an information economy, for the next several decades, information – rather than land and capital will drive the creation of wealth and creativity" (Ragu-Nathan et al, 2001). This notion is also supported by Karapetrovic and Willborn (2000), who stated that "the wars of the future will not be waged for land and resources, but more so for information and knowledge".

The importance of information becomes more pronounced in large organisations such as airline, utility, telecommunication, health care and banking as these organisations usually span in large geographical locations, employ huge number of employees, and provide a variety of products or services to substantial number of customers.

Electricity companies for example, are required to process tremendous amount of transactions and perform large numbers of operations daily to ensure that electricity is generated and supplied sufficiently, minimal disruptions of electricity supplies while charging reasonable tariff to the customers. All these transactions and operations are facilitated with information exchange among different parties, such as the generation, transmission, distribution and supply segments of a vertically-integrated electricity companies. Hence, it can be observed that information is very crucial in the operations of electricity companies as missing, incomplete or inaccurate information can significantly effect the operations of these companies. Furthermore, operational inefficiency that results in mismatch or inferior provision of products and services could be detrimental to these companies due to the significant number of customers that they currently serve, and becomes more evident in the future competitive environments.

According to Evans and Wurster (1997), information becomes valuable and important to organisations due to its unique characteristics. They stated that there are three (3) important characteristics of information that make it valuable, which are *reach* - if it is able to be reached by its intended recipients; *richness* - its content and richness that bring added-values to the recipients and *affiliation of the information* - its effective communication to the respective recipients. Furthermore, unlike other types of resources used by electricity companies such as power plant equipments, fuel, transmission towers, distribution lines and capital, information will never be diminished or reduced no matter how many times it is being drawn upon or utilised. Instead, the more information is being utilised and exploited by electricity companies, the more valuable and importance it will be to these companies. Due to this factor, it can be observed that electricity companies need to have an effective and efficient mechanism to understand, evaluate, assess and appreciate the information that they possess.

However, the challenge for many companies, including electricity companies, is to ensure that the information is of the highest quality possible, particularly in terms of timeliness, accuracy, completeness, confidence in source, reliability and appropriateness. There are many factors that lead cause this challenge, which include among others, *transformation of manually-supported operations to computer-assisted process* (Linder, 2002); *intensification of business communications via*

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many channels and forms such as print, electronic, image, audio and video; and *emerging business trends* such as globalisation, deregulation and outsourcing (Waddington, 1996). If this situation is not being handled in an effective and efficient manner, electricity companies may have difficulties in finding the right information in time of need. The transformation of manual operations to computerised processes resulted in information being transacted and stored electronically. Thus, information may be scattered around different places, replicated in different formats and owned by different people. This situation results in a phenomenon which is known as *information overload*, where commonly happens when organisations possess too much information, thus making it difficult to ascertain whether they have the required information or not, where to look for and how to access the values of the information.

In view of the importance of information and its benefits to the electricity companies, it is advisable for these companies to have an effective information management strategy to ensure that information can be utilised and leveraged to create competitive advantage. The establishment of effective and efficient information management requires electricity companies to have among others the understanding on their *information provision*, which defines what information they currently have; *information requirements*, which defines additional information that they need; *information governance*, which defines the owners of and accessibility to information among others; *information flow*, the flow and structure of information internally and externally.

2.0 THE ROLES OF INFORMATION AUDIT IN ELECTRICITY COMPANIES

Figure 1 illustrates how information audit can be utilised in assisting electricity companies in achieving its vision by aligning the information strategy with the defined business strategy, which translated the companies' vision into action plans. It can be seen that information strategy must be aligned with business strategy in order to ensure that it can provide the required information for the execution of the business strategy in accomplishment of the electricity companies' vision. However, in a real world situation, there exist constraints such as economic, resources, misinterpretations that may hinder the electricity companies in acquiring the required information. As such, there exist gaps between the *information provision* (what is available) and *information requirement* (what is needed).

