

Competitive Advantage from Mandatory Investments: An Empirical Study of Australian Firms

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Abstract

Mandatory information system (IS) investments occur when government regulations require firms to alter their IS. These investments are additional expenditures added onto the initial expenditures of non-mandatory IS investments. Managers are concerned about associated costs and in an attempt to reduce the expenditures, most firms refrain from formal planning methods when mandatory investments are imposed upon them. Drawing on Henderson's and Sifonis' (1988) IS Planning and Investment Model as our theoretical lens, this paper argues that firms should re-consider this practice. It is hypothesised that formal planning methods are beneficial because they enable firms to combine mandatory and non-mandatory investments in such a way that competitive advantage can be achieved.

We use a secondary dataset provided by the Australian government to test the hypotheses. Results show that only two out of three investigated formal planning methods are positively associated with competitive advantage. We conclude that in the special case of mandatory investments, formal methods are only beneficial if they incorporate information from the entire firm, rather than information from particular departments only.

Keywords: Strategic IS Planning, Competitive Advantage, IT Investments, Regulatory Compliance.

1 Introduction

In a global economy, firms need to comply with a wide range of national and international government regulations that have implications for their information system (IS) (Braganza and Franken, 2007; Williams, 1994). For example, firms in various countries have recently been affected by new auditing regulations based on the Sarbanes-Oxley Act (SOX) (Marnet, 2007). Many firms needed to increase IS security to achieve SOX compliance, for example by updating wireless networks to prevent unauthorised access (Sipior and Ward, 2007). Because SOX compliance is legally required, related investments are mandatory. It is estimated that firms spend up to 15% of their IS budgets on regulatory compliance (Gartner, 2006).

Recent surveys show that managers are increasingly concerned about the high costs associated with mandatory IS investments (Gartner, 2008a). They expect that these investments do not pay off because they are not part of the firm strategy (Strassmann, 1996). Firms cannot freely decide if, when, and in which technology they invest (Garcia, 2004); rather, such decisions are determined by government regulations which, by nature, are composed externally and without special consideration of a firm's particular situation (Hall and Liedka, 2007). Mandatory investments are therefore more difficult to align with a firm's strategy than other IS investments (Hu et al., 2007; Haworth and Pietron, 2006).

Misalignments between investment and strategy are particularly problematic for firms that pursue a low-cost strategy. These firms create competitive advantage by producing products and services at lower costs than competitors. Throughout industries and countries, many low-cost firms suffer from shrinking margins (Tallon et al., 2007). IS expenditures that do not lead to cost reductions further aggravate the financial situation of these firms. Low-cost firms cannot afford 'wasting' money on IS that do not contribute to their strategy (Mata et al., 1995).

In an attempt to reduce efforts for mandatory investments, low-cost firms combine these investments with non-mandatory investments (Pula et al., 2003). Despite the importance of creating competitive advantage from IS investments that have a mandatory part, IT managers are unsure how to respond when confronted with mandatory investment decisions (Gartner, 2008a), and prior research offers few insights that could assist managers in this situation. As a result, many low-cost firms are unable to combine mandatory investments with their non-mandatory IS investments in such a way that competitive advantage is achieved (Gartner, 2006).

This research addresses the gap by investigating how low-cost firms can achieve competitive advantage from IS investments that include a mandatory part. We argue that strategic IS planning (SISP) affects the creation of competitive advantage. SISP is defined as the process of identifying opportunities to use IS investments for strategic purposes and developing action plans to implement these opportunities (Newkirk et al., 2003). Two major SISP approaches exist: formal SISP and intuitive SISP (Lederer and Salmela, 1996). Formal SISP is based on formal planning methods and often involves senior managers (Salmela et al., 2000). Intuitive SISP relies on informal strategic decisions that are based on personal experiences of IT managers and IT operational staff (Sambamurthy et al., 1994). Experiences from practice show that low-cost firms prefer intuitive SISP (Garcia, 2004) because it consumes fewer resources (Newkirk et al., 2003; Segars and Grover, 1998). Hence, research and practice have perceived intuitive SISP more adequate for low-cost firms. In this paper, we challenge this argument and propose that formal SISP is more adequate in low-cost firms when mandatory investments occur. We expect that formal SISP methods enable low-cost firms to combine mandatory and non-mandatory investments in a way that is adequate for their business strategy and results in competitive advantage.

Additionally, this paper investigates how the dominance of regulatory pressure as an investment reason affects competitive advantage. The dominance of this investment reason varies because some firms combine mandatory investments with major long-planned IS

investments (Pula et al., 2003), while others integrate them only with minor investments (Hu et al., 2007). If government regulations are a dominant investment reason, IS investments contain a large mandatory part. Hence, such investments are strongly affected by externally defined timing and technology specifications that make it more difficult to use investments for strategic benefits. It is therefore reasonable to assume that the dominance of government regulations as an investment reason has a negative impact on competitive advantage, however little supporting empirical evidence exists.

This paper aims to demonstrate that if mandatory IS investments are imposed upon low-cost firms, competitive advantage is achieved (1) through reducing the dominance of government regulations as an investment reason and (2) through using formal SISP methods. We examine a sample of 142 Australian firms that recently experienced mandatory IS investments to test our hypotheses. Data was taken from on a secondary dataset provided by the Australian Department of Communication, Information Technology and the Arts (DCITA).

The remainder of this paper is organised as follows. Next, we outline the theoretical foundation of this research and develop the hypotheses. After that, the methodology is described and results are discussed. Finally, conclusions are presented.

2 Competitive Advantage from mandatory Information System Investments

2.1 Competitive Strategies

Strategy is defined as “the determination of the basic long term goals of an enterprise and the adoption of actions and the allocation of resources necessary for carrying out these goals” (Chandler, 1962; p. 13). The long term goal of firms in competitive markets is improving or defending their competitive position and gaining advantages over competitors (Barney, 2002; p. 7). Much has been written about how firms can develop successful competitive strategies and achieve competitive advantage.

Prominent approaches on competitive advantage include the Porter's strategy model (Porter, 1985), the Miles and Snow typology of firms (Miles and Snow, 1978), the resource based view (Penrose, 1959; Wernerfelt, 1984; Barney, 1991), the dynamic capabilities approach (Helfat and Peteraf, 2003), and the core competency theory (Prahalad and Hamel, 1990).

