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# The complementary use of IS technologies to support flexibility and integration needs in budgeting

Wipawee Victoria Paulsson

DOCTORAL DISSERTATION

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Department of Informatics, Lund University, Sweden.

To be defended at EC2:101, Holger Crafoords Ekonomisentrum,  
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*Faculty opponent*

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Abstract :  <p>In business controllers' work on budgeting, considered as a classic decision-making process in organisations, it is consistently indicated that enterprise resource planning (ERP) systems, business intelligence (BI) and spreadsheets are commonly applied to assist the process. An academic research contribution on this topic is few. Most available research concentrates on ERP systems but it mentions neither BI nor spreadsheets. A further review of budgeting literature designates that budgeting characterises both flexibility and integration needs to accomplish decision-making. Given the limited understanding as to how IS technologies are used in budgeting, this dissertation aims to describe and explain how business controllers can complementarily use IS technologies to support the flexibility and integration needs in a budgeting process. Two research questions addressed are: RQ1- how do business controllers perceive IS technologies in relation to the need for both flexibility and integration in budgeting? And RQ2 - why do business controllers use IS technologies to support the need for both flexibility and integration in budgeting? The analysis employs conceptual ideas pertaining to structuration theory. Empirical data was collected through interviews, observations and documentations with twenty-six business controllers in sixteen companies in Thailand. It is concluded that business controllers perceive IS technologies to enable and constrain their flexibility and integration needs in budgeting. Spreadsheets are the main IS technology used in budgeting despite an existent of ERP systems and BI because of the flexibility that spreadsheets offer. Business controllers use spreadsheets to support both the flexibility and integration domains but they use ERP systems and BI to support the integration function alone. It is necessary for business controllers to rethink their IS technology use practice because spreadsheets cause errors and frauds. The insights generated create a framework to describe how the three IS technologies should be complementarily used to support specific budgeting activities in respect of the flexibility and integration needs.</p>		
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Chapter 4 – Uppatumwichian<sup>1</sup>, Wipawee (2012). IS technologies constraining and enabling powers in budgeting, *Advances in Enterprise Information Systems II*, edited by C. Møller and S. Chaudhry. London: CRC Press, pp.277-290.

Chapter 5 – Uppatumwichian, Wipawee (2013). Analysing flexibility and integration needs in budgeting IS technologies, *Accounting Information Systems for Decision Making*, edited by D. Mancini, E. H. J. Vaassen and R. P. Dameri. Heidelberg. Berlin: Springer, pp.261-275.

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Chapter 7 – Uppatumwichian, Wipawee (2013). Understanding the ERP system use in budgeting, *Enterprise Information Systems of the Future*, edited by G. Poels. London : Springer, pp.106-121.

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<sup>1</sup> This is the maiden name of the author.

Chapter 8 – Uppatumwichian, Wipawee (2013). An empirical investigation of business intelligence use in budgeting. In proceedings of the 21st European Conference on Information Systems (ECIS 2013), Utrecht, the Netherlands, 6–8 June 2013.

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# Part I: Research overview





# 1. Introduction

Imagine that we have a hammer – which is a very handy tool for solving problems that involve nails – but we come across a problem that involves screws. What should we do? Well, if the hammer is our only tool then we might be tempted to “hammer” the screws. This, of course, is the wrong approach. A much better approach would be to find a better tool (e.g., a screwdriver) for solving the problem at hand. (Michalewicz et al. 2007, p.177)

The rise in innovative information system (IS) technologies such as telemedicine technology (Chau and Hu 2002), the group support system (Chin and Gopal 1995) and the enterprise resource planning (ERP) system (Van Everdingen, Van Hillegersberg, and Waarts 2000; Buonanno et al. 2005) has increased over the past few years. IS technology is seen in this dissertation as “social systems which rely, to a greater and greater extent, on new technology for their operation” (Hirschheim and Boland, 1985, p. viii). Organisations often implement these IS technologies with an intention to improve, for instance, strategic cooperation among partner organisations (Subramani 2004), organisational efficiency (Davenport 1998), information quality (Häkkinen and Hilmola 2008), organisational flexibility (Shang and Seddon 2002; Brazel and Dang 2008) as well as organisational integration (Quattrone and Hopper 2005; Chapman and Kihn 2009). Provided with the abundant numbers of IS technologies as well as the endless claims of benefits that these IS technologies promise to deliver, the challenge for organisations in the twenty-first century is neither to develop new IS technology (Davenport 1998; Hong and Kim 2002) nor to produce more information out of the existing IS technology (Lonsdale 2004). Rather, the challenge is to apply an appropriate IS technology to support decision-making so that the organisation produces information that is useful for local and organisation-wide business requirements (March 1988, p.402; Bruns and McKinnon 1993). Therefore organisations are faced with questions of how they could apply suitable IS technology to support decision-making and attain organisational competitive advantages from IS technology.

As explained in the analogy of the quotation presented at the beginning of this chapter, organisations should consider the very nature of the business process in their quest for IS technology support, then carefully select the most suitable IS technology

to support their decision-making. This process will prevent them from applying the wrong tool to solve the problem, i.e., using a hammer to solve a problem or a decision which requires a screwdriver.

This topic should be the prominent question for IS researchers and practitioners as it is a classical concern in IS research (Hedberg and Jönsson 1978; March 1988, p.400). There are cases, such a case of ERP implementation described in Hong and Kim (2002), in which the system fails on the grounds that it is not suitable for the business process in need for support. Therefore it cannot support any decision-making activities in organisations (Hong and Kim 2002).

Such questions fit in with the larger scheme of IS use and non-use<sup>2</sup> research tradition for decision-making. In the quest for competitive advantage through decision-making, organisations often implement new IS technologies. Nevertheless these IS technologies are not always utilised for decision-making in the way that was initially planned. Therefore, they fail to produce the benefits hoped for (Davis 1989; Granlund and Malmi 2002; Walsham 2002; Boudreau and Robey 2005). Whenever users deny using any IS technology, either in passive terms by not using it (Walsham 2002) or actively by working around an existing IS technology (Boudreau and Robey 2005), it is always interesting to investigate how and why it is the case.

The IS use and non-use research tradition for decision-making is also applicable to an IS sister field; accounting information system (AIS) research. The rise in numbers of innovative IS technologies, to support various accounting activities in business organisations since the 1970s, directly poses a challenge to the AIS research field. This applies in particular to the management accounting function (Granlund and Mouritsen 2003) in order to explain why users decide to use or not to use certain IS technologies to support various management accounting activities which are considered as core decision-making activities in modern business organisations.

Markus (1983), in one of the seminal works on AIS, addresses a case of resistance to a new accounting IS technology. The research suggests a struggle between financial accountants and management accountants, often referred to as business controllers in today's literature and in this dissertation, who feel that the accounting IS technology installed by financial accountants is inadequate for their management accounting works. In their resistance, the business controllers continue to use spreadsheets for their work and bypass the main IS technology installed. Thirty years on, the relationship between IS technologies and business controllers has become increasingly

---

<sup>2</sup> It is hard to distinguish between the IS use and non-use research because in today's environment, a decision to use a certain IS technology often means a decision to abandon some other IS technologies. Therefore I have chosen to refer to this research stream consistently as IS use and non-use.

intertwined (Newman and Westrup 2005). Several other advanced IS technologies such as the enterprise resource planning (ERP) system and business intelligence (BI) have been introduced to support management accounting operations. One thing remains, however; the scientific knowledge with regard to how and why business controllers decide to use and not to use certain IS technologies in management accounting is not fully developed (see: quotations in section 1.3 from Berry et al. (2009) and Granlund (2011)).

From a practitioner's perspective, several indications show that the use and non-use of IS technologies in management accounting is still a live issue in business organisations around the globe. A recent survey conducted by KPMG (KPMG 2012; Videla 2012) among 150 leading companies in Sweden found that the spreadsheet is the main IS technology that companies use to support budgeting, which is the most common management accounting practice (Libby and Lindsay 2010; Arwidi and Jönsson 2010). The use of spreadsheets continues despite the availability of advanced IS technologies like ERP systems and BI in their organisations. One third of these companies admit that the spreadsheets is the "only" IS technology used to support the entire budgeting process. Another one third report using dedicated systems such as budgeting BI from popular vendors such as Cognos and Hyperion for this process. The remaining one third use an ERP system (21%) or other in-house solutions (10%).

The KPMG report also suggests another interesting finding which has not previously been shown in any academic publication. That is, in most cases, different types of IS technologies are brought together to support the entire budgeting process from budget construction, integration and monitoring to reporting. Unfortunately, the KPMG report does not suggest how these IS technologies are actually brought together to complement one another in practice.

Another report, the PricewaterhouseCoopers (USA) budgeting and forecasting study (2007), provides an example of how various types of IS technologies are usually bundled together to support the budgeting process:

The Pfizer planning system environment includes a host of applications including Oracle [ERP], Hyperion [BI], Cognos [BI], and assorted spreadsheets models. In addition, our various business units – commercial, manufacturing, and research – each approached the planning process with different types of models, data requirements, and forecast calendars.

Looking at this complementary use of various IS technologies to support a single management accounting function; it is not at all surprising to find this in practice. In fact, academia has long called for various types of IS technology to support accounting functions. Consider the following argument presented by Hedberg and Jönsson (1978, p.47-48):

Information and accounting systems are sometimes thought of as being neutral with respect to their impacts on [an] organisation's behaviour. The argument is that they

represent potential resources which can assist and aid decision makers in many different ways, and that their impacts are determined by the way they are used. This is true in a sense. Formalized information systems and information technologies are not good or bad, per se. But, there are information systems which offer less discretion to decision-makers than others, and which lead to organisational rigidity; and there are information systems which stimulate organisations to experiment and innovate, and which foster organisational flexibility.

Hedberg and Jönsson deliberately present an insightful idea that accounting is not as simple as one might typically think. Accounting, seen as a decision-making tool in their writing, comprises of the part that makes organisations stable and the part that destabilises organisations. Therefore they argue for a complementary use of different kinds of IS technology to support both parts since certain characteristics in a particular IS technology are more suitable to support stabilising activities than destabilising activities and vice versa. To put it in the language which will be consistently applied throughout the dissertation, Hedberg and Jönsson might have been the first few theorists to recognise a fundamentally contradictory principle that accounting is a decision-making process which requires both flexibility (or the destabilising part) and integration (or the stabilising part).

This idea could be the reason why actual organisations, as presented in the KPMG and PricewaterhouseCoopers reports, have to employ different types of IS technology in practice to balance between the two. Reviews of the IS literature over the last thirty years (Hackathorn and Keen 1981; Berry et al. 2009; Granlund 2011) consistently indicate that research contributions on the complementary use of IS technologies to support budgeting, the classic management accounting process, are warranted. Berry et al. (2009), for example, describe how business controllers often complain of the deficiencies of advanced IS technology, especially the ERP system, namely, that it does not address local requirements. Therefore they resort to local practices and other IS technologies, especially spreadsheets, to complement the ERP system. From a broad view point, Berry et al. suggest more research is needed to clarify such complicated relationships between IS technology and management accounting practice. Hackathorn and Keen (1981) provide a similar insight that IS technology used in budgeting should fulfil two main roles of communication and coordination as well as problem solving. Therefore an ideal IS technology to support budgeting should provide “facilities for storing disaggregated, detailed budget at the department level, then allowing this to be integrated first by division and finally for the company as a whole” (Hackathorn and Keen 1981, p.24). Nevertheless, to the best of my knowledge, no empirical investigation following their suggestions has been conducted.

