Determinants of Effective Information Technology Governance: A Study of IT Intensity

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Abstract

Recent increases in the importance of information technology (IT), as a strategic factor for organisations in achieving their objectives, have raised the concern of organisations in establishing and implementing effective IT governance. This study seeks to examine empirically the individual IT governance mechanisms that influence the overall effectiveness of IT governance, by taking into account the level of IT intensity within organisations.

Obtaining the sample data by using web based survey from 176 members of ISACA (Information Systems and Audit Control Association) Australia, this study examined the influences of six proposed IT governance mechanisms on the overall effectiveness of IT governance. Using Factor Analysis and Multiple Regression techniques, this study found significant positive relationships between the overall level of effective IT governance and the following four IT governance mechanisms: an IT strategy committee, the involvement of senior management in IT, the existence of ethics/ culture of compliance in IT, and corporate communication systems.

Key words: IT governance; Mechanisms; IT Intensity; Australia.

1. INTRODUCTION

In recent years, information technology (IT) governance has been emerging as a central issue in the business and IT world. A survey conducted by Gartner (*Top Ten CIO Management Priorities for 2003*) revealed that "Improving IT governance", selected as a topic for the first time, was ranked third by chief information officers (CIOs) (Grembergen, 2003). A more recent study, published in 2004 by the IT Governance Institute (2003b), entitled "*IT Governance Global Status Report*", revealed that more than 80% of CIOs acknowledged the need for better IT governance in delivering their enterprise's strategy. Furthermore, the importance of IT governance was supported by a study showing that firms with superior IT governance gained profits 25% higher than those with meagre governance, given similar strategic objectives (Weill and Ross, 2004).

According to the IT Governance Institute (2003a), IT governance is defined as:

"A structure of relationships and processes to control the enterprise in order to achieve the enterprise's goals by adding value while balancing risk versus return over IT and its processes."

Despite the increasing importance of IT governance, evidence shows that many organisations have failed in their quest to obtain benefits from IT. Unsuccessful project development (e.g., being over budget and under specification), loss of competitiveness, and even organisational demise (Schwartz, 2004; Woodhead, 2004) have been attributed to lack of governance in IT.

Previous studies examining the effectiveness of IT governance mechanisms have produced interesting results (Vaswani, 2003; Well and Ross, 2004). Vaswani (2003), whose respondents were 80 auditors in Queensland, Australia, found that certain individual mechanisms, such as an IT steering committee, involvement of senior management and corporate performance measurement systems, were correlated positively with the overall level of IT governance effectiveness. Very recently, Weill and Ross (2004) surveyed CIOs from 256 enterprises in the US and identified fifteen of the most common IT governance mechanisms, such as a senior management committee, an IT executive committee, an architecture committee, etc.

However, these studies did not provide a general understanding of the conditions under which the mechanisms are likely to produce effective IT governance. They did not consider the different characteristics of certain types of firms or industries that may contribute to the effectiveness of IT governance within those organisations (Sohal and Fitzpatrick, 1998). It is important to understand that the factors that determine the effectiveness of IT governance cannot be generalized to all types of firms or industries, since each has its own different characteristics. The present study addresses this gap; it extends earlier studies by proposing a contingency factor — IT intensity — that, it will argue, modifies previously found IT governance mechanisms affecting the effectiveness level of IT governance.

Thus, the general research question of this study is: what factors are required to establish and implement effective IT governance? Two specific questions arising from this are:

- What mechanisms contribute to effective IT Governance?
- To what extent does IT intensity influence effective IT governance mechanisms?

2. MODEL AND HYPOTHESES DEVELOPMENT

As shown in Figure below, this study adopted and extended the prior study model (Vaswani, 2003) into the following model:

$$EFFECT = \alpha + \beta_1 STRATCOM + \beta_2 STEERCOM + \beta_3 INVOLVE + \beta_4 CORPSYS + \beta_5 ETHICULT + \beta_6 COMSYS + \beta_7 ITINTENT + \varepsilon$$

Where:
EFFECT: Perceived overall effectiveness of IT governance
STRATCOM: IT strategy committee
STEERCOM: IT steering committee
INVOLVE: Involvement of top management in IT
CORPSYS: Corporate performance measurement systems
ETHICULT: Ethics/culture of compliance
COMSYS: Corporate communication systems
ITINTENT: IT Intensity

