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AN EMPIRICAL INVESTIGATION OF THE DRIVERS AND OUTCOMES OF INFORMATION TECHNOLOGY GOVERNANCE BY BOARDS OF DIRECTORS¹

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Abstract

This study examines the extent to which board of directors are providing 'governance oversight' of their organization's IT activities and whether their efforts are making any difference in terms of organizational performance. Building on contingency theory we theorize that the magnitude of IT oversight exercised by boards depends on an organization's particular IT situation and especially its need for (1) fast and reliable IT, and (2) new innovative IT. However, we also posit that the contingency approach may be suboptimal because it focuses only on current IT needs, and may ignore other potential competitive and defensive uses of IT. These future-looking considerations are in line with the resource-based view of the firm according to which IT is a key resource which, when utilized efficiently and effectively, can create a competitive advantage. Accordingly, we hypothesize that the magnitude of board-level IT oversight positively affects firm performance regardless of existing IT needs. Using structural equation modelling analysis applied to data collected from a sample of 146 directors, representing 146 Canadian firms we found support for all our hypotheses. Implications for research and practice are discussed.

Keywords: IT Governance, Board of directors, Contingency theory, Structural Equation Modelling

¹ Both authors contributed equally to this paper. Authorship for this paper is organized, by mutual agreement, in descending alphabetical order.

1 INTRODUCTION

To what extent are boards of directors currently providing ‘governance oversight’ of their organization’s IT activities and, if so, is it making any difference in terms of performance? Not so long ago, it was generally reported that boards of directors were reluctant to deal with IT issues; were passive receivers of IT information; and expressed little interest in their organization’s return on its IT investments (*Huff et al.*, 2004; 2005). This ‘IT indifference’ on the part of boards was happening despite the fact that some firms (principally in the financial services sector) were spending half their capital budgets on IT (*Ellis et al.*, 2000; *Huff et al.*, 2005). It has also proven to be a financially costly attitude (*Anthony et al.*, 2006; *Nolan and McFarlan*, 2005).

Since the passage of the Sarbanes-Oxley Act of 2002 (SOX), corporate boards have been increasingly challenged to provide more and better oversight – or supervision - of their organizations’ IT functions in order to reduce the risks facing their enterprises, but especially, the loss or embarrassment occurring from fraud, error or non-compliance (*Bowen et al.*, 2007; *Klamm and Watson*, 2009; *Nolan and McFarlan*, 2005; *Weill*, 2004; *Weill and Ross*, 2004). In Canada, the Canadian Securities Administrators (CSA) issued National Instrument 52-109 (“Certification of Disclosure in Issuers’ Annual and Interim Filings”), which is part of the CSA’s Investor Confidence Rules. It is fairly similar to the rules of SOX’s Section 404 – the latter of which requires the management of publicly listed companies to evaluate the effectiveness of their organization’s internal controls over financial reporting (including IT) and provide disclosure about their conclusions. Such regulations further push boards of directors to plan, assess and monitor the ability of their IT systems to comply with regulations.

In response, the boards of some organizations (e.g. FedEx, Hewlett-Packard, Home Depot, American Airlines, Wal-Mart) have created a board-level IT governance committee (or mandated another board committee e.g., audit and finance) with the responsibility to supervise and appraise IT operations. Others have approved the creation of a Chief Information Officer position (to increase *operational oversight* of IT) and then regularly request his/her attendance at board meetings. However, it is generally recognized today that the principle activity which boards need to perform in discharging their specific IT supervisory responsibilities is to ask pertinent, probing and thought-provoking questions of management (*CICA*, 2004; *ISO*, 2008; *IT Governance Institute*, 2003).