Inspired by the lack of academic research as indicated in the academic literature reviews over the thirty-year period as well as the real life examples implicated in the practitioner’s reports, this dissertation will further investigate *how and why business controllers employ different types of IS technologies to support a management*

*accounting process*. The next section provides further detailed discussions toward the research context described in this opening introductory section.

## 1.1 Contextual settings

Despite the awareness as to how several IS technologies are used to support management accounting in real organisations, we still have limited knowledge as to how these IS technologies are used in a complementary manner in real life settings to support decision-making (Berry et al. 2009; Grabski, Leech, and Schmidt 2011; Granlund 2011).

Built upon the general discussion presented in the previous section, this section aims to indicate the research context upon which this dissertation intends to build from insights suggested in the literature. The first sub-section describes the three types of IS technology that this dissertation focuses on; the ERP system, BI and spreadsheets. The second sub-section discusses the management accounting activity, i.e., budgeting, that this dissertation rests upon. The last sub-section defines business controllers – the people studied in representation of their organisations – who are directly responsible for the budgeting process.

### 1.1.1 Three types of IS technology

Although our knowledge about how advanced technologies like the ERP system and BI are used in management accounting practice is limited, one thing we know for certain is that these advanced IS technologies enable various easy-to-use and timely functions to assist many management accounting practices. Examples include functions such as rolling forecast and activity-based budgeting as well as many other performance measurement practices (Arwidi and Samuelson 1993; Cooper and Kaplan 1998; Granlund 2011).

Grounded on this knowledge about IS technologies, it is often claimed that they have the potential to hasten management accounting practices. Therefore business controllers are able to spend a smaller amount of time on less important work of data-gathering and spend more time on the more value-added work of data analysis. It is claimed that this practice will inevitably transform the traditional role of business controllers from *bean counters*, who simply collect data, to *business partners* (see also the discussion in section 1.1.3), who give insightful business suggestions (Caglio 2003; Scapens and Jazayeri 2003; Grabski, Leech, and Sangster 2008; Baldvinsdottir et al. 2009).

Despite the knowledge that these advanced IS technologies might improve the role of business controllers, a problem commonly found in the AIS literature is that most organisations are not using these advanced IS technologies, especially the ERP system, to anywhere near their full potential to support management accounting practices (White 2004; Granlund 2011). It is acknowledged that a limited number (if any) of management accounting processes are operated in the ERP system (Granlund and Malmi 2002; Grabski, Leech, and Sangster 2009). Additional IS technologies such as spreadsheets (Newman and Westrup 2005; Panko 2006) and BI (Rom and Rohde 2006; Elbashir, Collier, and Sutton 2011) are often introduced and/or integrated with the main ERP system for management accounting purposes. However, little is known how these IS technologies are applied to support decision-making (Granlund 2011). It is for these reasons that this dissertation sees that it would be more beneficial to study how organisations use these three types of IS technologies (the ERP system, BI and spreadsheets) to support budgeting processes rather than focusing on one single type of IS technology. Short descriptions of each IS technology in focus are provided below;

- The ERP system is in essence an integrated cross-function business support system (Grabski, Leech, and Schmidt 2011) which is often available to organisations in the form of an “off-the-shelf” solution. It offers a support to numerous business functions as organisations might desire. In general, the ERP system is comprised of four layers (Møller 2005). First, the foundation layer is comprised of core components and basic architecture required for the ERP system. The core components are integrated database and application framework. Second, the process layer is the central components which support the transaction based system characteristics of the ERP system. Central components are the classic ERP system software and the business process management (BPM) framework which promotes best practice within business processes. Third, the analytical layer provides decision-making support to corporate components. These components are not necessarily directly synchronized with the integrated database. Components contained in this layer are, for example, supply chain management (SCM), customer relationship management (CRM) and supplier relationship management (SRM). Finally, the e-business layer provides collaborative components to external parties. Components such as business-to-consumer (B2C), business-to-business (B2B), business-to-employee (B2E) and enterprise application integration (EAI) are all components that can be configured into the ERP system to promote collaboration with external parties. Budgeting is also one of the functionalities that the ERP system supports especially in connection to the second and the third layers. Nevertheless many studies report a consistently limited ERP system use for budgeting (Booth, Matolcsy, and Wieder 2000; Granlund and Mouritsen 2003; Kallunki, Laitinen, and Silvola 2011).
- BI is fundamentally a new generation of business solution which combines “data gathering, data storage and knowledge management with analysis to evaluate

complex corporate and competitive information for presentations to planners and decision-makers” (Negash and Gray 2008). BI is often designed to sit on top of an existing ERP system to bridge a transactional efficiency in the ERP system with a strategic planning in BI (Elbashir, Collier, and Sutton 2011). Despite a recent BI popularity among business organisations, little is known about how BI is used to support decision-making in organisations. Prior research (Rom and Rohde 2006) suggests that BI offers a better suitability than the ERP system to facilitate decision-making in management accounting activities but it cannot describe in details why it is so due to the quantitative research method’s limitation.

- Spreadsheets are interactive computer applications which allow users to organise and analyse information in a tabular form to build models. Users are free to put in and model data according to their needs in a spreadsheet environment (Fischer et al. 2004). Over time more sophisticated functions such as statistical and mathematical functions, graphing and charting facilities and graphic user interface are added into spreadsheets (Power 2004) which contribute significantly to the popularity of spreadsheets among business and home users (Baker and Sugden 2003). Despite the fact that spreadsheets are a common IS technology to support budgeting, spreadsheet use is challenging. Information accuracy, information security, and regulation and compliance violations (e.g., Sarbanes-Oxley, Basel II/III) are among the few classic concerns in the spreadsheet literature (Panko 2006) which could affect the quality of decisions made in a budgeting process.

There are several IS technologies available in the market to aid the budgeting process. Research findings indicate that numerous advanced IS technologies are not that influential in the budgeting process. On the contrary, spreadsheets, a simple and classic IS technology, are often employed to aid budgeting (PricewaterhouseCoopers 2007; KPMG 2012). Since there is a clear indication that these three types of IS technology, the ERP system, BI and spreadsheets, are commonly used to support a management accounting activity like budgeting, this dissertation will focus on these three. In the first part of the dissertation, these three IS technologies are referred to as a group, usually by the term “IS technologies”. The latter part of the dissertation pays specific attention to each IS technology: the ERP system, BI and spreadsheets respectively. More discussion about the dissertation structure is provided in section 1.5.

### **1.1.2 One management accounting process: budgeting**

Management accounting in general is a broad stream of research which involves many management accounting tools in organisations. Budgeting is selected over other management accounting activities such as balanced scorecard (BSC) and activity-



based costing (ABC) because it is one of the most common practices in business organisations (Arwidi and Jönsson 2010; Libby and Lindsay 2010).

Budgeting as we know it today in business organisations is derived from the budgetary technique adopted in government around 1920 (Hofstede 1968). The use of budgeting in business organisations is considered a logical extension of Taylor's Scientific Management from the shop floor to total organisation. There is common agreement that budgeting is a guide that leads business toward its prescribed goals (Abernethy and Brownell 1999). Hofstede's (1968) classic work on budgeting specifies that budgeting is primarily intended to achieve the two following results:

1. Higher profitability by coordinating efforts, avoiding waste and improving management decisions.
2. Optimal liquidity and the best way of financing the business because of advance knowledge of cash needs.

The interest in budgeting as an accounting-based decision-making tool in organisations arose after the seminal work by Anthony (1965) in which management accounting is disaggregated into three areas: strategic planning, management control, and operational control. Anthony's terminology and framework encourage a strong emphasis on budgeting in organisations especially for the management control area at the middle management level (Merchant and Otley 2006). By placing budgeting in the middle ground between strategic planning and operational control, Anthony clearly emphasises that budgeting is an accounting decision-making tool. Budgeting can be connected to strategic and operational issues, but they are not the direct focus. Such a formulation exposes budgeting to the risk of losing relevancy in volatile business environments when accounting measures do not offer accurate support for decision-making purposes.

In comparison to other innovative management accounting tools, such as activity-based costing (ABC) or balanced scorecard (BSC), which could also have been selected as a research topic, I selected budgeting for the following three reasons.

First, budgeting is used for *decision-making* at any organisational level such as strategic, tactical and operational levels (Anthony 1965). This dissertation rests budgeting on the tactical level and focuses on how the budgeting interplay between the strategic (or organisational) and the operational (or local) levels plays out in organisations. The concept that budgeting is a decision-making tool leads to many new interpretations in the accounting literature on how budgeting can be used in organisations. For example, Frow et al. (2010) mention the complementarity of a "mechanistic" role of budgeting which emphasises efficiency at the organisational level and an "organic" role of budgeting which prioritises flexibility at the local level. Abernethy and Brownell (1999) build upon Simons' levers of control framework

<sup>3</sup>(1994) to determine how organisations can combine budgeting as an “interactive” tool at local level and a “diagnostic” tool at organisational level to formulate and implement a strategic change. Budgeting corresponds to the argument presented in Hedberg and Jönsson (1978) (see: section 1) that there are two conflicting yet complementary functions in budgeting in many variations, i.e., organisational rigidity versus organisational flexibility (Hedberg and Jönsson, 1978), mechanistic versus organic (Frow et al., 2010) and interactive versus diagnostic (Simons, 1994). This special characteristic of budgeting warrants IS technology choices to adapt accordingly (Hackathorn and Keen 1981). Second, budgeting is at the heart of organisations (Hansen, Otley, and Van der Stede 2003) because it is one of the centrally coordinated activities within organisations. Lastly, budgeting is a longstanding control procedure (Davila and Foster 2007) which continues to soar in popularity among modern organisations (Ekholm and Wallin 2000; Arwidi and Jönsson 2010; Libby and Lindsay 2010) despite criticisms and calls for it to be abandoned (see: Beyond budgeting in Hope and Fraser 2003).

The decision to focus on budgeting, especially the dual role of budgeting to support decision-making at local and organisational levels, fits very well with recent call from the AIS community for research in this area. This is specifically applicable to calls to investigate how IS technologies can be continuously used to support decision-making in organisations (for example: Berry et al. 2009; Granlund 2011 in section 1.3).