As the current trends of electricity control centres are moving towards distributed and decentralised architectures such as grid computing and intelligent web services (Wu, 2005), technologies and applications would need to be more flexible, integrated and scalable. This scenario would result in tremendous amount of data being transacted and exchanged daily in electricity companies; thus may cause electricity

companies to face the state of *information overload* if they do not emphasise on effective information management strategy
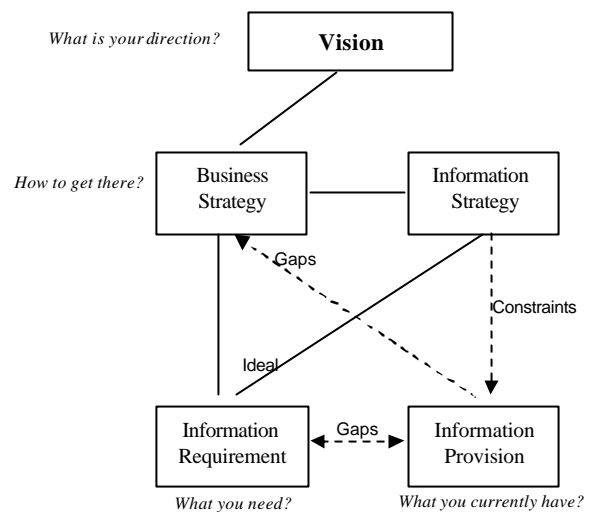

Figure 1: Information audit and its relation with organisations

Information audit can be utilised as a tool to help electricity companies in identifying the information provision, requirement, governance, flow and associated assets in order to implement, maintain or improve the organisation management of information (Buchanan and Gibb, 1998) and provide managers with an overview of the present situation regarding specific resources and services provided by them (Botha and Boon, 2003). Therefore, it is advisable for electricity to conduct information audit, which is defined by this study as **an assessment of organisational information requirement, provision, flow, governance and relationship with the objective of extracting the operational and strategic values of information in achieving business goals**.

3.0 RESEARCH METHODOLOGY

Qualitative research was chosen as the main approach for this study which aimed at exploring and understanding how information audit is being practised in electricity companies in Malaysia, as well as the expected benefits that could be gained by these companies. In order to be able to acquire this understanding, an in-depth study of information audit practices in the electricity companies needed to be performed. Case study had been identified as the most suitable strategy for this research. This study focused on the current practices of information audit in the electricity companies by gathering their views and perspectives towards this issue primarily through interviews. These interviews were aimed at answering the questions posted in this study, which were focused on the "*what*" type of question. Hence, this study fulfilled the elements of exploratory case study as indicated by Yin (2003) that assessed the strategy for a research based on three (3) criteria, namely *type of research questions, the control a*

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researcher has over the research events, and *focus of the phenomena*, which can either be contemporary or historical.

The data collection technique adopted for this study was the open-ended, semi-structured interview, which were conducted with several departments from two (2) main electricity companies in Malaysia. The departments chosen as the key respondents for this study can be grouped into two (2) categories. Firstly, they are the main IT solution and infrastructure providers for the case companies, and secondly, they are responsible for the audit functions of the case companies. The data collection was conducted within a period of three (3) months, starting from August to October 2007 at the case companies' offices in KL and Kuching, Sarawak.

4.0 RESEARCH FINDINGS

Both case companies employed a *risk-based* approach to auditing, where the entities or areas to be audited or known as the *auditable areas* are identified or selected based on the risk profiles. The risk profiles were assigned by a dedicated team in both case companies, who are responsible to identify the potential risks and exposures. Most of the entities or areas that were selected as auditable areas in the case companies are those being identified as high-risk entities or areas. Dedicated departments have been established in the case companies to assess and assign risk profiles of different business entities in the case companies. Based on the current audit practices in both case companies, it can be observed that they recognised audit as only one of the key supporting activities in ensuring that they meet regulatory requirements, comply with defined standards and able to mitigate possible threats. Due to this, it can also be seen that the focus of the audit exercises in both case companies was more towards preventive, detective and corrective measures, indicating operational perspective of audit. This is corroborated with the departments' definition of audit in general and the different audit types that they were aware of, such as IT security, financial, operational and ISO audits.