Realizing the importance of this issue, several recent papers have discussed the concept of IT governance⁽²⁾ – or ITG - its importance, and suggest a number of IT governance frameworks (e.g., *Nolan and McFarlan*, 2005; *Raghupathi*, 2007; *Weill and Ross*, 2004). However, beyond some anecdotal commentaries, there is no generally accepted overarching framework for ITG (*Raghupathi*, 2007). Little empirical research exists on the board’s actual involvement in IT governance (i.e., did companies actually shift IT emphasis from the “C-Level” to the boardroom?) *and, most importantly, whether their efforts are even worthwhile.*

This paper presents findings related to our examination of the IT governance role that Canadian board members from 146 organizations provide through the IT issues they discuss in the boardroom. We used the set of 27 board focused IT governance questions developed by the Canadian Institute of

² The IT Governance Institute (2003) states that “IT governance is the responsibility of the board of directors and executive management. It is an integral part of enterprise governance and consists of the leadership and organizational structures and processes that ensure that the organization’s IT sustains and extends the organization’s strategies and objectives.”

Chartered Accountants (CICA, 2004) and inquired about the extent to which the questions were actually asked. We were also interested in determining whether the ITG questions asked might depend on a firm's particular IT needs and, additionally, whether they influenced performance. This study therefore represents one of the first investigations into the extent involvement of boards of directors in information technology governance. It is also one of the few to compare actual board ITG practice within the context of a prescribed set of recommended IT governance questions.

The specific research questions we asked of our sample were as follows:

1. What is the magnitude of ITG oversight provided by a board of directors through the ITG questions they ask? More specifically, to what extent have boards of directors asked the 27 ITG questions recommended by the CICA?
2. Is the magnitude of ITG questions asked by a board "contingent" on the way their organization uses IT?
3. Does the magnitude of a board's ITG questions have merit i.e. influence performance?

Finding answers to the first two questions will help boards determine to what extent the 27 questions recommended by the CICA are being used. Moreover, it will help inform boards regarding the way others are dispensing their IT governance oversight responsibilities and help them assess whether they are ahead of the pack, behind the pack, or running with the majority. The third question is particularly important because many directors lack the knowledge to discuss IT issues (Huff *et al.*, 2004; Nolan and McFarlan, 2005) and consequently are afraid 'to raise IT issues at meetings for fear of embarrassing themselves in front of their peers.' (Huff *et al.*, 2004, p. 4). Furthermore, busy boards of directors want to channel their efforts in areas where they perceive a payoff to the organization and themselves. Knowing that the questions can make a difference in terms of an organization's performance, therefore, can give directors the courage or incentive they need to speak up and allocate board time to discuss IT matters. It will give much needed knowledge into some of the board oversight practices of successful enterprises. Additionally, it will both validate the future use of the questions and prove that the expansion of IT governance from the executive team to include the board of directors is not just hype.

2 THEORY

This study builds primarily on Contingency Theory (Fiedler, 1964) and the Resource Based View of the firm (Hart, 1995; Schroeder *et al.*, 2002). Contingency theory suggests that there is no optimal configuration, leadership and control structure that fits all companies and that choosing the optimal configuration, leadership or control structure (1) depends on the environment of the company, and (2) influences the company's performance (Fiedler, 1964; Schoonhoven, 1981; Zeithaml *et al.*, 1988). While this theory has been used in management research (e.g., Hollenbeck *et al.*, 2002; Otley, 1980) and information system research (e.g., Austin and Devin, 2009; Lee *et al.*, 2004), it has not yet been applied to IT governance. In this study, we posit that Contingency Theory applies and that, depending on a firm's particular current IT circumstances or needs, a board of directors will exercise *varying levels of oversight* over their firms' current IT activities.

However, the Resource Based View of the firm argues that it is the efficient and effective use of firm resources, including IT, that leads to a sustainable competitive advantage (Barney, 2001; Peteraf, 1993). The proper deployment of IT resources, therefore, is imperative because IT resources have attributes (e.g., value, rarity) that are instrumental to advantage creation and also prevent imitation - thereby sustaining the advantage created (Wade and Hulland, 2004). Accordingly, in this study we also posit that high levels of ITG oversight by boards of directors (regardless of a firm's current IT circumstances) is the effective way of supervising management's use of IT resources, and as such, it should translate into stronger firm performance.