Having described the motivations behind a focus on budgeting, the next step is to define what budgeting is. This dissertation considers budgeting as a classic “decision-making process” which is made up of activities (Nutt 1984). As a result, it adopts Covaleski et al.’s (2006) definition that budgeting is a process undertaken to achieve a quantified statement for a defined period of time. After a slight modification of Shields and Shields (1998) on budgeting, it is suggested that budgeting is a cyclical process which covers four main activities:

- Budget construction
- Budget consolidation

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<sup>3</sup> The levers of control framework are comprised of 4 systems: Belief systems, Boundary systems, Interactive Control systems and Diagnostic Control systems. I use the levers of control framework according to Abernethy and Brownell (1999) in which only the Interactive Control systems and Diagnostic Control systems are assessed to fit the nature of budgeting. The Interactive Control systems encourage managers “to monitor organisational outcomes and correct deviations from pre-set standards” (Simons, 1994). The Diagnostic Control systems stimulate managers to “regularly and personally involve themselves in the decision activities of subordinates” (Simons, 1994).

- Budget monitoring
- Budget reporting

In the first activity of the budgeting process or the budget construction, business controllers make a forecast, an informed guess at best, into the future about how their business will perform in the subsequent time period. Depending on the budgeting approach adopted in particular organisations a budget can be constructed top-down or bottom-up. In the top-down approach, a budget is constructed for an entire organisation then it is broken down into small departmental budgets. In the bottom-up approach, various departments are authorised to plan their own budgets which are submitted to a central unit where departmental budgets are consolidated to obtain an overall organisational budget (Hendrick 1989). Regardless of the choice of a top-down or bottom-up budgeting approach, organisations must consolidate their departmental budgets together in order to obtain a consolidated organisational budget which provides an overall picture of future business results and guides many important decisions e.g., strategic moves. This process is commonly referred to as budget consolidation, the second activity listed in the budget cycle. Once a budget is completed and a new financial period begins, the business operates as usual. Operational results are continuously recorded throughout the time period. For every certain time period, be it daily, weekly, fortnightly, monthly, quarterly or yearly, operational results are compared against the predetermined budgets for monitoring purposes. The third activity of budget monitoring takes place to ensure that the business operates as planned. In cases of deviations from the plan, necessary actions are implemented to ensure smooth operations. Subsequent to budget monitoring, the fourth activity of budget reporting takes place. Budget reporting involves both standard reporting, such as a variance analysis which compares results between actual operations and budgets so that business controllers can spot problem areas, and ad-hoc reporting, which allows business controllers to further investigate problems identified from the standard variance analysis reports. Ad-hoc reports are presented in various forms. It depends upon how business controllers might design it as appropriate for problem investigation and decision-making purposes. Generally speaking, the third and the fourth activities, budget monitoring and budget reporting, take place at more frequent time intervals in most organisations because business controllers have to constantly control and take actions against new environmental factors found in their businesses.

Despite the choice of focus on budgeting, this dissertation acknowledges the three main limitations that budgeting represents (Hansen, Otley, and Van der Stede 2003). First, there are recurring criticisms that budgeting becomes out-of-date easily due to rapidly changing environmental circumstances. An annual budget made based on outdated assumptions fails to act as a reliable performance controlling measurement. Second, budgeting reinforces the command-and-control structure within organisations. Budgeting is often characterised with central decision-making which

might prohibit innovations and learning at lower organisational levels. This is true especially when the top-down budgeting approach is emphasised. Third, budgeting, used as a performance control mechanism, can promote dysfunctional behaviour in organisations such as gaming and budgetary slack. This dysfunctional behaviour represents a phenomenon where employees adhere to their short-term goals, i.e., to create slack in a budget so their performance measurements look better than they would have without the slack, rather than to promote the interests of the organisation in the long run.

### **1.1.3 One group of human agencies: business controllers**

Budgeting is nothing but a common business practice and it cannot be carried out on its own. It needs people to perform the activity; these people are usually referred to in the literature and in this dissertation as business controllers.

The art of controlling can be traced back for more than 5000 years ago to when the Mesopotamian recorded cattle logs on clay tablets. However it was not until the start of the industrial revolution that controlling gained a more considerable role in business organisations (Nurdin 2009, p.9). That is when organisations shifted into a new era i.e., organisations with multiple products, multiple divisions and lines of command. Organisations needed a pilot to get a grip on this new complex form. Business controllers are often considered as co-pilots who help the chief executive officer (CEO), the pilot in this analogy, manage and direct these modern yet complex organisations. The role of business controllers is not only to look back at past events, i.e., collecting data and preparing historical reports, but also to look forward into the future, i.e., analysing and predicting future trends, in order for organisations to manage in an efficient and effective manner (Baldvinsdottir et al. 2009; Nurdin 2009).

The role of business controllers in organisations has changed over the years (Hyvönen, Järvinen, and Pellinen 2008) due to various factors such as corporate cultures, IS technologies, new management accounting tools and inter-professional competition. Cieslak (2011, p.26) points out that the transformation of business controllers can be characterised in three areas. First, transaction processing, book-keeping and other operational duties are significantly reduced due to the availability of various IS technologies. Financial information processing costs are also significantly reduced; business controllers have more resources to focus on a decision-making role. Second, the stewardship or the attention-directing function of business controllers is redesigned. New management accounting techniques are constantly introduced into organisations, such as the beyond budgeting technique which includes rolling forecasts and a rolling strategy process to complement the traditional static budgeting process, and the combination of financial and non-financial performance. The stewardship role is redesigned in such a way that non-accounting employees become

more involved in the business controller works. As a result, business controllers have become more dedicated to the decision-making role. Third and last, the decision-making role of business controllers is the main role and the crux of role transformation. The complex nature of business calls for advanced business analytics which require multi-dimensional data and attention span in order to yield a competitive edge (Davenport 2006). Therefore the role of the twenty-first century business controller has shifted to support decision-making and to concentrate on activities such as evaluation and consulting, in comparison with the traditional management control role of monitoring and controlling business operations. The significant change in the business controller's role cause Horngren, Sundem, and Stratton (2004) as well as many other academic publications (Caglio 2003; Scapens and Jazayeri 2003; Yazdifar and Tsamenyi 2005) to refer to business controllers as *business partners*. They argue that the role of business controllers is no longer to do book-keeping works but to give advice to CEOs and management teams in steering organisations toward the future

This study chooses to concentrate on business controllers as it has been demonstrated that they are the main group of people responsible for budgeting process in organisations. In connection to the changing role of budgeting in organisations to cover both the flexibility and integration domains so to the definition and responsibilities of management controllers change over time to cover both domains.

Although this dissertation focuses on the term "business controller", it should be observed that these business controllers are in many ways considered as "managers" as Winograd and Flores (1986, p.143) suggest:

Within the office we will focus our attention more specifically on what goes on under the general category of "management". In referring to management, we are not limiting our concern to the running of businesses. Anyone in a position to direct actions that affect the economic, political, or physical conditions of others is in some sense a manager. In all but the most routinized jobs, a worker functions in some ways as a manager, requesting and initiating actions that affect the work of the others.

In short, business controllers can be considered as managers because they are in "a position to direct actions" (Winograd and Flores, 1986, p.143) especially in relation to the decision-making functions that they do to support the economic conditions in organisations. This view is consistently adopted in the decision-making literature such as in Simon (1960, p.1) who suggests that:

What part does decision making play in managing? I shall find it convenient to take mild liberties with the English language by using "decision making" as though it were synonymous with "managing".

The term business controller is preferred over the term manager because the term business controller gives a much more precise focus that the type of managers that this dissertation is interested in are those who are directly involved with the budgeting decision-making process. It will be of a little value to study other managers, who are

not involved in the budgeting process, as the research aim and questions specifically call for a genuine interest in budgeting.

Having explained the fundamental research context in this section, the next section discusses the two fundamental concepts which are the heart of this dissertation.

## 1.2 Flexibility and integration in budgeting

The new insights generated in the modern accounting literature that budgeting can be used diagnostically and interactively to assist the decision-making process at the organisational and local levels (Abernethy and Brownell 1999) are the inspiration for this dissertation to approach budgeting from a new perspective.

When a management accounting procedure like budgeting is required to assist decision-making diagnostically and interactively, the needs for IS technologies to support this process change considerably. This is previously articulated in the quotation from Hedberg and Jönsson (1978) at the beginning of this chapter when they suggest that business organisations must insightfully apply the right IS technologies to support business processes according to their characteristics. In short, organisations should apply static IS technology to support tasks that require organisational integration, i.e., the diagnostic function. However they must also purposefully apply flexible IS technology to support tasks that require organisational flexibility, i.e., the interactive function.

Putting it in the context of IS technology in the twenty-first century when we have advanced IS technologies like the ERP system and BI, but the classic simple IS technologies like spreadsheets continue to prosper (PricewaterhouseCoopers 2007; KPMG 2012), this dissertation focuses on how business controllers are using these three types of IS technology to support the entire budgeting process through: flexibility and integration. Hence the flexibility and integration are key concepts in this dissertation.

Flexibility is described as the discretion business controllers have over the use of a budgeting system for decision-making which gains its momentum from IS technologies such as BI and the ERP (Ahrens and Chapman 2004; Frow, Marginson, and Ogden 2010). It is claimed that the availability of these IS technologies allows business controllers to create ad-hoc reports needed to support their decision-making processes. Decision-making is constantly required because of rapidly changing circumstances and priorities which affect business organisations.

Integration is described as the standardisation of data definitions and structures using common conceptual scheme across a collection of data sources with the assistance of IS technologies (Goodhue, Wybo, and Kirsch 1992). It is important to note that the

concept of integration defined here is close to the concept of consolidation adopted in the accounting literature. Consolidation is indispensable in the decision-making process because without consolidated budgets, business controllers cannot purposefully monitor their subordinates' activities and performance. Nevertheless, since this dissertation focuses on the use of IS technologies to support an accounting process, the term integration is considered more appropriate because it incorporates the existence of IS technologies into the fundamental accounting activity.

This section describes that this dissertation focuses on two key concepts, which are flexibility and integration. These two concepts are used in order to explain how business controllers are using IS technologies to support the budgeting process. Having posited the research focus in this section, the next section puts forward the research purpose.

### 1.3 Research purpose

The motivation of this research to uncover how and why various types of IS technology, namely the ERP system, BI and spreadsheets, are complementarily applied to support decision-making in budgeting is consistent with several gaps found in the research in the AIS discipline (Berry et al. 2009; Granlund 2011; Grabski, Leech, and Schmidt 2011). For example, it is specifically addressed in Berry et al. (2009, p.12) that:

During the past two decades the rate of development of information [system] technologies to support organisational processes has increased dramatically. [...] Yet the relationships between management [accounting] and new [information system technologies] remain underdeveloped both theoretically and practically.

Granlund (2011, p.3) makes the further observation that:

AIS research has largely ignored the production of information for management control and partly decision-making. This appears obscure as production of managerially relevant information is considered to be one of the core functions of corporate information systems.