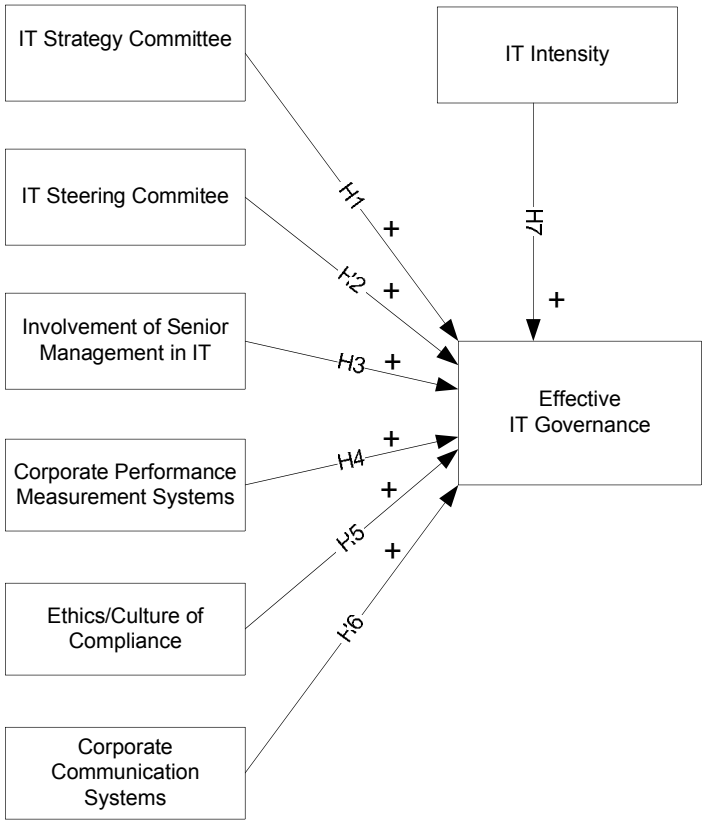

Figure 1. Research Model

2.1 IT Strategy Committee

As IT becomes a critical element of business strategies or core operating processes, there is a need for greater involvement of the board of directors in establishing effective governance of IT. A board can pursue these responsibilities by establishing a committee called the IT strategy committee (IT Governance Institute, 2003a). In this study an IT strategy committee means a sub committee of board members with responsibility to provide insight and advice to the board on topics such as the alignment of IT with the business direction and the achievement of strategic IT objectives; and also to provide direction to management relating to the IT strategy (IT Governance Institute, 2003).

The involvement of boards in IT governance implies that the organisation is committed to establishing effective IT governance. The commitment of the IT strategy committee to IT governance is very important. Commitment is indicated by the provision of sufficient resources for meeting IT strategic objectives (Barlow, 1990; Gottschalk, 1996; Premkumar and King, 1994), providing direction to management related to IT strategy and its approval (IT Governance Institute, 2003a). Thus:

H1: The existence of an IT strategy committee will positively influence the effectiveness of IT governance.

2.2 IT Steering Committee

The IT steering committee, as a mechanism for supporting information systems planning and management, has been widely supported in the systems literature. In this study an IT steering committee means a high-level executive management team of representatives from multiple divisions or functions that are assigned the task of linking IT strategy with business strategy by setting strategic directions, matching corporate concerns with technology potential, and

building commitment (IT Governance Institute, 2003). The committee serves as a high-level executive team, comprised of representatives from various divisions or functions within the organisation (such as business executives and the CIO), with the main function of linking its IT strategy and business strategy (Nolan, 1982; IT governance Institute, 2003a). Previous studies have empirically supported the benefits of the existence of an IT steering committee in IS planning and management (Doll, 1985; Steiner, 1979; Ragunathan and Ragunathan, 1989).

Several earlier IS studies provide further empirical evidence of the importance of an IT steering committee. For example, a study by Karimi et al. (2000) found that an IT steering committee had a positive impact on the sophistication of IT management, and it was shown to have made improvements to IS project portfolios (McKeen and Guimaraes, 1985). A more recent study by Vaswani (2003), using 80 auditors in Australia, revealed that an IT steering committee has a positive correlation with the level of effectiveness of overall IT governance. Thus:

H2: The existence of an IT steering committee will positively influence the effectiveness of IT governance

2.3 Involvement of Senior Management in IT

Many researchers have examined the critical role of senior management practices in IS success. In this study senior management means the CEO and the level of management directly below that of the CEO. The involvement of senior management appears to lead to effective IS planning (Rockart, 1988; Cerpa and Verner, 1998; Earl, 1993; Shuman and Rohrbaugh, 1991; and Sohal and Fitzpatrick, 2002). A lack of senior management involvement has been shown to lead to unfavorable outcomes in IS planning, and even failure to plan for IS. (Cerpa and Verner, 1998; Nath, 1989; Sabherwal, 1999; and Salmela et al., 2000).