2.1 Drivers of IT Governance by the Board

Several conceptual papers suggest that boards should employ a contingency plan when it comes to the way they exercise their ITG. After all, not all firms are alike, and some boards, at least in theory, should put more emphasis on IT issues than others. For example, it would make sense that eBay.com emphasize IT in the boardroom to a greater extent than, say, a knitting factory. Why? It has to do with the way organizations use their IT and their needs for different systems. This notion is aligned with contingency theory (*Fiedler, 1964*) according to which there is no one optimal way to organize, lead and control, and the different ways to do this are not equally effective (*Schoonhoven, 1981; Zeithaml et al., 1988*). IT therefore requires organizations to assess their particular situations and find their optimal magnitudes of ITG oversight.

This proposition was confirmed in one small study which compared board ITG practices between eight firms from the financial services sector and nine from the primary resources sector (*Huff et al., 2004*). The researchers expected – and found - that the boards of financial services firms exercised greater IT oversight due to the information intensity of their industry. In contrast, the boards of the primary resources companies “seldom, if ever, discuss IT, even though many of them have large IS departments and significant IT capital investments” (*Huff et al., 2004, p.2*). They further explained that for these latter firms “if IT collapsed, the inconvenience might be great, but basic operations (e.g., digging coal out of the ground) would continue” (*Huff et al., 2004, p.2*).

Recently, some researchers (6) have advanced the notion that companies can be categorized into four ‘IT usage modes’, based on two criteria: (1) their need for new, cutting-edge technologies to gain competitive advantage (‘high need/offensive use’ versus ‘low need/defensive use’), and (2) their need for fast and reliable information technologies (high need versus low need). The four resultant IT usage modes (i.e. factory, strategic, support and turnaround) are depicted in Figure 1 as well as the 14 indicators for determining a firm’s mode classification. (Note: Some of the individual indicators are used to help classify more than one mode.)

Companies in the ‘turnaround mode’ do not need fast, reliable IT systems and so there is less concern regarding a major system failure. Such companies, though, will still attempt to use innovative, less tested technologies ‘offensively’ to help them implement major transformations, reduce costs and generally close gaps with competitors. In contrast, companies in the strategic mode heavily rely upon both expensive state-of-the-art IT for producing significant strategic gains (e.g., tapping into new markets) and quick, highly reliable systems (which typically require stronger IT security, stability and backup than those in the turnaround mode). When companies do not need such revolutionary technologies to thrive strategically but nevertheless require rapid response and reliable IT to carry out major operations (e.g. an automated auto assembly line) their IT usage is more ‘defensive’ in nature and they are categorized as “factory mode”.

Finally, ‘support mode’ companies are those in which both the need for IT response swiftness and reliability is low and there is a low need for new state-of-the-art technologies to stay in business (i.e. IT is used only for defensive purposes).