Porter's strategy model stands out among these approaches because of its strong focus on the activities of a firm. According to Porter, "the essence of strategy is in the activities" which are the key to perform differently than competitors (Porter, 1996; p. 64). In the information age, most activities are facilitated by IS and Porter's model provides insights into the contribution of IS to competitive advantage (Slaughter et al., 2006). Therefore, we build on Porter's strategy model (Porter, 1985). Note that in this research the firm is the unit of analysis.

Porter's model identifies three major competitive strategies: cost-leadership, differentiation, and focus. Firms that follow the cost-leadership strategy concentrate in their activities on operating at lower costs than competitors. Due to the cost advantage, firms are able to offer products and services at lower prices, thereby attracting more customers and gaining higher returns. By contrast, firms that follow the differentiation strategy distinguish themselves by certain attributes of their products and services. They select one or more differentiation attributes that buyers perceive as important and direct their activities at providing these attributes. Differentiation attributes vary in different markets and industries. Examples of differentiation attributes include product quality and functional product characteristics. Finally, firms that follow the focus strategy concentrate on one particular segment of a market. This target segment must have buyers with unusual needs. By optimising activities for a target segment, firms seek to outperform competitors in this particular segment (Porter, 1985).

Much research has been conducted into the relation between competitive strategy and firm performance. Most studies conclude that out of Porter's three strategies, the cost-leadership strategy is least successful and needs to be complemented with other strategies like

differentiation to be truly effective (Robinsons and Pearce, 1988; White, 1986). Firms that pursue a cost-leadership strategy tend to engage in activities of standardisation and mass production that can easily be imitated. Further, customers of these firms are price-sensitive with low levels of brand loyalty. Cost-leadership firms are therefore permanently threatened by new market entrants and price wars (Porter, 1985).

To secure long-term survival, most firms have moved away from the cost-leadership strategy towards a low-cost strategy. The difference between the two strategies is that the low-cost strategy does not aim for absolute cost-leadership. While low costs and prices remain the major competitive element in the low-cost strategy, differentiation and niche elements are used to gain new customers and increase customer loyalty (Tallon, 2007). For example, most low-cost airlines have introduced frequent flyer programs to differentiate themselves from competitors and increase customer loyalty in times of increased competition in the market. Many firms have experienced that once they had moved away from the cost-leadership strategy towards a low-cost strategy, they had difficulties to clearly define their strategic goals (Dess and Davis, 1984; Robinson and Pearce, 1986). The lack of clear goals resulted in frequent changes to operating models and confusion among owners and managers (Treacy and Wiersema, 1995). As a consequence, these firms continue to struggle and perform worse than competitors that follow a pure differentiation or niche strategy (Tallon, 2007).

The question if the application of IS can help low-cost firms improve performance has attracted much interest in prior research (Min et al., 1999). It could be argued that IS are appropriate to support activities associated with a low-cost strategy, such as standardisation and mass production (Melville, 2004). Therefore, one would expect that IS should improve the performance of low-cost firms, but actually, early studies found a negative relationship between IS and firm performance (Baily, 1986; Roach, 1987; Morrison and Berndt, 1991). This phenomenon became known as the productivity paradox of IS (Brynjolfsson, 2003). The paradox was mainly resolved during the 1980s and 1990s (Henderson and Sifonis, 1988) when researchers started to shift their focus away from the market level and towards the firm

level (Devaraj and Kohli, 2003). This shift enabled the consideration of firms' individual circumstances and resulted in a range of studies showing positive relationship between firm performance and IS (Melville et al., 2004; Piccoli and Ives, 2005).

2.2 Strategic Information Systems Planning

Once the productivity paradox had been resolved, researchers began to examine how firms can align IS with their competitive strategies (Brynjolfsson and Hitt, 1996). The new interest in the strategic implications of IS underlined the importance of SISP. This planning approach had already existed before the productivity paradox was resolved, but many firms had hesitated to apply it. As empirical evidence seemed to suggest a negative relationship between IS and firm performance the purpose in SISP was questioned (Tallon, 2007). The resolution of the productivity paradox triggered practitioners' interests and made SISP a common practice in firms.

SISP is the process of identifying opportunities to use IS as a means to achieve strategic firm goals (Grover and Segars, 2005), and to develop action plans to implement these opportunities (Newkirk et al., 2003; Segars and Grover, 1998). In the course of the SISP process, a firm decides how existing systems can be utilised and which other systems and/or system components need to be acquired (Mohdzain and Ward, 2007). The outcome of SISP is an IS portfolio that assists a firm to achieve its goals (Lederer and Sethi, 1988). In the early stages of the information age, when technology components were expensive and IS were mainly used to improve clerical and administrative tasks through batch processing and automation (Mohdzain and Ward, 2007), SISP was dominated by the goal to reduce administrative costs (Nolan, 1979; Zachman, 1982). Later, when technology costs decreased and new IS applications were developed, firms started to investigate how IS could decrease production costs and increase efficiencies (Selig, 1982). When finally the positive relation between IS and firm performance became evident, SISP goals were extended to increased business performance and competitive advantage (King, 1983; Henderson and Sifonis, 1988; Das et al.,

1991; Earl, 1993; Segars and Grover, 1998; Smits and van der Poel, 1996; Kearns and Lederer, 2004).

Various theoretical approaches to SISP exist (Earl, 1993; Segars and Grover, 1998; Salmela et al., 2000) but in this research, we build on Henderson's and Sifonis' IS Planning and Investment Model (Henderson and Sifonis, 1988) to conceptualise how firms align IS and competitive strategy. The model illustrated in Figure 1 shows how SISP connects the strategy of a firm with its IS investments. The outcome of the SISP process is an investment decision that once implemented results in competitive advantage through its alignment with the firm's business strategy (Henderson and Sifonis, 1988).

[Insert Figure 1 around here]

Henderson's and Sifonis' model was chosen as the theoretical foundation of this research because in contrast to other SISP models, it is compatible with Porter's (1985) model of competitive strategies through the focus on firm activities. As mentioned above, Porter outlined that firms achieve competitive advantage by selecting activities which correspond with the business strategy. Henderson's and Sifonis' model illustrates how a firm's SISP and investment activities are matched with the firm's business strategy. Other theoretical models on the relationship between SISP and competitive advantage are less adequate because they miss this strategy - activity match (Earl, 1993; King, 1983; Segars et al., 1998).