In the IT governance literature, a recent study by Vaswani (2003) has shown that senior management involvement was positively correlated with effective IT governance. Thus:

H3: Involvement of senior management in IT will positively influence the effectiveness of IT governance

2.4 Corporate Performance Measurement Systems

One of the IT strategy committee's duties is to supervise the implementation of its strategic agenda. To achieve this outcome, effective performance measurement mechanisms, such as an IT balanced scorecard, project tracking systems, and IT charge back systems, are necessary. Such a system enables the management and the board to detect and correct any deviations and alter the strategy when necessary (IT Governance Institute, 2003a). In line with this argument, Hardy (2002) contends that the use of a performance management system is an integral part in applying effective IT governance. The measurement, which incorporates a set of metrics, provides management with a regular and precise analysis of how IT is performing the current operations and the latest projects. Thus:

H4: The implementation of a corporate performance measurement system will positively influence the effectiveness of IT governance

2.5 Ethics/Culture of Compliance

Over the last decade, business has been paying greater attention to corporate ethical and legal compliance programs. In a survey of Fortune 1000 firms, Weaver et al. (1990) found that 98% of responding firms address ethical or conduct issues in formal documents. Meanwhile, 78% have a separate code of ethics, and most of them distribute these policies widely within the organisation. Recent corporate collapses, like Enron, WorldCom, HIH, and One.Tel,

have shown that the lack of a culture/ethics of compliance has adversely impacted the company's existence. This situation has forced government authorities to enact laws like the Sarbanes-Oxley Act (2002) in US, and CLERP 9 in Australia, to address such cases in the future. In this study, ethics or culture refers to similar concept that means "all the beliefs, values, attitudes, rituals and behaviour patterns that people in an organisation share" (Meyer, 2004, p.29).

Effective ethical compliance management has several advantages. First, as employees' ethical and legal awareness increase, the employees tend to ask questions correctly and, in the end, do the right thing when facing dilemmas. Second, it influences employees to be willing to report violations to management, thus contributing better decisions in the company. Finally, it increases employees' commitment, since a culture of ethical compliance creates value congruence that generates a sense of belongingness among employees (Trevino et al., 1999; McCabe et al., 1996).

In a similar vein, but with respect to IT governance, this study argues the need to promote a culture/ethics of compliance in order for firms to achieve their IT governance effectively. Such an environment is useful in preventing and detecting conduct that may endanger the objectives of IT governance.

To achieve an effective ethics/culture of compliance, a firm needs to establish a code of ethics, adopt and implement a comprehensive compliance program such as COSO (Committee of Sponsoring Organisations of the Treadway Commission), COBIT (Control Objectives for Information and related Technology), ITIL (Information Technology Infrastructure Library), and/or ISO 17799, provide sufficient ethical training for employees, and provide a reporting hotline. It is also important for top management to give leadership in promoting awareness of ethical compliance within their organisation, as it sends messages to employees that inevitably shape the culture of their organisations (Beyer and Nino, 1999). Thus:

H5: The existence of ethics/culture of compliance will positively influence the level of effective IT governance.

2.6 Corporate Communication Systems

The role of communication systems in the effective governance and management of IT has been examined extensively. Effective IT governance requires close relationships between the business and IT so that there will be better understanding between both areas, thus creating good participation and collaboration in the organisation (Henderson, Venkatraman and Oldach, 1993; Broadbent, 1998; Luftman and Brier, 1999; Luftman, 2000; Reich and Benbasat, 2000; Callahan and Keyes, 2004).