The intention to close the research gap in AIS according to the aforementioned literatures applies in particular to a more specific agenda on how these IS technologies can be applied to support the flexibility and integration needs in budgeting which have not yet received considerable attention. A few examples of the ERP research in this line are Quattrone and Hopper (2005), Granlund (2009) and Kallunki, Laitinen, and Silvola (2011). The very few existing research papers on BI in this line are Rom and Rohde (2006) and Elbashir, Collier, and Sutton(2011). Nevertheless, there is no

known example of the spreadsheet research in a comparable topic. Guided by the lack of research in this field, the overall purpose of this dissertation is to:

*Describe and explain how IS technologies can be used complementarily to support the flexibility and integration needs in budgeting process.*

This research purpose is constructed with the intention of developing a theory for explanation according to the taxonomy of theory types in IS (Gregor 2006). According to Gregor, the theory for explanation aims at explaining *how* and *why* a certain phenomenon occurs without predicting how the phenomenon will unfold or evolve in a future time period. The contribution that this type of theory makes is in a form of new and interesting conjecture; i.e., the theory must explain a phenomenon that is not understood or poorly understood. Aspects such as plausibility, credibility, consistency, and transferability are used to judge the adequacy of the theory developed.

## 1.4 Research questions

Based on the classical concern in IS research on the challenge to apply an appropriate IS technology to support budgeting, a common decision-making process in organisations, and the several research gaps addressed in the AIS literature that a research on this topic has not yet received considerable attention, the overarching research purpose suggested in the last section is broken down into two related research questions:

*RQ1: How do business controllers perceive IS technologies in relation to the need for both flexibility and integration in budgeting?*

*RQ2: Why do business controllers use IS technologies to support the need for both flexibility and integration in budgeting?*

The first research question is crafted according the suggestion posited in Kaplan and Maxwell (1994) that knowledge on the user's perspective is not known in advance. Therefore IS research should develop an understanding of how IS technology users perceive and interpret what IS technology means to them. The second research question is also crafted according to Kaplan and Maxwell's suggestion that knowledge of the social and organisational impact on IS technology use is context-dependent. There is a need to consider these social and organisational impacts as intrinsic to understanding how users decide to use and not to use certain IS technology. Even though the opinions that Kaplan and Maxwell offer are twenty years old, I believe that their suggestions are still valid in the twenty-first-century IS landscape because the constant changes in businesses and environmental circumstances surrounding IS



technology use cause IS technology perception and use to change in the course of time.

Overall, the two research questions are developed with a view to formulating a *theory for explanation* which can work in accordance with the taxonomy of theory types in IS (Gregor 2006) and in response to the aforementioned research purpose (see: section 1.3). The theory for explanation aims at explaining *how* and *why* a certain phenomenon occurs without predicting how the phenomenon will unfold or evolve in a future time period.

By focusing both on how business controllers interpret the IS technologies and why they use these IS technologies to support budgeting in real practice, this dissertation can make stronger claims about the complementary use of IS technologies to support budgeting.

## 1.5 The dissertation roadmap

This dissertation is a compilation consisting of six peer-reviewed papers which have been previously published in the proceedings of reputable international conferences on IS or as book chapters. Therefore a roadmap is a vital feature for specifying not only the structure followed but also contributions which the dissertation makes to the academic research community. Figure 1.1 illustrates the dissertation roadmap.

This dissertation is composed of four main parts: the research overview, the business controllers' perceptions of IS technologies (RQ1), the business controllers' use of IS technologies (RQ2), and the contributions and implications of the research.

The first part, the research overview, gives an overall foundation to this dissertation. This part is composed of three chapters. **Chapter 1** presents an introduction through reviews of academic as well as practitioner publications in order to rationalise why a study which addresses *a complementary use of IS technologies to support flexibility and integration needs in budgeting* is needed. A review of academic publications reveals that there are few in this research stream. Most existing publications merely present an idea that a certain IS technology, in particular the ERP system, is hardly used in a management accounting process like budgeting. However, they do not specify why this is the case. In addition to that, this dissertation has noted a limited research interest in other significant IS technologies of the twenty-first century such as BI and spreadsheets. The academic insight is complemented through a review of practitioner publications which indicates that spreadsheets are the main IS technology employed in budgeting despite the availability of other advanced IS technologies like the ERP system and BI. In addition it is also noted that, in real practice, three types of IS technology – the ERP system, BI as well as spreadsheets – are used in a

complementary manner to support a budgeting process. This insight has not been previously suggested in any academic publication. Therefore, it is considered as the main point of departure of this dissertation.

**Chapter 2** discusses the structuration theory (ST), which is the main theory applied as a sensitising device to data collection and analysis. The chapter presents an overall idea that ST is in essence an attempt to explain a social reproduction through interactions between human agency and social structure (or the IS technology in this case). Three concepts in ST are selected that correspond with the research aim and the research questions. **Chapter 3** puts forward the research methods adopted in this study. The research design section posits that the dissertation follows the interpretivism paradigm, therefore it adopts a qualitative research method. It is argued that the qualitative research allows researchers to collect data in natural settings and interpret the data according to the human sense-making process. A multiple case-study research strategy is adopted. The research process articulates case sampling strategy and provides brief descriptions of the sixteen companies selected. The main data collection method is interview, which is supplemented with observation and documentation. These methods were possible because all interviews were conducted at participant's locations. The chapter ends with examples of etic and emic coding technique applied to assist the data analysis. The key message presented in the chapter is that a research method design and operationalization is a constellation of many factors such as paradigm, aim, question and output. Appropriate research design and execution will ensure research quality.

The second part, based on RQ1, discusses how business controllers perceive IS technologies used in budgeting. **Chapter 4** moves from the general research introduction theme to present empirical findings. The data presented in this chapter is collected from various secondary data sources such as academic journals and advisory reports. In this chapter, the three main IS technologies used in budgeting – the ERP system, BI and spreadsheets – are examined in relation to the domains of integration and flexibility in budgeting. The concept of human agency in ST is consistently applied to guide the data analysis. The results show that business controllers perceive the IS technologies used in the budgeting process according to the domains of flexibility and integration. The business controllers perceive the ERP system to offer a high integration capability due to the fundamental data processing origin, while they recognise that spreadsheets offer a high flexibility capability because users are free to put in and model data on spreadsheets according to their requirements. However they perceive BI to be a trade-off between the two extremes of flexibility and integration. In short, they acknowledge that BI excels in the integration domain but they find that it is rather cumbersome to serve the flexibility purpose. Considering these three IS technologies in the light of budgeting, which calls for both flexibility and integration in the overall process, no single IS technology is appropriate to serve the budgeting process in its own right. BI may be the best IS technology available but it is still far from ideal to serve budgeting. Therefore, this chapter

concludes that different types of IS technology must be consistently applied as a group to overcome the constraining and enabling powers embedded in each IS technology. **Chapter 5** further investigates the two concepts of integration and flexibility in budgeting through interviews with twenty-one business controllers in eleven case companies from Thailand. The concept of human agency in ST is still applied in this chapter. The analysis shows that the flexibility and integration domains in budgeting can be perceived from four perspectives: organisation-in-focus, personal requirement, business requirement and reporting requirement. The first organisation-in-focus reveals that there is a struggle between the operational and the legal entity views of organisations. The operational view requires a high level of flexibility but the legal entity view requires a high level of integration. The second personal requirement demonstrates a tension between the individual and the collective requirements. At the local level, business controllers often require distinctive sets of information according to their flexible and fast-changing requirements. However at the corporate level, integrative information is needed as well as integrative IS technology like the ERP system which is not suitable for local data needs. The third business requirement dimension represents an incongruity between the local business requirements and the enterprise-wide business requirements. Advanced IS technologies like the ERP system and BI restrict business controllers in meeting local requirements, therefore they resort to spreadsheets. The last reporting requirement portrays a conflicting need between the individual reporting compliance and the external reporting compliance. The chapter concludes that there are conflicts between these four domains based on the needs for flexibility and integration in budgeting. The results indicate that spreadsheets are the main IS technology that business controllers rely upon to support their needs for flexibility in budgeting. However advanced IS technologies like the ERP system and BI are used to support the integration needs in budgeting such as budget consolidation and budget monitoring. The main insight generated in chapter 5 is that business controllers should apply budgeting IS technologies to fit the nature of budgeting activities. Therefore, there is clearly a need to employ a variety of IS technologies, and not to allow any particular IS technology for budgeting to dominate since each IS technology is designed for its own respective purpose and intentions.

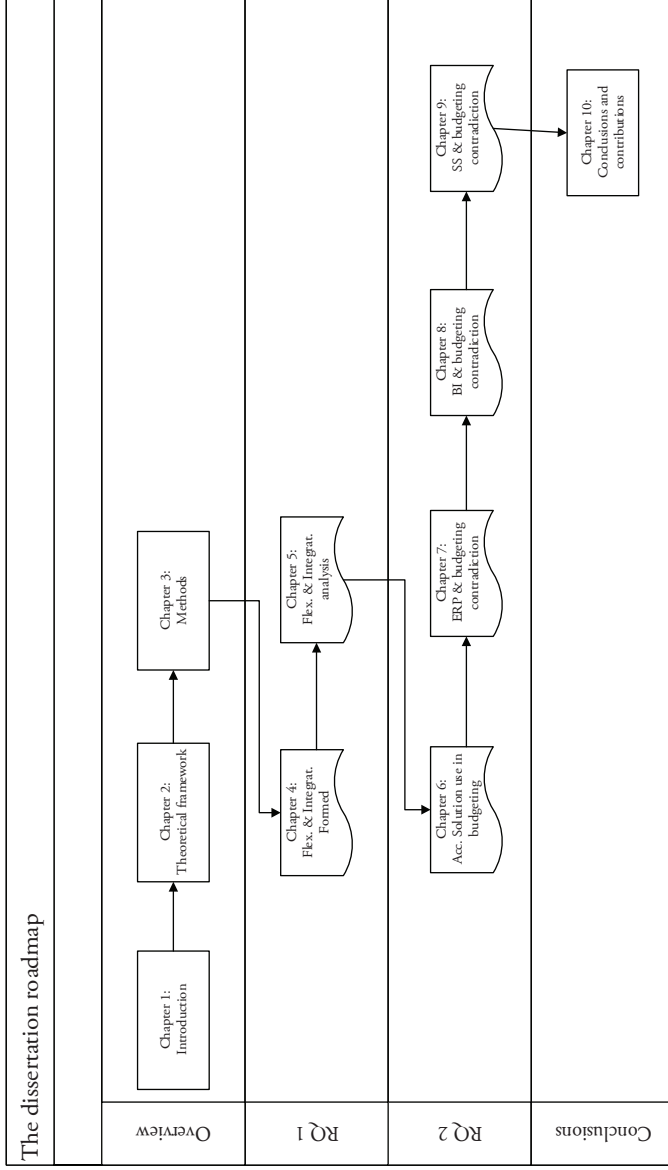
The third part, based on RQ2, discusses why business controllers use IS technologies in the course of budgeting. **Chapter 6** serves as an explorative study to investigate why business controllers use or do not use one of the main “accounting solutions” – whether an ERP system, best-of-breed (BoB) or hybrid ERP – to support budgeting processes. An analysis based on the soft-deterministic perspective which rests on an interaction between human and machine agencies provides an account as to why business controllers use or do not use the provided accounting solution for budgeting. It is posited that the problem of non-use of accounting solutions for budgeting is persistent, irrespective of whether it is an ERP, BoB or hybrid ERP system. This study shows that the problem of system non-use is a mixture of technical and social