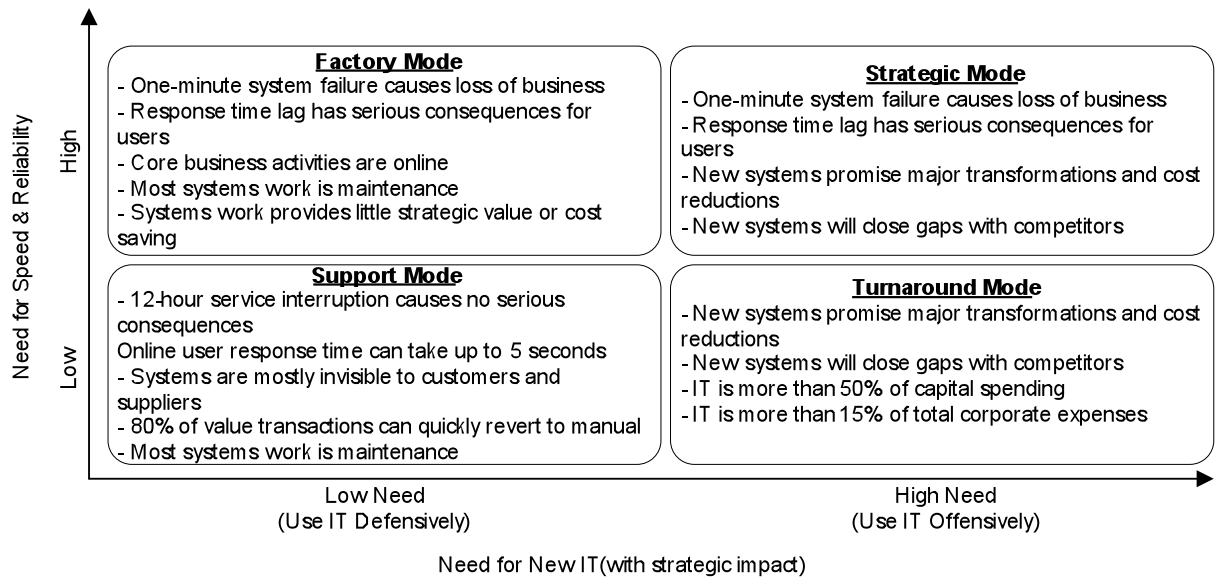


Figure 1: The Four IT Usage Modes and their Mode Classification Indicators (adapted from Nolan and McFarlan, 2005)

It is hypothesized that the differences in both “the need for new IT” and “the need for reliable IT” should also translate into different board ITG mindsets and, accordingly, the magnitude of oversight they will provide on IT issues (6). In other words, both the nature and quantity of ITG questions raised by directors will vary with – or be contingent upon – an organization’s relative need for new and/or reliable IT. For example, it would be logical to expect that the greater the need either for innovative (and potentially strategic) IT or for fast and reliable systems, the greater the magnitude of ITG oversight that would be exercised by a board. The opposite would be true for those boards representing firms with a low need for either strategic or reliable systems – or both. In line with the premises of contingency theory (Fiedler, 1964), the conceptual frameworks mentioned above (e.g., Nolan and McFarlan, 2005), and evidence from ITG practice (Huff et al., 2004) we suggest the following hypotheses:

H1a: The greater an organization’s need for new IT (i.e., using IT ‘offensively’), the greater the magnitude of ITG oversight provided by the board of directors.

H1b: The greater an organization’s need for fast and reliable IT, the greater the magnitude of ITG oversight provided by the board of directors.

2.2 Outcomes of Board IT Governance

Several publications have provided prescriptive guidelines regarding the number and type of ITG questions board member should raise to assess their current IT situation and to provide effective ITG oversight (CICA, 2004; ISO, 2008; IT Governance Institute, 2003; Nolan and McFarlan, 2005). The questions can be classified into four categories: (1) efficient management and use of IT, (2) risk assessment and mitigation, (3) strategic use of new IT, and (4) internal control and auditing of IT.

Using the categories mentioned above, it is easy to understand why more extensive board IT governance should lead to stronger organizational performance i.e., boards of directors that take their ITG oversight responsibilities seriously and, in so doing, cast a wide net around IT issues will steer their organizations toward more efficient and effective use of IT resources. They will be better able to determine if their management is deploying their organization’s IT both efficiently and more effectively relative to the competition. They will be able to assess whether management is regularly

evaluating the use of new IT (or new uses of existing IT) rather than simply accepting the existing IT status quo. They will also be in a better position to assess the risk-reward tradeoffs on any major IT issue. Notwithstanding the contingency theory argument that IT governance questions should vary with an organization's IT needs, it seems equally reasonable to hypothesize that the more ITG oversight a board provides through the questions they ask, the higher a firm's financial performance – especially in relation to industry peers.