Weill and Ross (2004) also reveal that the more that management communicate formally about the existence of IT governance mechanisms, how they work, and what outcomes are expected, the more effective are their governance processes. However, the study was based primarily on case studies that have a limitation in terms of external validity. By contrast, this study differs from the previous studies in that it provides empirical evidence of communication mechanisms based on an extensive questionnaire survey. Thus:

H6: The implementation of a corporate communication system will positively influence the effectiveness of IT governance

2.7 IT Intensity

Effective IT governance mechanisms do not take place in isolation from the milieu of organisational contexts in which the governance occurs (Dehning et al., 2003). As different industries employ IT in different ways, the need for effective IT governance will be different

as well. Starre and de Jong (1998) investigated IT governance and management practices by analysing the responses to a survey along five perspectives. The study revealed that information intensity was the only significant factor in IT governance. In a similar study, Sohal and Fitzpatrick (2002) surveyed 57 large organisations in Australia and found that the IT intensity was also the only significant factor in determining effective IT governance. However, their study did not make any attempt to provide empirical support for the IT intensity perspective on IT governance performance. This study examines the influence of IT intensity factor based on a similar approach used by Clarckson et al., (2003). Thus,

H7: IT intensity has a direct positive correlation with the level of effective IT governance.

3. Research Methodology

Data for this study was collected using web based survey. Email invitations to participate in the survey were sent out to 1116 members of ISACA throughout Australia (to the Brisbane, New South Wales, Canberra, Melbourne, Adelaide and Perth Chapters). The total of completed and usable responses was 176, thus the response rate for this survey is 15.77%. This response rate is relatively high compared with previous similar studies (Vaswani, 2003; Sriram et al., 1997; Sohal and Ng, 1998.

3.1 Sample Characteristics

Table 1: Sample Characteristics

		Frequency	**Percentage**
A.	Audit background (n=176)		
	Internal auditor	122	69%
	External auditor	54	31%
B.	IS Auditor	139	79%
C.	Qualified CISA (certified information systems auditor)	86	49%
	Experience and Familiarity*	***Mean***	***Std. Dev.***
D.	Audit experience (years)	9.30	7.46
E.	IS Audit experience (years)	7.85	6.21
F.	Familiarity with IT Governance	5.69	1.23
	Type of Industry		
D.	Government		26
E.	Finance, Banking and Insurance		18
F.	Chartered Firm/Management Consulting		13
	Others		43

* On a 7–point Likert scale: (1= Not at All; 7= a Great Extent)

3.2 Operational Measures of the Study Variables

The following variables were adopted from prior studies or newly developed for the purpose of this study. Except for the *IT intensity* variables, all the variables were measured using seven-point Likert scales.

3.2.1 Dependent variable

Perceived overall level of effective IT governance (EFFECT) was measured using two items that were validated by Vaswani (2003). The two items were originally developed and validated in Goodhue and Thompson (1995).

3.2.2 Independent variables

To measure *IT Strategy Committee* (STRACOM), three questions adapted from the IT Governance Institute (2003a) were used.

IT Steering Committee (STEERCOM) was measured using three items that were validated by Vaswani (2003). All three items were originally developed and validated based on a study conducted by Karimi et al. (2000).

To measure *involvement of top management in IT* (INVOLVE), this study used three items that were validated by Vaswani (2003). The first two items were originally developed and validated based on a study conducted by Jarvenpaa and Ives (1991), while the last item was developed and validated by Vaswani (2003) .

Corporate performance measurement system (CORPSYS) was measured using three items that were validated by Vaswani (2003). All three items were originally developed and validated based on a study conducted by Chan and Ho (2000).

To measure *ethics/culture of compliance* (ETHICULT), three items from Trevino et. al., (1999) were adapted to the context of IT governance.

Corporate communication systems (CORPSYS) was measured using three items adapted from Weill and Ross (2004).

IT Intensity (ITINTENT) was measured using a similar approach to that of Clarkson et al. (2003). A factor analysis was performed in order to explore the four characteristic items, based on ratios derived from respondent's responses (i.e., total of personal computers (PCs)/total employment, total IT employee/total employment, total annual IT budget/total IT employment, and total annual IT budget/total employment). The result of the factor analysis was a single composite measurement of the variable as a proxy of IT intensity.

4. RESULTS AND DISCUSSION

Table 3 presents the mean and standard deviation for variables included in the multiple regression analysis.