problems. It is a technical problem because the system does not provide enough of the flexibility needed in budgeting. At the same time it is a social problem because the system does not align with organisational structure and people. This chapter contributes to a theoretical account of the weakness of “accounting solutions” for budgeting. It confirms the earlier finding that the ERP system is not widely used to support the budgeting process. In addition, it provides the additional insight that the problem is present regardless of an organisation’s choice to employ an ERP system or not. **Chapter 7** advances the insights generated in the previous chapter, that the problem of the non-use of the main accounting solution exists regardless of the choice to employ ERP, BoB or hybrid ERP systems. However the research in this chapter is more focused than the previous chapter because it examines organisations that employ the ERP system alone as the main accounting solution. The focus of research in this chapter is on explaining how and why organisations use or do not use the ERP system in their budgeting processes. The analysis is carried out based on the concept of conflict (applied at the activity level) and contradiction (applied at the structuration level) in ST. The determination to apply these concepts originates from the insight generated in RQ1 that the flexibility and integration needs are present in a contradictory fashion. The analysis at the activity level shows that the ERP system represents a conflict with the flexibility domain but it has a full potential to support the integration domain. Nevertheless, it should be noted that despite its potential to support integration, companies are not yet widely utilising ERP systems to support this function. The second analysis at the structuration level concludes that the ERP system is not used to support budgeting because the system only has a capability to support the integration domain but not the flexibility domain. To overcome the limitation that the ERP system presents, especially with regard to the system’s inadequacy regarding the need for flexibility, other types of IS technologies such as BI and spreadsheets are recommended. **Chapter 8** further investigates the problem of the use and non-use of BI in budgeting from a similar theme and concepts generated in the previous chapter. The result at the activity level shows that BI represents a conflict with the integration and flexibility domains. BI is merely used to support structured decisions, not unstructured decisions. Besides, BI use in the integration function is not found. The structural level analysis concludes that non-use of BI occurs due to the following contradictions with budgeting (1) the budgeting process demands a level of flexibility beyond what a BI is capable of offering and (2) the budgeting process demands a level of integration beyond what a BI implemented on a poor enterprise architecture design can offer. **Chapter 9** inspects the use and non-use of spreadsheets in budgeting from a similar theme and theory to that adopted in chapters 7 and 8. The analysis at the activity level from the concept of conflict demonstrates that spreadsheets are heavily used to support both the flexibility and integration needs in budgeting. However this chapter raises a serious issue of the awareness of business controllers about the inappropriateness of the spreadsheet as a tool to support the integration-related activities. This is because spreadsheets are astonishingly prone to errors and are time consuming for business controllers. The

analysis at the structuration level through the concept of contradiction shows that spreadsheets are contradictory to budgeting. This is because spreadsheets only have the potential to support the flexibility domain alone while budgeting constantly calls for both flexibility and integration. The chapter concludes that spreadsheets are necessary in the budgeting process. However, they should only be used to support the flexibility domain alone along with supplementary policies from the management to test, inspect and audit spreadsheets. Supplementary to spreadsheets, the management should promote advanced IS technologies such as the ERP system and BI to support the activities which need integration.

The last part of this dissertation is presented in **chapter 10**. The chapter presents conclusions, theoretical and methodological contributions, and practical implications of the overall research findings presented in earlier chapters. It starts off with summaries of the research findings according to RQ1 and RQ2. Later on it proceeds to discuss the theoretical and methodological contributions that this dissertation makes. The chapter provides an articulation of how business controllers can apply the insights generated in this dissertation to enhance their decision-making capability and attain competitive advantage for their organisationals. The chapter closes with limitations and suggestions for future research.

Figure 1.1 The dissertation roadmap



## 1.6 Summary

This chapter presents an overall idea why research on the complementary use of IS technologies to support a decision-making process like budgeting is needed (Berry et al. 2009; Granlund 2011). It is argued that such research is required from both academic and practitioner viewpoints. The research starts from the idea that an accounting process like budgeting is not as simple as we might typically think (Hedberg and Jönsson 1978). Budgeting requires organisational rigidity and organisational flexibility. This is also applicable to the IS technologies that we have today to support the budgeting process: the ERP system, BI and spreadsheets. The entanglement between an accounting process like budgeting and IS technologies leads this dissertation to suggest three research contexts on which to focus: IS technologies, budgeting, and business controllers. After a further review of budgeting literature, this dissertation will focus on two concepts central to budgeting; flexibility and integration. It is argued that there is a need to use different IS technologies to support different activities in budgeting in response to the flexibility and integration domains. Having described the research context and the research focus, the research purpose is posited as to:

*Describe and explain how IS technologies can be used complementarily to support the flexibility and integration needs in budgeting process.*

Following this research purpose, two research questions are constructed in order to achieve the research purpose. These two research questions are:

*RQ1: How do business controllers perceive IS technologies in relation to the need for both flexibility and integration in budgeting?*

*RQ2: Why do business controllers use IS technologies to support the need for both flexibility and integration in budgeting?*

The chapter ends with a short description of how the entire dissertation is structured around the two main research questions. Figure 1.1 illustrates the dissertation roadmap. In short, chapters 1–3 present an overview to the dissertation. Chapters 4 and 5 tackle how business controllers perceive IS technologies according to the first research question (RQ1). Chapters 6–9 investigate the use of IS technologies in budgeting in response to the second research question (RQ2). The dissertation ends with chapter 10 which presents the conclusions, contributions, implications of the dissertation as well as limitations and suggestions for future research.

## 2. Structuration theory

The purpose of this chapter is to establish a common understanding on structuration theory (ST) which is the main theory underpinning this dissertation. The chapter embarks on a general discussion on the role of theory in empirical research. Then it provides a brief discussion of the fundamental concepts in ST. This discussion does not mean to be a detailed description of what ST is since that is not within the scope of this dissertation. However, it provides some general knowledge for those unfamiliar with ST and builds the ground for specific ST concepts which will be explicitly applied in the rest of this dissertation. After that, section 2.2 provides a general discussion on ST criticisms from theoretical and empirical data perspectives. Section 2.3 takes a different turn to focus on the application of ST in IS research and posits how the theory is commonly applied in the IS arena. Section 2.4 follows with a discussion of criticisms of ST commonly found in the IS literature. Afterwards, section 2.5 compares and contrasts ST with actor-network theory and institutional theory, which are also dominant theories in IS. The purpose is to establish arguments as to why ST is appropriate in the context of the research aim and research questions specified in this dissertation. Subsequently section 2.6 spells out how ST is adopted to guide the research shown in this dissertation. The chapter concludes with a short summary of the key concepts and ideas presented in this chapter.

### 2.1 The fundamentals of structuration theory

Scientific theories are universal statements. Like all linguistic representations they are systems of signs or symbols. [...] Theories are nets cast to catch what we call “the world”: to rationalise, to explain, and to master it. We endeavour to make the mesh ever finer and finer. (Popper 2005, p.37-38)

The quotation above from Karl Popper in his influential book, *The logic of scientific discovery*, addresses the importance and relationship of theory to empirical research. Theory provides researchers with answers to the question *why* a certain empirical



phenomenon occurs. Therefore, theory dominates experimental work from the initial planning to the completion of a research endeavour (Popper 2005, p.90).

The IS discipline, formerly referred to as a reference discipline, which draws upon engineering, computer science, cybernetic systems, theory, mathematics, management science, and behavioral decision theory, but which has now emerged as a distinct discipline (Baskerville and Myers 2002; Gregor 2006), is in constant search of “good theory” (Lee 2001, p.v). As far as the fundamental nature of IS is concerned, this good theory is used to explain and rationalise social phenomena arising from the human use, design, and delivery of physical objects (machines) as well as impacts on organisations and societies (Avison and Fitzgerald 1995, p.xi).

There are many theories which are widely used in IS research to explain these aforementioned phenomena. Given the research purpose described in section 1.3, Gregor (2006) suggests that theories such as ANT (Latour 1991), ST (Giddens 1979) as well as the situated-action perspective (Agre 1995) should be considered in connection to the research purpose. Having considered these theories in the light of the main research purpose, this dissertation adheres to ST.

In comparison with other theories which are based on the structuration scheme such as those of Urry (1982), Bourdieu (1977) and Bhaskar (1979) which draw on Burger and Luckmann’s (1967) concept of the mutual constitutions of society and individuals, Giddens’s work on ST has been shown to be the most noticeable theory across social and organisational fields (Jones and Karsten 2008). There are two main reasons which can account for the widespread adoption and interest in ST in academic research. First, ST attempts to reconcile opposing conceptualisations, i.e., agency and structure, and enables researchers not to subscribe to either the agency or the structure view but to embrace both views (Orlikowski 1992, p.403). Second ST’s prime focus on structure is suitable for researchers who are particularly concerned about “the structuring properties of technology” and the more recent interest in “structure as a property of organisations and work groups” (Poole and DeSanctis 2004). In their writings, Poole and DeSanctis (2004) suggest that Giddens’s choice to conceptualise structure as an interactive process is appealing. Such a conceptualisation allows researchers to open the black-box in how knowledgeable human actors come to create and shape the social structure in which they live.

Long before the existence of ST, sociologists had engaged in one of the hardest debates in the whole of social theory (Fuchs 2001; Pozzebun and Pinsonneault 2005) as to which end of dualism would best explain a social reproduction. Dualism believes in natural kinds as defined by some essential properties. These natural kinds are separated from other natural kinds by the great divide. It holds that only one end of these natural kinds serves as an explanation for a social reproduction. For example, anyone who believes in the dualism between agency and structure can argue that it is agency which has more power over the social structure in explaining social

reproduction and social change. Similar forms of debate are presented in many genres such as agency/structure, micro/macro etc. as is indicated in Fuchs (2001).

In an attempt to move beyond between the apparent opposition in the dualism rationale, Giddens provides an innovative way to surpass the dualism debate by offering a new way of thinking about social reproduction as a duality rather than the traditional dualism logic (Walsham and Han 1991). Duality goes beyond the dualistic view of the social world. It avoids the historical division presented in the great divide and holds that it is an on-going action between these two poles (e.g., agency and structure) that defines social reproduction. Neither end of the natural kinds dominates the other, but it is the mutual existence and interaction between them that generates social reproduction. This approach was considered as ground breaking at the time of its invention. It is important to note that Giddens is not the only theorist who comes up with this idea. Other theorists have also provided a similar form of thinking that an interplay between the two opposite poles serves as an explanation for social reproduction. Examples include Bhaskar's (1989) discussion of positivism and postmodernism, Bourdieu's (1977) interplay of objectivism and subjectivism, and Reed's (1997) dialogue on the relationship between agency and structure. These different accounts should not be considered as competitors to the original ST but as "alternatives" to ST which can be used to strengthen ST (Pozzebon and Pinsonneault 2005) (see: critical engagement with ST in section 2.3).