This notion is in line with the 'resource based view of the firm' but, here focusing specifically IT resources. This theory argues that the ultimate expected outcome of efficient and effective utilization and management of resources is competitive advantage and superior performance (Hart, 1995). Information technologies are a key resource that can help firms, when properly managed, to form and sustain superior performance (Kearns and Lederer, 2003; Wade and Hulland, 2004; Wade and Gravill, 2003). To capture performance this study focuses on a 'director's satisfaction with firm performance', his or her beliefs regarding 'the level of satisfaction of the board of directors as a whole with firm performance', and the 'relative performance standing of the firm within its industry'. As opposed to hard growth figures and financial ratios, these are measures that are easy to elicit from directors, and that capture an assessment of the 'relative performance' of the company within its peer group. We therefore hypothesize:

H2a-c: The greater the magnitude of ITG oversight provided by a board of directors, the greater a firm's performance as captured by (a) the board's satisfaction with the organization's performance (b) the responding director's satisfaction with the organization's performance, and (c) the firm's relative standing within its industry.

3 THE FIELD STUDY

To test the relationships among (a) the way various organizations use IT, (b) the corresponding ITG oversight questions posed by their boards of directors, and (c) the firms' associated relative financial performance, a paper-based survey was administered to 215 board members who attended a corporate director governance training program in Canada. Out of them, 146 board members representing 146 Canadian firms completed the survey (response rate of about 68%).

Data collected on each organization included its sales (in Millions of CAD \$), number of employees, and the type of orientation (i.e. for-profit or not-for-profit). These variables were used as controls in the proposed model. As measures of performance, respondents were asked to indicate:

- their board's and their own satisfaction with their organization's current financial performance, using a ten point Likert scale (1 = Not at all satisfied; 10 = Extremely satisfied); and
- the "relative performance standing" of the organization in its particular industry, again using a ten point Likert scale (1 = Significantly below; 10 = Significantly above);

To assess each organization's need (i.e., "high" versus "low") for new and fast/reliable IT, respondents were queried - using a seven point Likert scale (1 = strongly disagree; 7 = strongly agree) - on their level of agreement with the 14 questions depicted in Figure 1 (Nolan and McFarlan, 2005). For each respondent, the 'average level of agreement' reported for the questions indicating 'high need for new IT' (i.e., the questions in the right column in Figure 1) was calculated and compared with the average level of agreement reported for the questions indicating 'low need for IT' (i.e., the questions in the left column of Figure 1). Using this comparison, firms were classified (based on the highest column score) as having either a low or high need for new IT. A binary variable corresponding with this classification was created (i.e., Low need for new IT = 0; High need for new IT = 1). A similar comparison between the 'average level of agreement' calculated for the questions in the top and bottom rows of Figure 1 was used for generating a dummy variable to capture each company's need for fast, reliable IT (i.e., Low need = 0; High need = 1). The frequencies of these variables in the sample are presented in Table 1.

Finally, to assess the magnitude of their IT governance oversight, respondents were asked to indicate whether their boards of directors raised a list of 27 ITG questions that were recommended by the Canadian Institute of Chartered Accountants (CICA) to help corporate directors with their ITG duties (CICA, 2004). The reported total of the ITG questions raised was used as a proxy for the degree of ITG oversight provided by each board. It is acknowledged that this measure captures only ITG oversight breadth and not depth (e.g., the ‘amount of time’ or ‘number of meetings’ devoted to IT issues in the boardroom), but the latter is difficult to quantify. Furthermore, it is reasonable to assume that the breadth of ITG oversight is at least somewhat correlated with the length of any ITG discussion.