Table 3: Descriptive Statistics: Multiple Regression

Variable	Mean	Std. Deviation
STRACOM	4.6158	1.69805
STERCOM	4.7218	1.46891
INVOLVE	4.7217	1.37101
CORPSYS	3.9628	1.51976
ETHICUL	4.5276	1.42251
COMSYS	4.3863	1.51930
EFFECT	4.2069	1.43564
ITINTEN	-0.0650	0.76715

Table 4: Model Summary of Multiple Regression

Model	R Square	Adjusted R Square	F-statistics	Sig. F	Durbin-Watson
1	0.722	0.708	50.905	0.000	1.976

Predictors: (Constant), COMSYS, STRACOM, INVOLVE, STERCOM, CORPSYS, ETHICUL, ITINTEN
Dependent Variable: EFFECT

Table 4 presents the results of multiple regression. The table indicates that all independent variables (the six IT governance mechanisms and IT Intensity) explain 72.2% of the variance in the overall effectiveness of IT governance. This value is highly significant as indicated by the F-value and the significance (F-statistics=50.905, p=000).

Table 5 presents the results of the multiple regression analysis that reveals the significance of the hypotheses. IT strategy committee had a marginally significant and positive effect on the effectiveness of IT governance (ρ=0.55), that suggests some support for Hypothesis 1—the existence of IT strategy committees positively influences the effectiveness of IT governance. This empirical finding partially supports the normative literature proposed by the IT Governance Institute (2003a).

Table 5: Results of Regression

Variable	Unstandardised Coefficients		Standardized Coefficients	t-statistic	Sig. (2-tailed)
	B	Std. Error	Beta		
(Constant)	8.936E-02	0.269		0.332	0.740
STRACOM	9.517E-02	0.049	0.113	1.933	0.055*
STERCOM	-0.108	0.064	-0.111	-1.701	0.091*
INVOLVE	0.113	0.064	0.108	1.767	0.079*
CORPSYS	-4.547E-02	0.061	-0.048	-0.744	0.458
ETHICUL	0.406	0.071	0.402	5.710	0.000**
COMSYS	0.454	0.067	0.480	6.741	0.000**
ITINTEN	-0.160	0.086	-0.086	-1.856	0.066*

* Significant at the 0.1 level (2-tailed)
** Significant at the 0.001 level (2-tailed)

In the same way as with Hypothesis 1, Hypothesis 2 (IT steering committee) also had a marginally significant (ρ=0.091) effect on the effectiveness of IT governance, at a 0.10 acceptance level. Surprisingly, the result reveals that this significance was negative, which is inconsistent with previous studies (Vaswani, 2003; Karimi, 2000), which found the IT steering committee positively influenced the level of effective IT governance. A possible explanation of this finding could be the way in which the related survey items were worded, so that the respondents had mixed perceptions or saw an ambiguity with hypotheses 1 (IT Strategy Committee). Another possible explanation is that, for these organizations, other mechanisms such as IT strategy committee and involvement of senior management in IT were perceived as more effective in influencing the overall level of effective IT governance.

A positive and marginally significant result (ρ=0.079) was found for Hypothesis 3. This finding suggests that the involvement of senior management is a positively influence on the effectiveness of IT governance, consistent with the previous study by Vaswani (2003).

Interestingly, the results provide no support for Hypothesis 4 that proposes corporate performance systems positively influence the effectiveness of IT governance. Table 5 reveals that the variable has a negative and non-significant result (ρ=0.0458). The result is inconsistent with previous study by Vaswani (2003), which found a positive correlation between this variable and the overall effectiveness of IT governance. The possible explanation of this finding is that the respondents to this study had mixed perceptions of the type of corporate performance measurement systems in use. Possible explanation may be that the concept of the balanced IT scorecard is relatively new and merely supported by the theoretical approaches of Van Grembergen and Van Bruggen (1997) and Van Der Zee and De Jong (1999).

Ethics/Culture of compliance in IT had a highly significant and positive influence on the overall effectiveness of IT governance (ρ<0.001). This result provides support for Hypothesis 5 that the existence of Ethics/Culture of compliance influences a perception of an effective level of IT governance.

The corporate communication systems were also found to have a positive and significant effect (ρ<0.001), supporting hypothesis 6 that the existence of corporate communication mechanisms relate positively to the overall effective level of IT governance. Despite many studies revealing similar findings (Henderson et al., 1993; Broadbent and Weill, 1998; Luftman and Brier, 1999; Reich and Benbasat, 2000; Callahan and Keyes, 2004) this finding provides the first empirical evidence based on an extensive survey in the context of the importance of corporate communication systems to IT governance.