Besides that, it was also observed that none of the departments in both case companies were able to accurately and comprehensively define information audit. All of them stated that they had never heard or exposed to any information audit exercise previously, and as such, were not able to define information audit correctly. Therefore, the current methods used in conducting information audit were not able to be obtained. Nevertheless, the current practices on conducting IT security and operational audits were able to be obtained and use as input to the proposed framework.

A question was also raised in this study to identify the required information that these departments needed in supporting the execution of their daily tasks and operations; and methods or techniques currently practised to assess the validity, accuracy and comprehensiveness of the information provided. The empirical data showed that the departments did not use any standardised methods in ascertaining the validity, accuracy and comprehensiveness of the information that they required for their decision making or future processes. Most of them indicated that they would know the accuracy of the information based on their personal experiences using the information, and also counterchecking with subordinates or the information source.

However, the absence of standardised method in assessing and verifying the validity, comprehensiveness and completeness of information may results in one of the following possibilities:

a) Delayed in subsequent processes execution as the processes may need to re-evaluate the information before it can be used

b) Inefficient decision making as the information provided may not be accurate and complete

c) Duplication of efforts as the information recipients may need to repeat some processes in order to verify the validity of the information

d) Low self respect of the information providers as the information recipients may not value the information provided by the information providers.

The above consequences may put the companies at a disadvantage if any of the possibilities highlighted above takes place. At an operational level, poor quality information leads directly to incurring higher operating cost, which may be caused by customer dissatisfaction, longer time needed to complete a process or reduced employees' self motivation and esteem.

5.0 RECOMMENDATIONS

The analysis of empirical data, discussion on the research questions and reviewed of related literature were performed with the aim of exploring the possible justification for the problem highlighted in this research: ***'What is the best information audit framework for electricity companies?*** The outcomes of the above activities had resulted in the development of an information audit framework for electricity companies, which is referred to as '**Integrated Electricity Company Information Audit (E*l*CIA) framework**'.

E*l*CIA framework encompasses eight elements which may be adopted by the electricity companies based on their suitability to the companies' environment. The framework is encapsulated within two outer layers, namely business strategy and information strategy. The outermost layer, which is business strategy, is established to support the electricity company's vision by defining what are to be accomplished by the company; and the means or methods of accomplishing those objectives. In order to achieve the defined objectives, the needs of business strategy, in terms of information requirements, provisions, management and governance are being fulfilled by the information strategy, which is the middle layer of E*l*CIA framework. These components of the information strategy,

which are required to support the business strategy, are the main deliverables of an information audit exercise.

Figure 2:Integrated Electricity Company Information Audit (ElCIA) framework

The above explanation shows the connection among the different layers of ElCIA framework and how the output or deliverables of the inner layers support the requirements of the outer layers. Although there are some other components or deliverables of the information strategy, ElCIA framework only focuses on the information needs, provisions, management and governance components of information strategy, as they are the main deliverables of information audit exercise, which is the focus on this study.

Prior to the adoption of ElCIA framework, electricity companies are advised to execute some preliminary initiatives first. These preliminary initiatives are recommended to be undertaken prior to the adoption of the proposed framework due to the following rationales:
- To ensure successful adoption of the proposed information audit framework
- To ensure that consensus is achieved at top management level on the adoption of the framework
- To ensure continuous organisational support and appreciation (from both top management and employees)

The initiatives are categorised into short and long term initiatives. The short tem initiatives are as follows:
a) *Study the proposed information audit framework*
   A task force may need to be formed to study the proposed information audit framework, in terms of understanding the objectives to be achieved and activities to be performed in each segment. Among the roles of the task force besides understanding the framework's elements are:
   - Identify the elements in the proposed framework that are relevant the companies' environments
   - Present to the company's Audit Committee on high-level results of the study

- Prepare a written report to explain the results of the study

b) *Adoption of the proposed information audit framework*
   - Communicate the adoption initiative to all vice presidents or heads of business division of the electricity companies
   - Commence the adoption initiative

The long term initiatives are as follows:
a) *Review progress of Information Audit Council (IAC) performance by Audit Committee*
   The Audit Committee of the electricity companies is recommended to review the performance of IAC to ensure that the objectives specified are met and the roles defined are effectively executed.
b) *Assess the reward system*
   If the reward element is being adopted, a review of the reward system needs to be done to ensure that it is effective in achieving its targeted objectives and any improvements that may be needed to increase the appreciation of information audit by the companies' employees.
c) *Review the relevancy of the elements adopted*
   To ensure continuous appreciation of information audit, scheduled reviews of the elements of information audit framework adopted need to be performed.