Using these data, Table 1 presents descriptive statistics regarding the participating organizations:

		Mean	Std. Deviation
Not-for-Profit (N=105, 72%)	Sales (Millions of \$)	800.06	1487.51
	Number of employees	2721.60	9111.33
	Board's satisfaction with the organization's current financial performance	6.96	1.87
	Own satisfaction with the organization's current financial performance	6.53	2.14
	Relative performance standing of the organization in its industry	7.49	1.60
	Number of IT-related questions/ issues the board has considered/ discussed	11.79	6.87
	Frequencies IT conditions: High need for new IT = 58 Low need for new IT = 47		High need for reliable IT = 53 Low need for reliable IT = 52
For Profit (N=41, 28%)	Sales (Millions of \$)	506.85	1439.89
	Number of employees	689.51	1033.70
	Board's satisfaction with the organization's current financial performance	6.44	2.15
	Own satisfaction with the organization's current financial performance	6.22	2.25
	Relative performance standing of the organization in its industry	7.08	2.08
	Number of IT-related questions/ issues the board has considered/ discussed	11.38	7.58
	Frequencies IT conditions: High need for new IT = 19 Low need for new IT = 22		High need for reliable IT = 23 Low need for reliable IT = 18
Total (N=146)	Sales (Millions of \$)	717.72	1475.28
	Number of employees	2150.94	7789.56
	Board's satisfaction with the organization's current financial performance	6.81	1.96
	Own satisfaction with the organization's current financial performance	6.44	2.17
	Relative performance standing of the organization in its industry	7.37	1.75
	Number of IT-related questions/ issues the board has considered/ discussed	11.68	7.06
	Frequencies IT conditions: High need for new IT = 80 Low need for new IT = 66		High need for reliable IT = 76 Low need for reliable IT = 70

Table 1: Descriptive Statistics for the Sample of Organizations

4 FINDINGS

In answer to the first research question, the median number of questions raised by the boards in the sample was 17 (or 63% of the total questions). Only one firm (representing 0.7% of the sample) was reported as raising all 27 IT-issues in the boardroom; and no ITG questions were asked in 10 (6.8%) of the sample firms. The mean, median and mode number of questions asked were 11.7, 11.0, and 9.0 respectively. It is therefore concluded that the magnitude of ITG oversight provided by the boards in our sample was fairly prevalent and moderately exercised, but also to a varying extent.

To answer the second and third research questions, a model of IT governance (based on the ITG ‘drivers’ and ‘outcomes’ previously discussed) was tested with the structural equation modelling facilities of AMOS 18. Initially, the model included three common corporate governance control variables, namely sales (\$M), number of employees (EMPEE), and whether the organization is for-profit or not-for-profit was estimated (TYPE). While the data fit the model well ($\chi^2(6) = 1.76$ (non significant, $p < 0.94$), CFI=1.0, RMSEA=0.00 with p-close = 0.98, and SRMR = 0.01)³, the EMPEE and TYPE variables did not significantly affect the model and were removed from further analyses. Sales significantly influenced the magnitude of ITG oversight and it was therefore retained. The final model, the implied standardized path coefficients, their levels of significance, and the variables’ Squared Multiple Correlations (SMC = the variation in a variable that is explained by its predictors) are depicted in Figure 2. The data fit this model well ($\chi^2(9) = 2.58$ (non significant, $p < 0.98$), CFI=1.0, RMSEA=0.00 with p-close = 0.99, and SRMR = 0.02) and together provided support to the theory we put forth.