In essence ST is an attempt to treat human interaction and social structure as a duality rather than a dualism. The duality of both human interaction and social structure is used to explain social reproduction. Giddens (1979, p.69) explains the fundamental concept of ST as:

The duality of structure which relates to the fundamentally recursive character of social life, and expresses the mutual dependence of structure and agency.

The fundamental ST concept as explained by Giddens in the quotation above can be further illuminated by a schematic chart of the analytical dimensions of the duality of structure (Figure 2.1). In the figure, the first row represents three types of social structure; each social structure has its own corresponding interaction (as they must interact through human agency or people) in the third row. These pairs are significant/communication, domination/power, and legitimation/sanction respectively. Interactions between the social structure and human interactions are represented in the second row as the modalities; interpretative scheme, facility and norm. These modalities are where the duality of structure can be made visible through their inter-linkage and reproduction of agency and structure. The preceding paragraph explains the three sets of relationship between agency and structure pair by pair.

First, in order for human agencies to communicate with others they draw on an interpretative scheme which represents stocks of knowledge that human agencies usually draw upon to make sense of their own and others' actions. In this ongoing

communication, they produce and/or reproduce a structure of meaning which is referred to as the structure of signification. The example of this structuration process can be found in even the smallest item of daily behaviour as Giddens (1979, p.77-78) portrays in the following example:

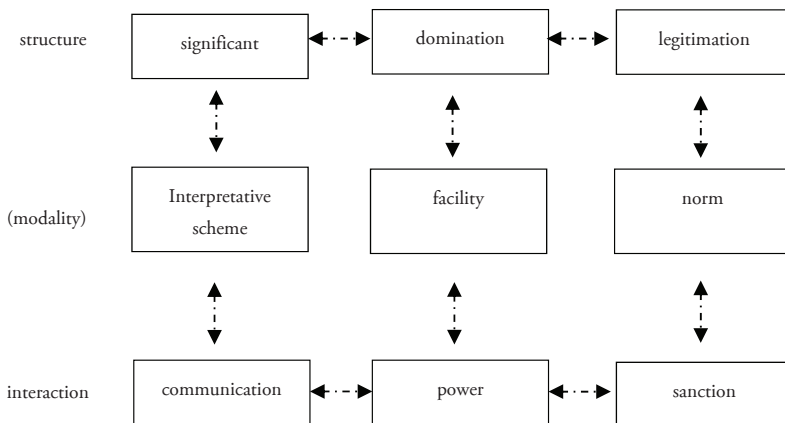
When I utter a grammatical English sentence in a casual conversation, I contribute to the reproduction of the English language as a whole. This is an unintended consequence of my speaking the sentence, but one that is bound in directly to the recursiveness of the duality of structure.

Second, in their interactions human agencies exercise their power to draw upon the facility modality, which is the ability to control resources such as the ability to allocate materials and human resources, in order to produce the structure of domination. Third, human agencies sanction their actions by drawing upon the norm modality, understood as standard of morality, which thereby produces and reproduces the legitimation structure.

As the figure caption has already suggested, the illustration presented in Figure 2.1 is intended for analytical purposes only. These three dimensions are inherently interlinked therefore it might not be feasible to demonstrate them empirically in a separable fashion (Walsham and Han 1991).

The illustration presented is often used as a starting point for analysis based on ST. Ultimately, it has become a checklist of sorts for ST analysis (Rose and Scheepers 2001). Even though this dissertation does not employ ST according to the framework, as specific concepts in ST are selected according to Giddens’s advice (Sharma, Barnett, and Clarke 2012), the illustration provides a fundamental understanding into the original ST conceptualisations.

**Figure 2.1 Analytical dimensions of duality of structure (Giddens, 1984, p.29)**



Summing up: this section presents the key idea that ST is a theory built upon the concept of duality of structure (Giddens 1979) which holds that social reproduction is a result of mutual interactions between (social) structure and human agency (or interaction). The interactions between structure and human agency are commonly referred to as modalities. Having described the basis of ST in this section, the next section discusses criticisms of ST.

## 2.2 Criticisms of structuration theory

ST is a popular theory which has been applied to a variety of research disciplines such as organisation study, community-state interaction, family/home, societal development, regional transformation, class mobility (Phipps 2001). While adoption of ST in these research disciplines has been rather positive as it is often claimed that ST is a powerful tool to illuminate and analyse complex empirical data (Walsham and Han 1991; King 2010), it is not without criticisms. This section will discuss criticisms of ST as a theory in general. It discusses first an important work by Margaret Archer who provides insightful criticisms of the very fundamentals of ST. Later it proceeds to discuss ST criticisms in empirical research.

When it comes to a classic critique of ST, one cannot ignore the important work by Margaret Archer (1982) which provides some of the very fundamental criticisms of the basic fundamentals of ST. This piece of work has claimed a dominant influence in the sociology research arena for 30 years (King 2010). The three key criticisms presented by Archer are as follows:

First, structuration, which rests on the dynamic interplay of duality of structure between social structure and human agency, fails to incorporate the time dimension into the process. Therefore, structuration is in itself an ever “process” which exists out of time and space and never an end product which could take a physical form. This implies that ST does not account for the fact that a current end product, i.e., a new structure produced through interactions between human agencies and social structures like a grammatical English sentence at the current time, will provide new contexts for subsequent interactions at a later time period (Archer 1982, p.457).

Second, the conceptualisation of human agency contradicts the most basic principle in the structuration process. Giddens’ (1979, p.56) statement that human agency always “could have acted otherwise” implies that human agency does not have to adhere to social structure in the structuration process. This underemphasis of the constraints to which human agency is subjected to leads to a high degree of freedom for actions and ultimately unexplained social reproductions (Fuchs 2001). This causes Archer to suggest that in fact Giddens “conflates” (Archer 1982, p.465) human agency with the system. That is, it is indeed the human agency that determines the

entire structuration process, not of both social structure and human agency as Giddens emphasises in the duality of structure.

Finally, ST fails to resolve the dualism of social structure and human agency (King 2010). Connected to the second point, in which Giddens holds that human agency is free to do what it wants to, Archer argues that Giddens cannot pin-point whether it is the social structure that precedes the human agency or the other way round in a social reproduction. Giddens' attempt to claim that social reproduction is a result of interactions between both parts, when it is rather clear that he gives more account to the human agency (Jones and Karsten 2008), actually does nothing more than "throw a blanket" (Archer 1996) over the concepts of social structure and human agency which prevents any further investigation of what is actually going on underneath.

These criticisms from Archer provide a fundamental insight into ST. However some of these criticisms are open for debates. Concerning the first point made that structuration is always a "process" and never an end product; many scholars especially in IS research who refer to Giddens suggest that there are many evidences to convince that structure can take a physical form as well. Poole (2009, p. 585) argues on this issue in the following way:

The issue of whether structures can persist outside on-going practices is important for scholars of information systems and communication technologies. These technologies are designed to enable and constrain human activity, and theorizing the source of their structuring potential is a significant move in explaining their impacts. [...] There are several reasons to advocate the view that structures can take other forms than memory traces.

This point is further discussed in section 2.4 (see: the technology as structure group). It is never the aim of this dissertation to embark on this on-going debate. But in short this dissertation agrees with Archer's comment that Giddens' conceptualisation of structure might be too limiting and supports Poole's position that structure can take a physical form.

On the second criticism made that human agency does not have to adhere to social structure in the structuration process. Giddens, to a certain extent, agrees with the comment but he thinks this is due to the fact that a practical consciousness on human being is under theorised and poorly understood. Giddens (1982, p.110) puts it as follow:

I fully agree that the relevant question to ask is "how it is possible for men (sic) to function as agents". [...] In large part, this is because practical consciousness, as routinely but reflexively applied in the chronic constitution and reconstitution of social life, remains untheorised - human beings then do indeed appear as "cultural dopes", much as they do in Parsonian theory also.

In short, Giddens still maintains his position that human agency has to adhere to social structure because humans are constrained by the very culture that they are in.

Finally on the last point made that ST fails to resolve the dualism of social structure and human agency because it is clear that Giddens gives more account to the human agent, Giddens fully disagrees with this criticism. He argues (1982, p.109):

The concept of structuration seeks to give full due to the “knowledgeability” of lay actors, without entailing any form of subjectivism

To cut a long story short, Giddens insists that ST does *resolve* the dualism of social structure and human agency. However he acknowledges that there is a lack of understanding as to how human agency might function as agents as suggested in the previous point, which is why Archer might misinterpret that it is only the human agency that dominates a structuration process.

Apart from theoretical criticisms that ST has received over time since its inception, ST also receives a considerable amount of criticism that it is hard to apply in empirical work. Pozzebon and Pinsonneault (2005) present the following two criticisms based on an extensive review of empirical works in IS research. Even though the empirical works reviewed are from the IS domain, these criticisms are written with an aim to inform organisational study research since it is indicated that these two research fields can further develop from experiences and knowledge accumulated in each other (Orlikowski and Barley 2001, p.145).

First, ST as a meta-theory is complex and contains a large number of concepts and propositions which operate at a very high level of abstraction (Gregor 2006). In many cases, ST “gives rises to diverse and sometimes contradictory interpretation” (Pozzebon and Pinsonneault 2005, p.1355) because ST “provides no analytical grip on which is likely to prevail under what conditions or circumstances” (Archer 1982, p.459). These characteristics, i.e., the theory complexity, the contradiction in basic propositions and the lack of testable propositions, contribute to the problems in applying ST in empirical research (Jones and Karsten 2008).

Second, Giddens strongly emphasises in many of his writings that ST is not coupled with any specific research method or a methodological approach (Poole and DeSanctis 2004). The following excerpts from Giddens’s original writings clarify his intention.

Structuration theory is not intended as a method of research or even as a methodological approach. (Giddens 1989, p.296)

And;

I do not try to wield a methodological scalpel [...] there is [nothing] in the logic or the substance of structuration theory which would somehow prohibit the use of some specific research technique, such as survey methods, questionnaires or whatever. (Giddens 1984, p.xxx)

The lack of linkage to a specific research method or a methodological approach leaves the application of ST in the empirical domain to the interpretations and decisions of

researchers who choose to follow ST. This is challenging, in a sense, because it might prevent the application of ST in empirical research due to fact that it is hard to interpret a “suitable” research method according to ST (Rose and Jones 2008).

I disagree with these two criticisms. Consider that Giddens always states he prefers ST to be used in small concepts rather as a whole because it allows a more meaningful and thorough exploration of the problems under investigation (Sharma, Barnett, and Clarke 2012), the first point made that ST complexity makes it hard to apply ST in empirical research is not sound. Section 2.6 provides more discussions on this topic. The second point suggested that ST is not coupled with any specific research method or a methodological approach is an impartial interpretation of Giddens’ works. Although Giddens states in many places that ST is an open-ended, and non-compulsory, framework for social enquiry; he at the same time sets out certain stringent criteria which should guide research and analysis of research results. For example, Giddens (1989, p. 296) puts it that:

For instance, it is a logical feature of social research, following from the double hermeneutic, that all research endeavours have an ethnographic or “anthropological” aspect to them. Since this is a logical point, by definition it does not disclose anything directly which is an option for a researcher; it sets out what all social investigation, without exception, involves.