The adoption of the proposed ElCIA framework may commence after the short term initiatives have been successfully completed and executed. As depicted in Figure 2, there are eight elements of ElCIA framework, which include:

(1) **Form**
Form element recommends the formation of a formalised Information Audit Council (IAC). The main objective of forming the IAC is to steer information audit in realising and appreciating the strategic values of the organisational information resources. The main objectives of the *form* element are:
- To establish strategic collaboration among top management in appreciating the value of information audit
- To promote information audit at the higher management level in order to gain their buy-in
- To inculcate positive information behaviours among senior officials, which include among others high perceptions towards values of information, systematic information management and information sharing culture
- To *champion* the information audit exercise at the different business divisions of the electricity companies

The main tasks that need to be undertaken by this element include:
- Selection of Head of Information Audit Council and members
- Formation of a formal Information Audit Council

- Identify the goals, roles and core tasks of Information Audit Council
- Announcing the members, goals and roles of Information Audit Council to organisation-wide

(2) *Initiate*

The *initiate* element in the proposed information audit framework recommends the organised and systematic high-level planning of an information audit exercise. The main objectives of this element are as follows:
- To ensure that information audit exercise is comprehensive
- To ensure clear roles and responsibilities of each champion, who is representing the different business divisions of electricity companies
- To ensure that optimal resources are utilised for each information audit exercise

The main tasks of this element are:
- Identify the roles of information audit that they want to focus on
- Develop the information audit objectives and scope based on the roles that they have identified
- Define the roles and responsibilities of each champion
- Define the required resources (in terms of number of manpower, duration and other resources)

(3) *Foster*

The *foster* element in the proposed information audit framework suggests that creating awareness of the information audit at organisational level needs to be carried out with the aim of gaining organisation-wide support. The main objectives of this element are as follows:
- To promote information audit at organisation-wide level to gain employees' support
- To ensure that the goals and roles of Information Audit Council are well accepted and understood
- To inculcate positive information behaviour and perception among employees
- To gain the co-operation in conducting the information audit exercise

The main tasks of this element are as follows:
- Recruiting information auditors – permanent posts within each business division, who report directly to the division's information audit champion
- Promoting information audit throughout the organisation using variety of initiatives such as campaign, road show, posting information on the Intranet and departmental discussion

(4) *Execute*

The *execute* element in the proposed information audit framework is the actual conduct of information audit exercise. The main objectives of this element are:
- To understand the current information resources
- To gather the current information needs

- To gather the current information provision

The main tasks of this element are:
- Preparation of relevant documentation and work papers
- Identify current information provision
- Identify current and future information requirements
- Identify information flows among the business processes
- Identify information owner
- Validate data collected

(5) *Analyse*

The *analyse* element in the proposed information audit framework assesses and reviews the current information resources collected by the *execute* element. The main objectives of this element are:
- To identify and determine the gaps in information requirements and provision
- To categorise information based on its criticality, sensitivity and importance
- To recommend solutions in minimising the gaps between information provision and requirements
- To ensure the current information provision supports business requirements

The main tasks of this element are:
- Perform gap analysis
- Develop solutions or recommendations to minimise gaps
- Categorise information
- Prepare action plan to implement solutions or recommendations

(6) *Announce*

The *announce* element in the proposed information audit framework suggests that information audit findings and solutions to be publicised and shared with the whole organisation. The main objectives of this element are as follows:
- To enable the employees to appreciate and value information audit
- To ensure that the whole organisation understands the possible outcomes or results of an information audit exercise
- To create a sense of belonging among employees

The main tasks of this element are:
- Publicising the information audit outcomes via road show, corporate Intranet or departmental discussion
- Gather feedback from the employees

(7) *Reward*

The *reward* element in the proposed information audit framework recommends that business unit or division that has the most effective information practices to be recognised and rewarded. The main objectives of this element are:
- To create the feeling of appreciation by the auditees
- To motivate non-auditee business units or divisions to enhance their information practices