2.3 Mandatory IS Investments

Mandatory IS investments are investments which are imposed upon firms by external sources such as governmental agencies or powerful customers (Fitzgerald, 1998; Willcocks and Lester, 1996). This research focuses only on mandatory IS investments imposed by governmental agencies. In recent years, more and more government regulations have had implications for IS and the pressure to alter IS to achieve regulatory compliance is constantly increasing. For example, the Health Insurance Portability and Accountability Act (HIPAA) in the US and various information privacy regulations in Canada and the European Union

required firms to improve information security standards to avoid data misuse (Matsuura, 2004). The Basel II capital regulations forced European banks to update database systems to prevent data losses (Garcia, 2004). The Sarbanes-Oxley Act (SOX), a set of auditing regulations introduced as a reaction to the Enron bankruptcy scandal in the US, also forced firms to improve their IS to ensure high levels of information security (Haworth and Pietron, 2006). In most cases, firms cannot achieve regulatory compliance through one particular investment; rather, several investments are necessary (Garcia, 2004). A mandatory IS investment is therefore not a one-time discrete event, it is a series of IS investments that are all triggered by a government regulation (Hu et al., 2007).

In an attempt to reduce costs, firms combine mandatory IS investments with other non-mandatory investments. For example, Pula et al. (2003) describe how firms use data warehouse projects that were originally initiated for purposes other than compliance to achieve compliance with anti money-laundering regulations. Further, Hu et al. (2007) report how firms combine SOX compliance investments with non-regulatory IS security investments.

Recent surveys show that low-cost firms are increasingly concerned about the high costs associated with regulatory compliance (Gartner, 2006). Managers perceive the mandatory part of IS investments as an additional cost factor that does not contribute to firm performance and threatens competitive advantage (Strassmann, 1996). The Henderson's and Sifonis' IS Planning and Investment offers an explanation why mandatory investments are perceived as a threat. According to the model, an IS investment is the result of a three step routine: First, a firm defines its business strategy; second, the firm uses SISP to determine necessary IS; and third, the firm finally invests (Henderson and Sifonis, 1988). Hence, any IS investment decision is the subsequent outcome of the firm's SISP. Mandatory IS investments disrupt the routine described in Henderson's and Sifonis' model. As shown in Figure 2, the first two steps of the routine are bypassed because the investment is directly triggered by the regulation and not by business needs (Ghandforoush et al., 1999).

[Insert Figure 2 around here]

The interruption of the routine described in Henderson's and Sifonis' model has an important implication: because the investments contains a mandatory part, certain investment characteristics are not determined by the firm's SISP, but rather by government regulations.

The first characteristic is the mere decision to invest. Normally, a firm makes an IS investment decision based on its business strategy, the carried out SISP activities, and invests only if the investment supports the strategy. For example, a firm that follows a low-cost strategy can decide not to invest because the investment leads to additional costs that are not mitigated by any benefits expected from the investment. In the case of mandatory investments, the firm does not have this choice. To ensure compliance, the firm is forced to invest regardless of any existing business strategy (Braganza and Franken, 2007).

The second characteristic is the investment timing. The timing of non-mandatory investments is determined by a firm's strategy. For example, a low-cost firm can decide to postpone investments during a time of price wars to be able to further decrease prices. However, in the case of mandatory investments, the firm is not completely free to time the investment because government regulations define compliance dates, i.e. deadlines for compliance (Haworth and Pietron, 2006).

The third characteristic relates to the implemented technology. The technology required for compliance can be different from the technology preferred by the firm. Low-cost firms often experience that government regulations require them to implement technology which they would otherwise not have adopted in order to save costs (Garcia, 2004).

The investment characteristics enforced by the regulation make it difficult for firms to use IS investments that contain a mandatory part for strategic purposes. Low-cost firms struggle to use these investments to reduce costs (Ariff et al., 1997) which is particular problematic because these firms are already struggling with shrinking margins (Tallon, 2007).

The dominance of government regulations as an investment reason impacts on the investment decision, the timing, and the technology implemented. This impact is reduced if other investment reasons emerge. For example, some firms comply with a regulation long before the compliance date because they use a non-mandatory investment which was already planned before the regulation was enacted to achieve compliance. The lower the dominance of government regulations as an investment reason, the smaller is the mismatch between investment characteristics and business strategy.

Further insights about multiple reasons behind IS investments can be derived from the resource-based view of the firm. The resource-based view proposes that competitive advantage is based on heterogeneity, i.e. firms achieve competitive advantage if their resources are different from those of competitors (Barney, 1991). As discussed above, if a government regulation is the only investment reason it will determine the investment characteristics, for example the technology. In the presence of other reasons such as business needs, the technology is not exclusively determined by the regulation; rather, it is influenced by the business needs. Hence, the implemented technology will be less similar to the technology that competitors implement. According to the resource-based view, this heterogeneity of technology results in competitive advantage (Barney, 1991). Based on the arguments presented here, it is hypothesised

(H1) The lower the dominance of government regulations as a reason for IS investments, the higher the competitive advantage that low-cost firms gain from these investments.

2.4 Formal Planning for Mandatory IS Investments

Surveys among practitioners indicate that most firms apply some form of SISP approach (Gartner, 2008b). Prior research distinguishes two major SISP approaches which are termed differently in the literature. Following Lederer and Salmela (1996) and McFarlan (1983), we refer to these approaches as intuitive and formal because these labels reflect the major foci of

the approaches. Intuitive SISP has also been referred to as “non-comprehensive” (Newkirk et al., 2003; Sambamurthy et al., 1994), “incremental (Salmela et al., 2000) or “organisational” (Earl, 1993). Formal SISP has also been called “comprehensive” (Newkirk et al., 2003; Sambamurthy et al., 1994).

Intuitive SISP mainly relies on personal experiences and judgement of key SISP actors (Sambamurthy et al., 1994) who are connected through an informal network (Pyburn, 1983). The intuitive approach tends to be very technical because the key actors are IT managers and operational IT staff (Ciborra, 1994; Salmela et al., 2000). Managerial staff is rarely involved in intuitive SISP and therefore, strategic IS plans are loosely integrated with the firm’s business strategy (Sambamurthy et al., 1994). By contrast, formal SISP is characterised by a more managerial focus because the key actors are senior general managers (Premkumar and King, 1994). Planning decisions are derived from formal SISP methods that enable the detailed consideration of strategic options (Ein-Dor and Segev, 1978; Rangunathan and Rangunathan, 1991). As a result, IS plans are highly integrated with the firm’s business strategy (Premkumar and King, 1994).