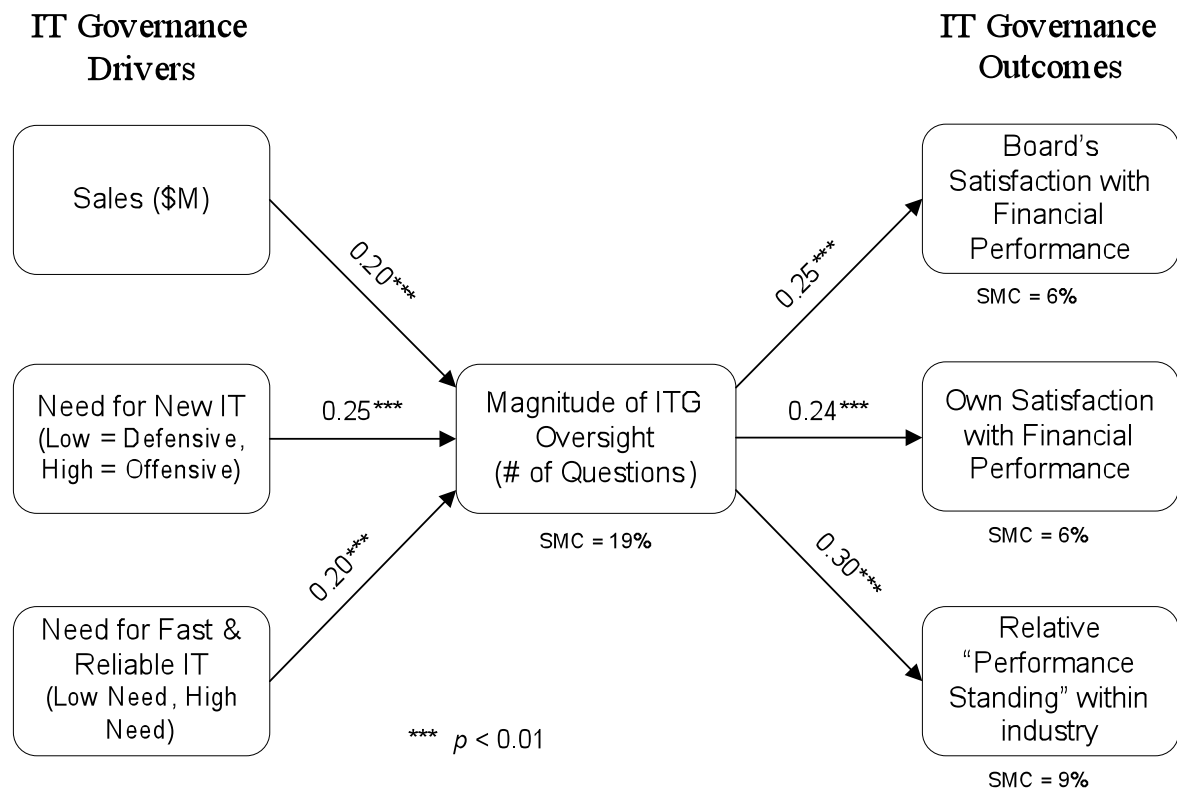


Figure 2: A model of drivers and outcomes of ITG oversight by the board of directors

This model implies, in line with our expectations, that directors employ a contingency approach when dispensing ITG oversight for their particular organizations. Specifically, the more that companies need newer IT (presumably for strategically offensive manoeuvring in their competitive marketplace) and/or need quick, reliable IT to manage their operations, the greater the magnitude of ITG oversight (i.e. number of ITG questions) provided by directors in their board meetings. Boards of companies with higher sales also raise more IT questions possibly because they have more at stake

³ These are fit indices that assess the ability of the model to reproduce the covariance structure implied by the data. The χ^2 statistics is expected to be non significant. CFI = Comparative Fit Index (values over 0.95 are considered adequate). RMSEA = Root Mean Square Error of Approximation (values below 0.05 are adequate; p-values for this statistic of over 0.05 indicate that the model is likely to have RMSEA below 0.05 and that the data therefore fits the model well). SRMR = Standardized Root Mean Square Residual (values below 0.08 are considered adequate)

i.e., they face higher losses if their organization's IT systems fail and they have potentially higher revenues if IT is efficiently used. Together these three variables explain 19% of the variation in the magnitude of ITG oversight. The remaining 81% of the variation in the magnitude of ITG oversight may be explained by other variables, such as the board's level of comfort with IT issues. Such new predictors should be explored in future studies.