In a nut shell, the two criticisms that it is cumbersome to apply ST in empirical research are a partial interpretation of Giddens’ works. Although ST is complex, Giddens never intends for anyone to use all ST concepts to guide a research at the same time. On the contrary he encourages researchers to select certain ST concepts only. In a similar way, while ST is not coupled with any specific research method, Giddens strongly draws a boundary that a ST research should contain an ethnographic or anthropological method. This leaves researchers with no interpretation whatsoever on a suitable research method in conjunction with ST.

Summing up, despite the wide influence of ST in social science research, it has received a number of criticisms in terms of its fundamental flaws as well as the awkwardness of its application in empirical research. Most of these criticisms represent partial understanding toward Giddens’ writings. However some of these criticisms, especially whether structure should take a physical form or not and whether human agency has to adhere to social structure or not, are fundamentally sound. Therefore they represent on-going debates among structuration scholars and calls for further theorising. Withstanding these criticisms, ST is still proven to be a popular theory in the social science research because of (1) its attempt to reconcile opposing conceptualisations and (2) its prime focus on structure (see: section 2.1 ). This dissertation adheres to ST because of its strengths which fit very well into the overall research aim and questions described in the first chapter. Section 2.5 compares ST with other theories in IS in the light of the research aim and questions in order to show that ST is appropriately applied in this dissertation.

Since the main aim of this dissertation is to apply ST in an IS context, the next section will discuss how ST can be generally applied in the IS research context together with ST criticisms in IS research.

## 2.3 Structuration theory in IS research

Many researchers consider ST to be a meta-theory and a way of thinking across disciplines (Walsham and Han 1991; Gregor 2006) which can be generally applied to answer why and how social reproduction takes place. Therefore, it does not offer any specific testable proposition (Pozzebon and Pinsonneault 2005; Jones and Karsten 2008). In addition, it is quite obvious that ST does not mention anything in relation to IS research at all. Although IS and/or technology is missing from the original theory (Jones and Karsten 2008), ST is appealing to IS research because of its vast potential for uncovering the interplay of people with technology (Walsham and Han 1993; Poole and DeSanctis 2004, 2008). Hence, ST has enjoyed considerable popularity in IS research (Evans and Brooks 2005). It is even claimed to be the most influential social science theory in IS (Poole and DeSanctis 2004; Pozzebon and Pinsonneault 2005; Jones and Karsten 2008).

Previous work in IS has provided typologies on how ST is applied in IS research based on a literature review approach. These include Walsham and Han (1991), Jones (1997), Jones, Orlikowski and Munir (2004), Jesús Alberto (2007) and Jones and Karsten (2008). The most recent ST review from Jones and Karsten (2008), featured in *MIS Quarterly*, appears to contain the most comprehensive information, application and critique about ST in the IS discipline; therefore it is the main reference in this section.

According to Jones and Karsten (2008), there are three broad strands in which ST has been applied in the IS research:

- IS-specific version of ST.
- Critical engagement with ST.
- Straight application of ST.

The following paragraphs will describe how these three ST variations differ from one another. First, IS researchers have developed a number of IS-specific versions of ST in order to remedy the issue of the absence of IS technology from the original ST (see: section 2.2). Theories such as adaptive structuration theory (AST) (DeSanctis and Poole 1994; Markus and Silver 2008), duality of technology (Orlikowski 1992), the practice lens (Orlikowski 2000) as well as other IS empirical research which deliberately apply these theories fall into this first category.



Second, some research sets out to compare ST with other social theories such as ANT (Berg 1998) and institutional theory (Barley and Tolbert 1997) to explore theory limitations and gaps. Some combine ST with other theories to improve the theories' limitations. For example, ANT does not differentiate between human and non-human actors. Therefore it cannot be used to study the interaction between human and non-human actors. ST, on the other hand, rests on the concept that human agency has a stronger power over the social structure (or the non-human actor according to the ANT language) in determining a social reproduction (Giddens 1979, p.7). As a consequence ST rules out the non-human actor. This causes scholars such as Brook and Atkinson (2004) and Ignaiadis and Nandhakumar (2009) to combine ST with ANT to improve the limitations of ST and ANT in IS settings.

The last strand takes ST as a given and explores how the theory can offer insights into IS phenomena. ST can be used as a meta-theory to define structuration (Walsham and Han 1993) or certain fundamental concepts within ST can be applied for problem analysis. Regardless of the choices to apply ST, they must be constantly related back to the broader constitution of ST (Walsham and Han 1991). It is claimed that Giddens favours the application of a specific ST concept over a vague application of ST in its entirety as it permits a more detailed and meaningful exploration of an imminent problem (Sharma, Barnett, and Clarke 2012).

Having explained the three typologies on how ST is generally applied in IS research, the next section provides a general discussion on ST critiques in IS research.

## 2.4 Criticisms of structuration theory in IS research

The dominant status of ST as one of the influential theories (Poole and DeSanctis 2004) in IS research also attracts a number of criticisms of its application in the IS research domain. The influence of ST in IS research is shown in the most recent review by Jones and Karsten (2008) in which they have reviewed over 300 IS publications which are influenced by ST over 25-year<sup>4</sup> period from 1979 to 2004. In

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<sup>4</sup> Jones and Karsten review the IS publications at different time periods depending on the availability of the journal in question. The most intensive coverage is a review of IFIP Working Group 8.2 Conference Proceedings from 1975 to 2004. The least intensive coverage is reviews of The Information Society journal and Journal of Organizational Computing from 1996 to 2004. Full details of the IS publications covered can be found in Table 3 (see: Jones and Karsten 2008, p.137). However, in short, it can be approximated that they review IS journals over the 25- year period.

addition, there are a number of exemplary ST-inspired theories in IS such as the duality of technology (Orlikowski 1992), the practice lens (Orlikowski 2000), and the adaptive structuration theory (DeSanctis and Poole 1994). The prevailing status of ST in IS research leads this section to discuss criticisms of ST application in IS research at a general level in order to judge the suitability of ST in this dissertation. These criticisms are worth taking into account when we want to use and further develop ST in IS research as it has been remarked that we should learn from these criticisms to further develop ST.

One of the most general critiques of ST application in the IS research discipline is that such application might go against the intention of Anthony Giddens who might never have intended ST to be widely applied in the IS research as is the case with ANT. This criticism is supported by the fact that Giddens hardly talks about IS technology in particular in his writing on ST (Jones and Karsten 2008). One of the very few direct indications toward IS technology does not appear until 1998, almost 20 years after he first wrote about ST. In this statement, he mentions;

Technology does nothing, except as implicated in the actions of human beings. (Giddens and Pierson 1998, p.82)

This statement leads to the second criticism that the concept of IS technology as a physical entity might go against Giddens's fundamental rule of ST which posits that structure is a virtual structure which exists outside time and space. The above statement implies that IS technologies are nothing more than an "occasion for structuring" (Barley 1986, p.78). In other words, the physical form of IS technologies transform themselves as resources (see: the modality of facility in section 2.1) only when human agencies decide to utilise them in the structuration process (Giddens 1984, p.33) – to be precise only when human agencies move to use them. Poole and DeSanctis (2004, p.211) suggest that this has divided IS researchers into two poles. The first pole represents those who stay true to the original ST. This group suggests that what IS research should study following the original ST is the structuration process which is influenced by IS technologies. IS research should not study any IS technology in particular because it has neither meaning nor force outside of its use through human agencies. The second pole represents those who feel that the disregard of IS technology artefacts limits the view of what IS as a research discipline should be. This group chooses to consider IS technologies as a source of social structures. They argue that designers of IS technologies (the human agencies) have already incorporated social structures such as social norms and social rules into IS technologies during the development stage. These social structures somehow are further enacted and changed when users use them. The latter view is categorised as the *technology as structure* group in the ensemble view of technology (Orlikowski and Iacono 2001). This is also the view that this dissertation subscribes to.

The third criticism is connected to the first general critique suggested by Archer (see: section 2.2). The fact that ST represents an ever ongoing process without

acknowledging any end point in the time frame affects the application of ST in IS research to account for variance in behaviour or to predict future outcomes (Poole and DeSanctis 2004, p.211). Applied in the context of IS research, ST is not a suitable theory to anticipate the impacts of the adoption and use of IS technologies in society or to provide recommendations as to how developers should develop any particular IS technology

Summing up: this section suggests three general criticisms as to how ST should be used or not be used in the IS research. Once again, these criticisms do not appear to diminish the popularity of ST in IS research. The higher concern for acknowledging these criticisms is for IS researchers to become more conscious when applying ST in their research projects. The interest of a research endeavour does not stop at producing empirical results but it also extends beyond that through an attempt to refine the theory in use. A proper application of ST to suitable empirical settings will allow ST to advance as a theory to explain and rationalise the empirical world.

This dissertation acknowledges and considers the criticisms that ST represents, however these criticisms do not endure the application of ST because of the following strengths of ST:

- ST focuses on the interaction process between agency and structure which allows this dissertation to investigate how business controllers or human agency perceive IS technologies in relation to the budgeting process (Orlikowski 1992).
- ST focuses on the structure which is suitable to investigate how business controllers react upon “the structuring properties of [IS]technology” for the budgeting process (Poole and DeSanctis 2004).

The next section compares ST with the other two dominant theories in IS, namely actor network theory (ANT) and the institutional theory, in the context of the research aim and questions in order to explain why ST is more suitable than other theories in IS for this dissertation.

## 2.5 Comparing structuration theory with other theories

The purpose of this section is to compare ST with other dominating theories in IS in the light of the research aim and the research questions posed. It intends to clarify why ST is chosen in the context of this dissertation instead of other theories. The actor network theory (ANT) and the institutional theory are selected to compare with ST. These two theories are selected because their prevailing statuses in IS research are

similar to ST. The section starts off by explaining basic fundamental concepts contained in the two theories. Later it compares and contrasts ST with a specific theory in question in order to develop arguments why ST is more appropriate than a particular theory in the context of this dissertation.

### **2.5.1 Structuration theory and actor network theory**

Actor network theory (ANT) is a theory which holds that the ordering of the social is never purely “social” but rather of a “sociotechnical” nature in the sense that the social and the technical mutually define one another (Doolin and Lowe 2002). Within the IS field, ANT is consistently applied to guide IS analysis because of its potential to highlight the complex social interactions between the social and IS technologies (Hanseth, Aanestad, and Berg 2004; Sarker, Sarker, and Sidorova 2006). ANT offers a rich set of concepts to understand such complex relationships in a sociotechnical network; however some of the concepts are selected to be discussed briefly here.