Various studies have examined the benefits and risks of intuitive and formal SISP. Some studies argue that the intuitive approach is more flexible and encourages knowledge sharing and creativity (Mohdzain and Ward, 2007; Peppard and Ward, 2004) and hence, it is very appropriate to develop innovative IS plans (Doherty et al., 1999). Formal SISP tends to oversee possibilities that arise from new technologies because technical staff rarely gets involved, and managerial staff are often unaware of new technologies (Peppard and Ward, 2004). Other studies report that formal SISP produces IS plans that are more useful for firms because they are closely aligned with the competitive strategy (McFarlan and McKenney, 1983). Recently, researchers have concluded that there is no general answer to the question if firms should follow the intuitive or the formal approach (Philip, 2007).

Our conceptualisation of mandatory IS investments as disruptions of the routine illustrated in Henderson's and Sifonis' model (Figure 3) enables the analysis of which SISP approach is appropriate. Firms that follow the intuitive approach (labelled A in Figure 3) will address the disruption mainly on the operational level (Sambamurthy et al., 1994). SISP actors will not deliberately attempt to identify possibilities to combine mandatory and non-mandatory investments and create competitive advantage because of the loose integration of intuitive strategic IS plans with a firm's competitive strategy (Salmela et al., 2000). Hence, the firm will be mainly unaware of competitive possibilities. The mandatory investment will be considered an additional expenditure (Hall and Liedka, 2007) that conflicts with the low-cost strategy (Lazarides, 2007). To realign IS investments with the low-cost strategy, the firm minimises the expenditures for the mandatory investment, for example by purchasing inexpensive technology and minimising planning efforts (Garcia, 2004). Guided by the attempt to reduce planning efforts, the firm will not engage in additional SISP activities and will not make major adjustments to its existing IS plan. The transition from investments to competitive advantage (arrow A.1 in Figure 3) is identical to the original transition in the Henderson and Sifonis model.

[Insert Figure 3 around here]

By contrast, firms that follow the formal SISP approach will try to closely align the mandatory investment with the low-cost strategy (Hu et al., 2007). Therefore, they will engage in additional SISP activities to combine mandatory and non-mandatory investments and identify opportunities to use IS investment for cost reductions. This approach introduces a three-step iteration into Henderson's and Sifonis' model. Firms go back to the planning step (B.1 in Figure 3), integrate mandatory and non-mandatory investments on a strategic level (B.2), and use the combined investment to achieve competitive advantage (B.3). Because the formal SISP approach focuses more strongly on strategy than the intuitive approach, firm will identify more strategic opportunities. In particular, we expect low-cost firms that frequently apply formal SISP will identify more possibilities to combine mandatory and non-mandatory

investments. Further, formal SISP will enable low-cost firms to use combined IS investments for cost reductions and create competitive advantage.

The outcome of formal SISP is determined by the formal SISP methods used. Formal methods are a central part of the formal SISP approach and the selection of the method effects the firm's strategic IS plan (Salmela et al., 2000). Some firms develop SISP methods in-house, but this approach is cost-intensive and most low-cost firms avoid it (Lederer and Sethi, 1988). Prior research and practice have developed a range of standard methods that enable firms to efficiently address SISP. Standard methods include business cases (Ward and Peppard, 2002), internal contractual arrangements (Feeny and Willcocks, 1998), IT balanced scorecards (Teubner, 2007), importance-performance portfolios (Ward and Peppard, 2002), information engineering (Lederer and Sethi, 1988), and post-implementation reviews (Piccoli and Ives, 2005). These methods vary in characteristics as shown in Table 1 and it is therefore possible that formal SISP methods differ in their effects on competitive advantage. Thus, in this investigation, we need to distinguish between different SISP methods. Prior research and surveys among practitioners have revealed that the most commonly applied methods are business cases, internal contractual arrangements, and post-implementation reviews (Farbey et al., 1999; Parr and Shanks, 2000; Sutherland and Remenyi, 1995; Gartner, 2008b) and therefore, this research focuses on these three methods. Next, we discuss why these methods can be expected to promote competitive advantage in situations where firms are confronted with mandatory investments.

[Insert Table 1 around here]

Business Cases

A business case is a formal summary of benefits that a firm anticipates from an IS investment (Gil-Garcia et al., 2007; Parr and Shanks, 2000). Furthermore, the business case determines necessary actions to put anticipated benefits into practice (Irani et al., 2005). The development of a business case includes (1) the systematic identification of technology components created through an investment, (2) an analysis of their impacts on the firm, and (3) an investigation

into benefits of these impacts (Ward and Peppard, 2002; Farbey et al., 1999). Many impacts of new technology are created through synergy effects with existing technology in the firm. Developers of business cases therefore need to consider information from all departments to fully analyse the impacts of new technology. In an attempt to reduce complexity, business cases are represented as a combination of tables, figures and texts (Sarkis and Liles, 1995). Figure 4 shows an example of a business case (Ward and Peppard, 2002).

[Insert Figure 4 around here]

We argue that the systematic identification of technology components and their impacts will enable firms to identify synergies between mandatory and non-mandatory investments and hence, it supports the combination of the investments. Low-cost firms will particularly focus on cost-related benefits of technology when developing business cases. Thus, firms that frequently use business cases to integrate mandatory IS investments with other investments will discover opportunities to combine investments so that cost reductions can be achieved. Business cases also provide systematic action plans to put IS opportunities into practice (Atkinson, 1990). Therefore, firms that develop business cases more often will be more successful in implementing opportunities for cost reductions once these opportunities have been identified. The implementation of such opportunities results in cost reductions and competitive advantage. Hence, it is hypothesised

(H2a) The more frequently low-cost firms use business cases, the more competitive advantage they will create from IS investments that contain a mandatory part.

Internal Contractual Arrangements

An internal contractual arrangement is a formal agreement that defines IS-related responsibilities of particular departments in firms (Feeny and Willcocks, 1998). Such responsibilities include the systematic identification of IS capabilities and the report of these capabilities to the IT department (Figure 5). Internal contractual arrangements are negotiated between each department and top management. Their preparation requires detailed information about the IS

infrastructure in a particular department (Sutherland and Remenyi, 1995). Firms use the arrangements to ensure that previously identified IS opportunities can be successfully implemented (Wearne, 1985). The arrangements are particularly useful for the formal SISP approach because they facilitate the development of action plans to implement IS opportunities.