- To show the seriousness of the management in the information audit initiative

The main tasks of this element are:
- To identify the business unit or division that has the most systematic and effective information practice
- To identify the most suitable reward scheme
- To announce and publicise the reward recipient

(8) *Review*

The *review* element in the proposed information audit framework recommends that a post information audit exercise assessment and review to be conducted. The main objectives of this element are:
- To ensure continuous good practice of information management
- To ensure that recommended solutions are implemented
- To ensure that information audit exercise is a continuous process

The main tasks of this element are:
- Identify areas to be reviewed based on the audit outcomes
- Identify implemented recommendations
- Identify possible recommendation areas to be implemented
- Identify possible scope for the next audit exercise

6.0 CONCLUSION

E*l*CIA is a comprehensive information audit framework that is tailored to the electricity companies' environment. It is hoped that with the adoption of E*l*CIA framework, electricity companies may be able to efficiently manage their information resources, optimally utilise their information resources for competitive advantages and also flexible to future changes in business environment. Nevertheless, there are some issues and challenges that electricity companies need to consider and evaluate in adopting the E*l*CIA framework. Among the main issues and challenges are as follows:
i) Nature of the information in terms of format, structure and repository types
ii) Cultivation of positive information practices and sharing culture in the organisations
iii) Obtainment of top management buy-in
iv) Obtainment of corporate buy-in
v) Attainment of continuous support towards information audit initiatives
vi) Identification of the suitable ElCIA elements to be adopted
vii) Attainment of certified auditor to become the Head of IAC
viii) Nomination and selection of IAC members (champion and normal members)
ix) Formulation of the suitable reward system

Therefore, electricity companies are highly encouraged to review their current information management practices and study the E*l*CIA framework in detail. The short term initiatives are also recommended to be executed prior to the adoption and execution of E*l*CIA as it is hoped with this execution, E*l*CIA

may increase the effectiveness and success execution of the companies' information audit exercise.

REFERENCES

Buchanan, S. and Gibb, F. (1998), The information audit: An integrated strategic approach, *International Journal of Information Management*

Botha, H. and Boon, J.A. (2003), The information audit: Principles and Guidelines, *International Journal of Libraries and Information Services*, *Vol. 53*, pp 23-38

Croteau, A. and Bergeron, F. (2001), An information technology trilogy: business strategy, technological deployment and organizational performance, *Journal of Strategic Information Systems, Vol. 10*, pp 77-99

Evans, P and Wurster, T (1997), Strategy and the new economics of information, *Harvard Business Review, Sept – Oct*, pp 70 - 82

Karapetrovic, S. and Willborn, W. (2000), Generic audit of management systems: fundamentals, *Managerial Auditing Journal Vol.15, Issue 6*, pp 279-294

Linder, J. C (2002), Uncover hidden competitive value using information strategy, *Accenture's Outlook Point of View*, viewed at http://www.accenture.com on 10th April 2007

Meyer, H. W. J. (2005), The nature of information, and the effective use of information in rural development, *Information Research Vol. 10, Issue 2*, view at http://InformationR.net/ir/10-2/paper214.html on 23rd May 2007

Ragu-Nathan, B., Ragu-Nathan, R.S., Tu, Q. and Shi, Z. (2001), Information management (IM) strategy: the construct and its measurement, *Journal of Strategic Information Systems, Vol. 10*, pp 265-289

Waddinton, P. (1996), Dying for Information? A Report on the Effects of Information Overload In the UK and Worldwide, *Reuters*, view at http://www.ukoln.ac.uk/services/papers/bl/blri078/content/repor~13.htm on 24th May 2007

Wagner, C (2004), Enterprise strategy management systems: current and next generation, *Journal of Strategic Information Systems, Vol. 13*, pp 105-128

Wu, F. F., Bose, A. (2005), Power System Control Centers: Past, Present, and Future, *Proceedings of the IEEE, Vol. 93, No.11*, pp 1890 - 1907

Yin, R. K. (2003), Case Study Research: Design and Methods, *3rd Edition, Applied Social Science Research Methods Series, Vol. 5*, Sage Publications Inc.