Interestingly, Hypothesis 7a (ρ=0.066)—that IT intensity positively influences the effectiveness of IT governance, is marginally supported. However, the result reveals that the variable has a negative sign with the standardised coefficient for the variable being -0.086 (see Table 5). This finding on the IT intensity variable is perhaps not surprising, given the relatively crude proxies this study used for the measurement. Other possible explanation of the finding, although probably contrary to theory, was that the higher the level of IT intensity in the organisation, the lower the perception of there being an effective level of IT governance.

5. SUMMARY, CONTRIBUTION, LIMITATIONS AND FUTURE STUDY

5.1 Summary

This study sought to examine empirically the individual IT governance mechanisms that influence the overall effectiveness of IT governance, and also it considers the level of IT intensity within an organisation.

Obtaining the sample data by surveying 1116 members of ISACA (Information Systems Audit and Control Association) throughout Australia, with a 15.77% response rate, this study examined the influences of the following IT governance mechanisms on the overall effectiveness of IT governance: IT strategy committee, IT steering committee, involvement of senior management in IT, corporate performance measurement systems, ethics/culture of compliance in IT, and corporate communication systems.

This study advances our understanding of the roles of IT governance mechanisms and their impact on the overall effectiveness of IT governance. In particular, this study found robust empirical evidence that (1) the existence of ethics and a culture of compliance in IT is positively correlated with the overall effectiveness of IT governance, and (2) the existence of corporate communication systems support greatly enhances the overall effectiveness of IT governance.

Moreover, the findings suggest that the presence in an organisation of an IT strategy committee and the involvement of senior management in IT, are positively influences on the overall effectiveness of IT governance. Though, caution should be applied when interpreting these results as the study found only marginally significant support (at a ten percent acceptance level) for the related mechanisms.

5.2 Contributions

The study's findings contribute to both theoretical and practical aspects of IT governance.

5.2.1 Theoretical contributions

Modifying and extending an earlier study by Vaswani (2003), this study examined other additional individual IT governance mechanisms (IT strategy committee, ethics/culture of compliance in IT and corporate communication systems) and their influences on the overall effectiveness of IT governance. The findings of this study provide empirical results on the IT governance mechanisms that have been previously studied mainly by normative and case study approaches (IT Government Institute, 2003; Weill and Ross, 2004).

Calling on the ethics and organisational literature (Trevino et al., 1999; McCabe et al., 1996), this study is the first empirical study to examine the influence of ethics/culture of compliance in the context of IT governance. This finding contributes to IT governance literature evidence of the importance of ethics/culture of compliance in establishing effective IT governance.

5.2.2 Practical contributions

There are some practical conclusions from the study findings that can be applied in establishing and implementing IT governance effectively. The findings suggest that the most influential mechanisms for increasing the overall effectiveness of IT governance are the existence of an ethic and/or culture of compliance in IT and the support of corporate communication systems, such as a web portal, in disseminating information related to IT governance activities. Other mechanisms also proved to make a marginal impact on the overall effectiveness of IT governance, such as an IT strategy committee and the involvement of senior management in IT.

The study findings also reveal that for organisations that outsource their IT, the existence of an IT strategy committee and an IT steering committee were not significant in increasing the overall effectiveness of IT governance. This outcome is understandable, given that those organisations may perceive IT as a non-essential factor in their business.

5.2 Limitations and Recommendations for Future Study

This study also has some limitations that should be considered when interpreting its findings. The limitations also serve as references for performing future research.

First, this study used a relatively crude proxy for measuring IT intensity factor within each organisation. This approach was inevitable, given that asking respondents to give exact values of the four items (total PCs, total employment, total IT employment and the last year's IT budget) was deemed impractical and almost impossible. Future research should focus on establishing a more appropriate means of measuring the IT intensity factor. The approach used by Dehning et al. (2003) that asked some experts in IT to classify IT intensity level for certain type of industry, may result in a more reliable approach to a proxy for the IT intensity variable.

Finally, more reliable measures of the overall effectiveness of IT governance in an organisation also need to be developed, since subjective and indirect measures (based on auditor's perceptions) do not provide the same strength as direct objective measures would. This limitation was similar to that of an earlier study (Vaswani, 2003) and was deemed

unavoidable, as the type of research methodology used was a questionnaire approach, in the absence of objective measures.

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