[Insert Figure 5 around here]

Due to the focus on department-specific information, an action plan which includes internal contractual arrangements will be of high quality because it will only embrace actions that particular departments can realistically be expected to perform. High-quality action plans are tremendously important in the context of mandatory investments. Pressured by the externally defined timeframes that characterise these investments, senior management might delegate tasks to a department that pose great challenges on managers and staff, for example because the department lacks necessary resources. The frequent usage of internal contractual arrangements for investments that contain a mandatory part avoids such challenges and consequently, it contributes to the successful implementation of IS opportunities. As discussed before, firms that follow a low-cost strategy will focus on the implementation of opportunities which result in cost reductions and competitive advantage. Therefore, it is hypothesised

(H2b) The more frequently low-cost firms use internal contractual arrangements, the more competitive advantage they will create from IS investments that contain a mandatory part.

Post-Implementation Reviews

A post-implementation review is a systematic analysis of potential benefits from past IS investments (Smith, 1989). The analysis determines (1) which benefits have not been achieved (Piccoli and Ives, 2005) and (2) specifies how missed benefits can still be achieved through additional investments. In doing so, the review determines requirements for future investments (Figure 6). These future investments are not restricted to the department where

the original investment was made; they might also occur in other departments (Doll et al., 2003). Post-implementation reviews support the formal SISP approach in two ways. First, they identify future IS opportunities that arise from previous investment failures (Lin and Pervan, 2003). Second, they determine how ‘missed’ benefits can still be achieved through further investments. Thus, post-implementation reviews contribute to the development of action plans during the SISP process (Brady et al., 2005).

[Insert Figure 6 around here]

Post-implementation reviews are important for IS investments that have a mandatory part because such investments are usually split into a series of individual investments which are all related to a particular government regulation (Hu et al., 2007). This series of investments allows firms to re-examine every investment once it has been completed. Firms can evaluate if the level of integration between mandatory and non-mandatory investments is appropriate, and if any opportunities for cost-reductions have been missed. Based on the outcome of the evaluation, firms can make changes to the next investment. For example, a firm can attempt to implement a “missed” opportunity for cost reductions in the next investment (Gwillim et al., 2005). Frequent formal post-implementation reviews facilitate the timely improvement of investment decisions. Hence, it is hypothesised

(H2c) The more frequently low-cost firms use post implementation reviews, the more competitive advantage they will create from IS investments that contain a mandatory part.

3 Methodology

We tested the hypotheses with a secondary dataset provided by the Australian Department of Communication, Information Technology, and the Arts (DCITA). In 2004, DCITA initiated a project on IS investments in the July 2003-June 2004 Australian tax year which included a survey among Australian IS decision makers. An SPSS dataset containing all survey responses can be accessed free of charge through the website of the department (DCITA, 2005).

3.1 The DCITA Investment Dataset

The DCITA investment dataset results from a survey that aimed at investigating circumstances of IS investments in Australian firms; for example, discovering reasons behind IS investments and exploring ways of how IS investments lead to business value and competitive advantage. The survey was supervised by the Australian National University (ANU) and carried out by a marketing firm. The detailed presentation of the survey is published as a DCITA research report (Gregor et al., 2004). In the following, an overview of the survey approach is presented.

The survey comprised three phases. In the first phase, the survey instrument was developed adapting survey items from prior literature. Cognitive testing was used to verify the items. Cognitive testing is a qualitative validation technique which aims to ensure that all survey items are clear to participants and cannot be misunderstood (Goldberg, 1996). Interviews with IT decision makers were conducted to identify potential problems with the items and modify the questionnaire accordingly. In the second phase, data was collected through telephone interviews. Stratified random sampling was used to split the population into homogenous groups and select a representative number of participants from each group (Singleton and Straits, 2005); as a result the data is representative for Australian firms. Approximately 3,300 firms were contacted and 1,050 usable responses were obtained, the response rate was 31 % (Gregor et al., 2004). In the third phase, structured follow-up interviews with selected survey participants were conducted. The interviews aimed at clarifying any misunderstandings and ambiguous results from the survey. In total, 50 face-to-face and phone interviews were conducted (Gregor et al., 2004).

The time of data collection (June-July 2004) coincided with the enactment of the Corporate Law Economic Reform Program Act (CLERP 9) in July 2004 in Australia. New auditing regulations which were based on the US Sarbanes-Oxley Act were a central part of CLERP 9. These regulations were considerably stricter than previous auditing regulations in Australia and had various IS implications, including data storage and accessibility regulations (Gwillim

et al., 2005). Many firms had to invest in IS to achieve CLERP 9 compliance (O’Leary et al., 2006). The DCITA survey asked participants about IS investments in the twelve months before the enactment of CLERP 9 and hence, it covers investments related to CLERP 9 compliance. The DCITA investment dataset therefore provides a unique opportunity to examine a major change in government regulations and resulting mandatory IS investments in Australia.

In accordance with the focus of this research and to test the hypotheses, only low-cost firms that experienced mandatory investments were selected for the analysis. Cases were selected using the criteria presented in Table 2. Data was screened for outliers in preparation for multiple regression (Hair et al., 2006). Seven out of 149 originally selected cases were identified as outliers and removed from the analysis, which is below the critical threshold of 5% (Wilcox, 2005, p. 228). The final dataset contained 142 cases.

[Insert Table 2 around here]

3.2 Construct Operationalisation

The constructs in the hypotheses were operationalised using variables from the DCITA investment dataset (Bharadwaj, 2000; Hitt et al., 2002, Dehning and Statopoulos, 2003). We found that all constructs in our hypotheses could be measured using the variables in this dataset.

The dominance of government regulations as an investment reason in comparison to other reasons was measured following an approach by Sireli et al. (2003). This approach has been widely used to measure the dominance of reasons behind actions in prior research (Hitt et al. 2002; Dehning and Statopoulos 2003). Sireli’s approach calculates a score that indicates how important one reason is compared to other reasons. The DCITA dataset contains eight variables (ten-point scale) that describe possible reasons behind IS investments (see Table 3), with one reason being government regulations.

[Insert Table 3 around here]

To measure competitive advantage from IS investments that contain a mandatory part we follow prior studies that suggest that competitive advantage in low-cost firms can best be measured through cost reductions (Flynn et al., 1995; Mirani and Lederer, 1998). The DCITA investment dataset contains a set of items that measure different aspects of cost reductions achieved through IS investments (Table 4). All items are measured on a ten-point scale.

[Insert Table 4 around here]

The use of the three SISP methods is captured through single items in the DCITA dataset. Each item is measured on a five-point scale. The original questionnaire was reviewed to ensure that sufficient information about all three methods (i.e. business cases, contractual arrangements, and post-implementation reviews) was provided to the survey participants. Thus, we are confident that participants understood the methods in the same way as we do.