The magnitude of ITG oversight by the board also increased all three of our relative performance measures. This would indicate that ITG oversight by the board is valuable and appears to translate into relatively strong financial performance. The fact that, depending on the measure, 6% to 9% of the variation in firm performance was explained by the magnitude of board level ITG oversight is impressive because there are so many other variables (e.g., CEO competency, market forces, etc.) that can influence it. We therefore concluded that broad, strong oversight of a firm's IT by its board of directors is a worthwhile activity and that having board members ask more ITG questions (rather than less) appears to be rewarded with higher firm performance.

5 DISCUSSION AND CONCLUSIONS

A firm's increasing reliance on newer, faster and more reliable IT has increased the potential gains (and losses) associated with IT, and consequently, it has pushed boards of directors to often step out of their comfort zone and start dealing with IT issues. Without such oversight, board may fail to adequately serve the interests of their corporations in general and their shareholders in particular. Our findings demonstrate that, indeed, the vast majority of Canadian boards represented in our sample routinely raised almost two thirds of the 27 ITG questions recommended by the CICA. But, what about those boards that did not? One reason might be because many board members are simply not aware of the relevant IT questions they should ask. Another might be that often times directors simply feel uncomfortable (or inadequate) discussing the topic (*Huff et al.*, 2004). ITG training in director schools and in Executive MBA programs, therefore, could correct this by emphasizing the IT issues to be "probed" by a board and by stressing the importance of ITG oversight as part of a director's fiduciary duty. Accounting and corporate governance bodies could further the IT issues to be discussed by the board by updating, for example, the CICA guidelines (*CICA*, 2004).

Our findings also demonstrate that, in line with the conventional wisdom, common prescriptive guidelines (e.g., *Nolan and McFarlan*, 2005), and contingency theory (*Fiedler*, 1964), boards of directors appear to employ a contingency approach when discussing their organization's IT. Depending on their organizations' need for innovative and/or reliable IT, boards adjust their IT governance oversight accordingly. Companies with lower needs along these two dimensions have boards of directors who tend to raise, on average, less IT questions than those companies with higher needs. But is this practice advantageous? Does it lead to the optimal structure and control mechanism prescribed by contingency theory?

What is interesting in this particular study is the right side of our ITG model in Figure 2. While directors, for the most part, are encouraged to behave based on prescribed contingency guidelines (i.e., the left side of the model), our findings demonstrate that regardless of the circumstances, the more IT questions a board raises, the better their organizations perform. This supports the resource based view of the firm and the strategic importance of IT resources (*Wade and Hulland*, 2004). Our findings, therefore, suggest that a contingency approach to IT governance, while a recommended theoretical practice, is not necessarily an optimal one. Accordingly, better boards systematically inquire into as many of the ITG oversight questions prescribed by the CICA (*CICA*, 2004) as possible because, in so doing, they help contribute to the creation and sustainability of competitive advantage through IT (*Peteraf*, 1993; *Ray et al.*, 2004).

So, what might explain these findings? As we hypothesized earlier, casting a wider net of ITG oversight can help companies mitigate IT risks, use IT more efficiently, and generate greater strategic gains with IT, regardless of their IT situations. These elements also translate into higher relative

financial performance. Thus, even companies that have a low need for state-of-the-art and/or reliable IT can benefit from high levels of ITG oversight because it can help them (a) see the possibilities and advantages from using newer, faster, and more reliable IT, (b) become more competitively aggressive and (c) harvest a larger share of sales in their respective industries (e.g., even a knitting factory can benefit from broader ITG oversight). While some have argued that the strategic importance of IT has diminished, and that perhaps IT does not even matter anymore (*Carr, 2003*), this study proves otherwise. Broad, informed board governance oversight of IT can help firms excel!

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