3.3 Control Variables

We cannot exclude the possibility that IS-based competitive advantage is affected by factors that are not expressed in our hypotheses. Therefore, three control variables were introduced in the research design: firm size, IS investment volume, and IS experience.

Firm size was chosen as a control variable because prior studies showed its influence on the creation of competitive advantage from IS (Harris and Katz, 1991; Melville et al., 2004).

Large low-cost firms experience higher competitive advantages due to economics of scale. Following Dewar and Dutton (1986), the number of employees was used as a proxy for firm size.

Prior research also showed that the creation of competitive advantage is affected by the volume of IS investments (Melville et al., 2004). Large IS investments result in a large variety of technology components that provide a wider range of functionality (Brynjolfsson and Hitt, 1996). Therefore, it is possible that large mandatory investments have greater potential for cost reductions than small investments. Further, firms with large IS investments might also

experience high mandatory investments because they could have more or more complex systems than other firms and therefore, they might have to make more adjustments to achieve regulatory compliance. As a result, these firms benefit more from formal SISF than other firms. We controlled for investment volume to account for these possibilities.

Competitive advantage is further affected by past IS experience. The time firms use IS and the experiences they gain during that time impact their ability to become aware of opportunities to use IS for cost reductions (Chang, 2002). Further, firms that are inexperienced with IS require more resources to train staff and redesign business processes. Expenditures for additional resources might reduce competitive advantage (Melville et al., 2004). To account for the effects of IS experience we controlled for the number of years that a firm had used computers.

3.4 Data Analysis and Results

Our sample includes firms from various industries (see Table 5). IS investment volumes vary from below 10,000 AU Dollars to above 20,000,000 AU Dollars and thus, supports the importance of controlling for investment volume. Survey respondents were mainly IT managers and general managers. Table 6 provides means and standard deviations for the constructs in the hypotheses.

[Insert Table 5 around here]

[Insert Table 6 around here]

The hypotheses were tested using multiple regression analysis (Agresti and Finlay, 1997) with competitive advantage as the dependent variable. Results are displayed in Table 7. The standardised regression coefficient of the dominance of government regulations as an investment reason is negative and significant and thus, H1 is supported. The coefficients of business cases and post-implementation reviews are positive and significant and therefore, H2a and H2c are also supported. The coefficient of internal contractual arrangements is not

significant and hence, H2b is rejected. None of the control variables became significant in the regression analysis.

[Insert Table 7 around here]

4 Discussion

Our analysis shows that the dominance of government regulations as an investment reason has a negative effect on competitive advantage. When IT investments are conducted only to comply with government regulations, low-cost firms struggle to achieve cost reductions. Furthermore, our analysis shows that two of the investigated formal SISP methods (business cases and post-implementation reviews) have a positive effect on competitive advantage while the effect of the third method (internal contractual arrangements) is not significant. This study provides country-level empirical evidence that practitioners' concerns about mandatory IS investments cannot be completely justified. The surprisingly high score for competitive advantage implies that many firms achieve competitive advantage from IS investments that contain a mandatory part. We conclude that the high level of competitive advantage in our sample results from the comparably low score of the dominance of government regulations as an investment reason. The high standard deviation in competitive advantage nevertheless suggests that some firms are more successful at exploiting the potential of mandatory investments than others. This observation is interesting because low-cost firms are currently facing price wars and shrinking margins (Tallon, 2007). Our results indicate that a government regulation can become a chance of improving market positions. Regulations affect a large portion of, if not all, firms in a market. Only some of these firms will be able to combine mandatory with non-mandatory investments and reduce costs. The competitive advantage achieved by these firms is amplified by the fact that competitors struggle to utilise IS investments that contain a mandatory part for cost reductions. Hence, these competitors cannot compensate for the additional expenditures associated with the investment. Among all competitors, those with low financial performance will be particularly

threatened by mandatory investments because they will have less capital for IS investments and therefore, less opportunities to combine mandatory investments with other investments. In extreme cases, IS requirements in government regulations can drive struggling firms out of the market, especially in markets that are penetrated by low-cost firms and in highly regulated industries with frequent changes to government regulations.

This study further provides insights into the effects of formal SISP methods on IS investments that contain a mandatory part. Prior research has demonstrated that formal SISP methods are beneficial for firms that operate in unstable environments (Salmela et al., 2000). However, in this study only two out of three SISP methods had positive effects. Business cases and post-implementation reviews enable competitive advantage but internal contractual arrangements do not. A possible reason for these results is that the three investigated methods vary in their scope of information that is incorporated in the SISP process. Business cases and post-implementation reviews are developed based on a wide range of information from various departments (Lin and Pervan, 2003; Ward and Peppard, 2002). Therefore, in this analysis, we refer to them as wide-ranging methods. By contrast, the scope of information used for the development of internal contractual arrangements is narrow. These arrangements are based on information from one particular department, rather than on information from the entire firm (Feeny and Willcocks, 1998). Thus, an internal contractual arrangement can be considered a narrow-ranging SISP method.

Apparently, wide-ranging methods are more adequate than narrow-ranging methods when mandatory investments occur. We believe this phenomenon is rooted in the nature of competitive advantage in low-cost firms. The strategy of maintaining low costs over a long period of time is more effective if cost reductions are planned and implemented across departments. Of course, it is possible to restrict cost reductions to particular departments but such “local” cost reduction opportunities are limited in most firms (Mata et al., 1995). Firms that aim to achieve low costs through cost reductions across all departments have more opportunities for savings along their business processes and therefore, firm-wide cost

reductions are more effective (Rivard et al., 2006). Narrow-ranging methods fail to identify many opportunities because they focus on one particular department. Another argument why narrow-ranging methods are inadequate is that government regulations usually affect numerous departments simultaneously (Garcia, 2004). Therefore, mandatory investments occur in several departments at the same time, resulting in new cross-departmental opportunities to combine IS investments and reduce costs. Narrow-ranging SISP methods fail to identify these opportunities.

4.1 Contributions

This study contributes to theory because it is a further step towards an enhanced understanding of mandatory IS investments. Prior research has shown the benefits of formal SISP for firms in unstable environments (Salmela et al., 2000), but our findings demonstrate that mandatory investments require different planning methods. Thus, our results enhance prior knowledge by showing that not all formal SISP methods are equally adequate when environmental instability is triggered through changes in government regulations. Rather, firms need to use wide-ranging SISP methods.

Our study further extends prior research on SISP which mainly distinguished between formal and intuitive SISP. Our results indicate that this differentiation might not completely explain SISP outcomes. We found that two groups of formal SISP methods exist, wide-ranging and narrow-ranging methods. These groups lead to different outcomes of mandatory IS investments in low-cost firms.

The findings of this study have implications for managers of low-cost firms who are confronted with mandatory IS investments. Managers need to recognise that firm survival can depend on the ability to combine mandatory and non-mandatory investments. They need to carefully observe the regulatory environment to forecast mandatory IS investments and identify options to combine investments.

Furthermore, managers need to choose appropriate planning methods for mandatory investments. Surveys among practitioners have shown that managers in low-cost firms tend to avoid formal planning methods in an attempt to minimise planning resources (Garcia, 2004). We recommend that selecting an appropriate planning method can be a more profitable tactic. Through the application of wide-ranging SISP methods like business cases and post-implementation reviews low-cost firms can combine mandatory and non-mandatory investments in such a way that competitive advantage is achieved. Finally, our study also has implications for public policy makers. Awareness should exist that regulatory changes and new legislation can lead to an unexpected consolidation effect on markets because of the need to invest in IS.

4.2 Limitations

Although confident that we developed sound hypotheses and utilised an adequate approach to test them, we acknowledge that our study design has several limitations that arise from the usage of a secondary dataset. Prior research on IS investments has successfully used secondary datasets before (Hitt et al., 2002), and it has been demonstrated that these datasets can provide reliable and valid results if the challenges associated with such datasets are addressed appropriately (Bharadwaj, 2002). In the following, we outline which challenges were identified in this study and how they were addressed. First, it was not possible to directly ensure internal validity because we were not involved in the original data collection (Singleton and Straits, 2005). To address this challenge, we carefully studied the data collection process and believe we found sufficient evidence (e.g. cognitive testing and interviews) to assume internal validity. Second, the usage of a secondary dataset also bore the challenge of using variables in a different way than it was intended by the researchers who collected the data. Again, we carefully studied the report about the development and testing of the questionnaire and came to the conclusion that we understood all variables in the intended way.

The fact that the DCITA survey was supported by a governmental agency might have resulted in a response bias. For example, participants might have been influenced by their political view or by the hope to gain governmental support for participation. Our research design did not allow us to account for this bias but we believe this influence is limited because the data was collected through a third party (i.e. marketing firm).

5 Conclusion

Costs arising from mandatory IS investments are of increasing concern, particularly in low-cost firms. Our study investigated how low-cost firms can still benefit from mandatory investments. Utilising the Henderson and Sifonis Planning and Investment Model, it was proposed that firms achieve competitive advantage if they combine mandatory and non-mandatory investments, and use formal SISP methods.

Our empirical analysis confirmed that the combination of investments results in increased competitive advantage. Nevertheless, not all formal SISP methods promote competitive advantage; rather, firms need to apply wide-ranging formal methods like business cases and post-implementation reviews when planning mandatory IS investments.

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Figure 1
Information Systems Planning and Investment Model

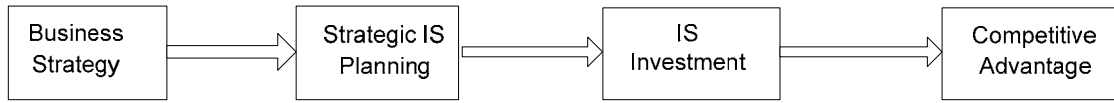


Figure 2
Mandatory Investments in Information Systems

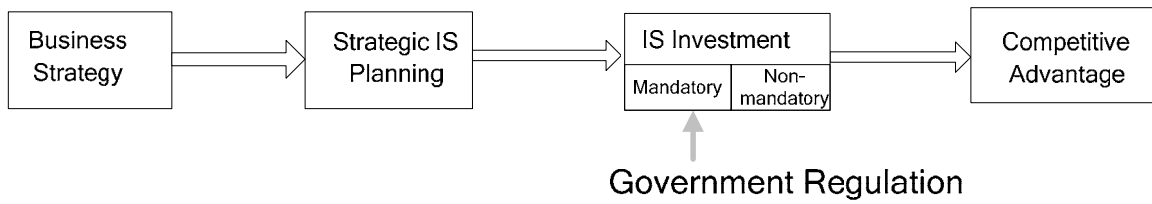


Figure 3
Intuitive and formal SISP for combined mandatory and non-mandatory Information System Investments

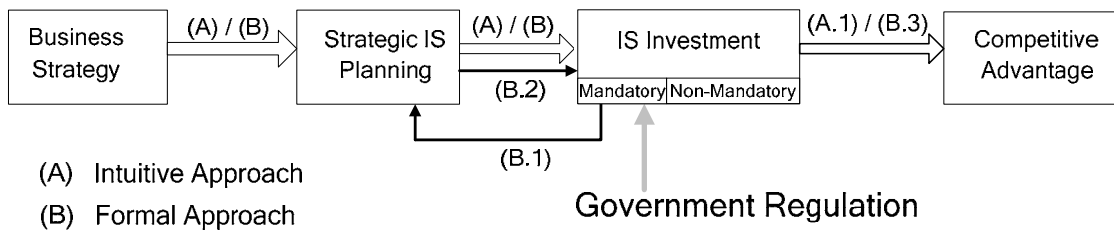


Figure 4
Illustration of a Business Case

Expected Benefits	New Activities	Improved Activities	Discontinued Activities
Financial			
Quantifiable			
Measurable			
Observable			

Figure 5
Internal Contractual Arrangement for Reporting of Information Systems Needs and Capabilities

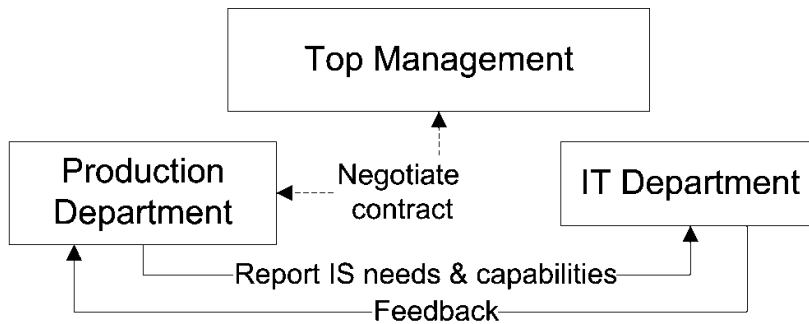


Figure 6
Post-Implementation Review

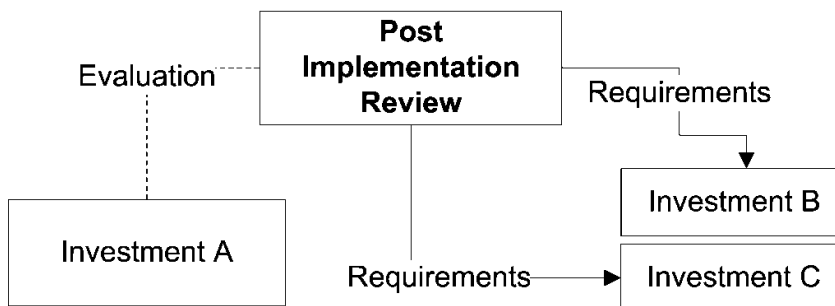


Table 1
Overview of formal SISP methods

Formal Planning Methods	Key SISP Actors	Planning Techniques	Scope of Information used	References
Business Case	<ul style="list-style-type: none"> • Business managers • Project managers 	<ul style="list-style-type: none"> • Cost-Benefit Analysis • Quantification of tangible benefits • Qualitative estimation of tangible and intangible benefits • Roadmaps 	<ul style="list-style-type: none"> • Information from all departments and business processes • Information about present and future company goals and strategies 	Atkinson, 1990; Irani et al., 2005; Farbey et al., 1999; Sarkis and Liles, 1995; Ward and Peppard, 2002
Internal Contractual Arrangement	<ul style="list-style-type: none"> • Business manager • Department manager 	<ul style="list-style-type: none"> • Service Agreements • Report cards for contract negotiation and monitoring 	Information from particular departments	Wearne, 1985; Feeny and Willcocks, 1998; Sutherland and Remenyi, 1995
Post-Implementation Review	<ul style="list-style-type: none"> • Project managers • Business managers • Users 	Project success evaluation using pre-defined and post-defined success measurements	<ul style="list-style-type: none"> • Information from the reviewed project • Information from interrelated projects • Context information from the entire firm 	Lin and Pervan, 2003; Brady et al., 2005
IT Balanced Scorecard	<ul style="list-style-type: none"> • Top management • Functional managers • IT managers • Analysts 	Cost monitoring based on quantitative business metrics	<ul style="list-style-type: none"> • IS information from various departments • Customer information • Business process information • HR information • Finance information 	Teubner, 2007
Importance-Performance Portfolios	Process planners	Quantitative or semi-quantitative evaluation of process performance	<ul style="list-style-type: none"> • Information about one particular IS-supported business process • Context information from the entire firm 	Ward and Peppard, 2002, pp. 225-226
Information Engineering	<ul style="list-style-type: none"> • Managers • Business analysts 	<ul style="list-style-type: none"> • Conceptual modelling techniques • Analysis of enterprise models, data models, process models 	<ul style="list-style-type: none"> • Information from various departments • Structural information about the firm • Business process information 	Lederer and Sethi, 1988

Table 2
DCITA dataset variables for case selection

Selection Variable	Item in Questionnaire	Scale	Selection
Occurrence of Mandatory IS Investments	Please indicate how important the following reason was for your IS investments in the past 12 months: - Changes to regulatory and other government requirements	1: Extremely unimportant ... 10: Extremely important	Cases >5 were selected
Competitive Strategy	'Does your organisation compete on the price of products and services?'	yes/no	'yes' –cases were selected

Table 3
Calculation of the dominance of government regulations (DRG) as an investment reason

Measurement Items and Equation	
Measurement items	Please indicate how important the following reason was for your IS investments in the past 12 months:
	GOV Changes to regulatory and other government requirements
	COM Keeping up with competitors
	FOR Being forced to invest by trading partners such as suppliers
	CUS Customer expectations
	COA Establishing or enhancing competitive advantage
	OPP Taking advantage of an unplanned opportunity
	COS Reducing Costs
	EFF Gaining Efficiencies
Equation	$DGR^1 = \frac{GOV}{GOV+COM+FOR+CUS+COA+OPP+COS+EFF}$ <p>¹ Score was calculated for each case in the dataset</p>

Table 4

Question in the DCITA dataset used to measure competitive advantage

Measurement Items	
SCM	Savings in the supply chain
OPE	Reducing operating costs
COM	Reducing communication costs
WOR	Avoiding the need to increase the workforce
ROA	Increasing the return on financial assets
PRO	Enhancing employee productivity

Table 5

Sample demographics

Sample of 142 firms by							
Industry	N	Number of Employees	N	IS Investment Volume past 12 Months	N	Respondent	N
Agriculture, Forestry and Fishing	11	0-19	0	< \$ 10,000	8	Owner	14
Manufacturing	9	20-50	61	\$ 10,001 - \$ 20,000	9	General Manager	26
Electricity, Gas and Water	7	51-200	40	\$ 20,001 - \$ 100,000	31	IT Manager	76
Construction	12	>200	41	\$ 100,001 - \$ 200,000	19	Other	26
Trade	24			\$ 200,001 - \$ 1,000,000	13		
Transportation and Storage	8			\$ 1,000,001- \$ 2,000,000	9		
Tourism and Cultural Services	14			\$ 2,000,001- \$ 10,000,000	11		
Communication	11			\$ 10,000,001- \$ 20,000,000	7		
Government Services	2			>\$ 20,000,000	10		
Finance and Business Services	30			missing	25		
Education	7						
Healthcare	7						

Table 6
Descriptive statistics of the constructs

Construct	Scale	Mean	S.D.
Dominance of Government Regulations as an Investment Reason	0 ... 1 = higher score indicates higher dominance	0.14	.03
Frequency of using Business Cases	1 ... 5 = higher score indicates higher frequency of usage	3.17	1.39
Frequency of using Internal Contractual Arrangements		3.17	1.36
Frequency of using Post-Implementation Reviews		3.40	1.39
Competitive Advantage	1 ... 10 = higher score indicates higher level of competitive advantage	6.72	1.52

Table 7
Results of the multiple regression analysis

Hypothesis	Independent Variable	Standardised Beta (Dependent Variable: Competitive Advantage)
H1	Dominance of Government Regulations as an Investment Reason	-0.21**
H2a	Frequency of using Business Cases	0.20*
H2b	Frequency of using Internal Contractual Arrangements	-0.01
H2c	Frequency of using Post-Implementation Reviews	0.27**
Control Variables	Number of full-time Employees	-0.13
	Investment Volume	-0.14
	Years of Computer Usage	0.09

$R^2 = 0.27$ adjusted $R^2 = 0.23$ * $p < 0.05$ ** $p < 0.01$