“Actor” is the most fundamental concept in ANT. Actor is defined as “any element which bends space around itself, makes other elements dependent upon itself and translates their will into the language of its own” (Callon and Latour 1981, p.286). The concept of actor is not restricted to any particular kind of social or technical beings. Therefore it covers human, technical artefacts, organisations and institutions etc. Each ANT actor is defined and understood in relation to other actors (Sarker, Sarker, and Sidorova 2006). ANT neither distinguishes between nor defines a priori any kind of elements. They are just called “actants” whether they are human or non-human. This fundamental assumption in ANT has raised many criticisms in academia. The key issue is to address how artefacts can have interests because fundamentally it is believed that only human actors possess such capacity. ANT philosophers reply to this issue by explaining that the interests of an artefact can be equated to the interests that have been inscribed in it by the very human actors who design or invent the artefact.

The actor-network relationship presented in ANT is of a heterogeneous nature which means that it is made of up “aligned interests from people, organisations and standards” (Walsham and Sahay 1999, p.42). There is no network consisted exclusively of either humans or artefacts (Hanseth, Aanestad, and Berg 2004). The actor-network in ANT can be understood at different levels of complexity as the theory allows researchers to zoom-in and zoom-out to reflect the level of granularity that they consider appropriate. The core of ANT is to study the construction of things which are normally taken-for-grant such as the border between the technical and the social and the border between design and use.

Concisely, ANT is a theory which focuses on tracing and explaining why a particular stable actor-network is created and maintained or alternatively why such a stable

actor-network fails to create or maintain itself. A successful actor-network formation is created through:

The enrolment of a sufficient body of allies and the translation of their interests so that they are willing to participate in particular ways of thinking and acting that maintain the network. (Walsham and Sahay 1999, p.42).

There are two important dissimilarities between ANT and ST. First, although both ANT and ST acknowledge the presence of human and non-human actors in shaping a social practice, ANT does not differentiate between human and non-human actors like ST. ST gives more priority to the human actor than the non-human actors. This is evidential when Giddens specifies that human actors (or agency in ST term) always “could have acted otherwise” (Giddens 1979, p.56). Critics of the ANT approach warn that ANT misses that meaningful interpretation found only in the human actors such as their ability to use language and other symbolic forms to generate and interpret meaning when ANT does not differentiate between human and non-human actors. As a result, ANT contributes to a limited extent in areas such as sense-making, interpretation and narrative (Whittle and Spicer 2008). Second, ANT and ST provide different focuses in an explanation of a social phenomenon. ANT focuses on explaining how a social structure unfolds itself through accounts of how human and non-human actors interact in networks as well as their ability to align and translate their interests. Therefore, ANT can be said to ignore any pre-existing structures such as power etc. Whittle and Spicer (2008, p.612) comment on this lack of consideration of pre-existing structure in ANT in the following way:

ANT [is] less well equipped for pursuing a critical account of organisations – that is, one which recognises the unfolding nature of reality considers the limits of knowledge and seeks to challenge structures of domination.

This criticism does not apply to ST as the theory fully takes into account the power of this pre-existing structure (or the structure of domination in the ST language as discussed in section 2.1). Giddens purposefully inserts that human actors draw upon their power to control resources to produce structures of domination. Thus it can be inferred that ST takes into account the context of any pre-existing structure.

In the context of this dissertation, ST is deemed more appropriate than ANT for the following reasons. One, the first argument posited that ANT lacks the ability to interpret meaning that human actors put into their social practice is the main argument why this dissertation deems ANT to be inferior in comparison to ST. The central tenet in this dissertation is business controllers and how they interpret (and use) IS technologies in their works, therefore ANT is not as suitable as ST. Two, the second argument that ANT ignores any pre-existing structure in a social structure analysis is contradictory to the very nature of how business controllers work. In business organisations, business controllers are given certain pre-existing structures in their work conditions such as the types of IS technologies available etc. Business controllers seem to have a little power to negotiate for a new IS technology, whether it

is a new ERP system or BI, to help them in their work. ANT does not represent a true account of the business controller's position in real organisations as ST does. As a result, ANT is ruled out and ST is selected to guide the research.

### 2.5.2 Structuration theory and institutional theory

Institutional theory is one of the most complex and diverse theories used in many different disciplines such as economics, political sciences and IS (Scott 2008). It is applied in many IS research studies because it:

Develop[s] a more structural and systematic understanding for how technologies are embedded in complex interdependent social, economic and political networks, and how they are consequently shaped by such broader institutional influences. (Orlikowski and Barley, 2001, p.154).

In other words, institutional theory attempts to provide a superior explanation as to how institutions are created, maintained, changed and dissolved while also taking into account the influence of human behaviour on institutions such as rules, routines, norms and belief systems (Scott 2004; 2008). The institutional theory in focus here is “neo-institutionalism” in organisation theory which differs from the “traditional institutionalism” school initiated by Phillips Selznick in many perspectives. Anyhow, the old and the new institutional theory share certain similarities; including scepticism towards the rational model of organisation, or Max Weber's “iron cage” (2001, p.123).

Despite their similarities, neo-institutionalism differs from Selznick's school in many respects due to fundamental differences of assumption. The new concept holds that organisations have limited rationality due to their struggle to balance relationships between stability, legitimacy and non-articulated common understandings in the society in contrast to the old vested interests due to political trade-off within organisations. Because neo-intuitionism places organisations in a wider context, it offers advantages to researchers in applying a macro/micro perspective on different units of study which is not achievable under the Selznick school which permits analysis only at the organisational level. The two fundamental concepts in neo-institutionalism – isomorphism and decoupling (and the logic of confidence and good faith) – are briefly discussed as follows.

DiMaggio and Powell (1983) address the “isomorphism” paradox in order to question why organisations are becoming more and more similar. They acknowledge that organisations are different when they first start out but once they reach a certain stage of maturity they tend to be similar to other organisations in the same industry or social network. They refer to the paradox as isomorphism which is defined as:

A constraining process that forces one unit in a population to resemble other units that face the same set of environmental conditions (DiMaggio and Powell 1983, p.149).

Isomorphism is a useful concept to analyse organisations from a holistic perspective in order to find out why firms are becoming more and more similar in their structures. However, another paradox exists when organisations are analysed at individual level: organisations whose structure becomes isomorphic decrease internal coordination and control in order to maintain legitimacy (Meyer and Rowan 1977). Empirical research suggests that there is a great gap between formal and informal organisational structures. They suggest that we can perceive an organisation as a continuum between two aims. At one end lies a production organisation whose success depends on clear-cut coordination and controlling activities in a way that enables it to achieve maximum efficiency. At the other end lies an institutionalized organisation whose success is based on strong reliance upon confidence and acceptance from society. Because attempts to control and coordinate activities according to the production organisational logic lead to conflicts and loss of legitimacy under the institutionalized organisation model, organisations choose to incorporate both structures by means of decoupling and the logic of confidence and good faith, which may be described in the following ways:

- Decoupling means that organisations maintain their standardised, legitimised, formal structures but allow internal work activities to vary in respond to practical work requirements. Formal organisational rules are avoided because they would generate inconsistencies among technical operations; individuals are left to work out technical interdependencies informally.
- The logic of confidence and good faith of individuals help prevent the entire decoupling process from anarchy. It legitimates institutionalised organisations based on the assumption that the individual thinks that things go as they ought to.

In summary, institutional theory accentuates how organisational influences and individuals mutually shape organisations. On one hand, institutional theory highlights organisational influences on decision-making and formal organisational structures. It holds that organisations and individuals are suspended in a web of values, norms, rules, beliefs and taken-for-granted assumptions that are at least partially of their own making. However, the focus is on explaining how organisations “constrain” options which individuals and collectives are likely to exercise in order to be considered legitimate. This is the cause of the first fundamental concept in the theory: the isomorphism paradox which focuses on why organisations are becoming similar to others. On the other hand, the theory acknowledges that the isomorphism paradox leads to the second paradox on decoupling. It is observed that individuals usually work inside organisations in a way which is inconsistent with the externally-legitimised organisational structures.

In comparison with ST, the two following differences between the two theories are widely suggested in the literature. First, even though it is observed that institutional theory exhibits duality, which is also the fundamental concept in ST (see: section 2.1) – in the sense that organisations (and individuals as explained in the decoupling logic)

form and constrain social actions – in most circumstances, institution theory concentrates on organisation’s capacity to “constrain” (Barley and Tolbert 1997). There is little evidence to support how institutional theory investigates processes by which organisations emerge to “enable”, or influence social actions (Barley and Tolbert 1997). Second, in contrast to ST which holds that social structure (or organisation in the institutional theory language) exists only when there is an interaction between agency and structure, the institutional theory holds a dissimilar assumption that social structure (or organisation) persists while individuals come and go. Although individuals are significant in creating social structure, the social structure under the institutional theory assumptions appears to enjoy some existence outside the presence of individuals to the point of creating a perhaps excessively static conception of social structure (Peters 2000).

In connection to the research aim and questions which focus on describing and explaining the use of IS technology in a budgeting process, these two fundamental differences between ST and institutional theory are the fundamental arguments why ST is more appropriate. In connection to the first point made, that institutional theory seems to pay more attention to the organisation’s capacity to “constrain”, rather to “enable” social reproduction, institutional theory would offer an inferior explanation as to how business controllers or individuals perceive IS technology to both enable and constrain their budgeting practice. In a similar sense, the assumption that social structure is a static process is contradictory to the fundamental tenet that this dissertation is interested in explaining an interaction between business controllers and IS technologies throughout the course of the budgeting process. Therefore the assumption of the institutional theory that business controllers are not necessarily required in a social structure does not fit with the general aim of this dissertation.

In a nutshell, this section compares and contrasts ST with two other dominant theories in IS, actor-network theory (ANT) and institutional theory, in the context of the research aim and questions. It presents arguments as to why ST is the most appropriate theory selected in this dissertation in comparison with the other two prevailing theories. The next section describes ST variations employed in the dissertation in connection with the general research aim and the two main research questions.

## 2.6 Structuration theory variations employed

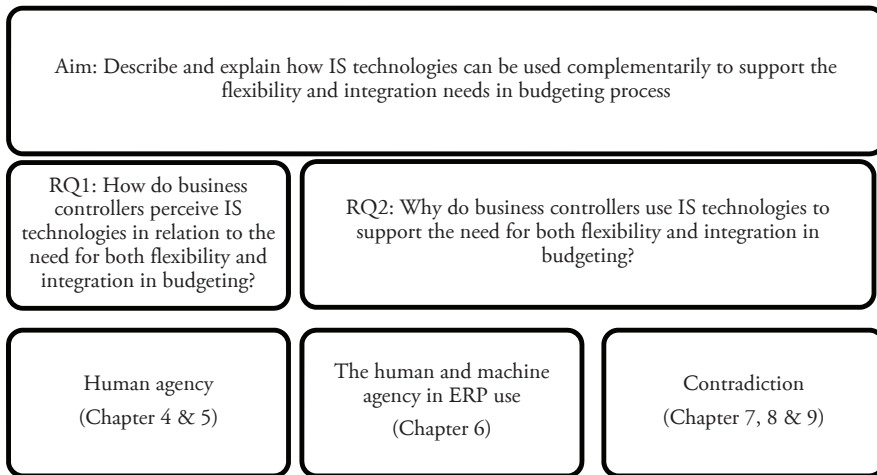
This dissertation employs ST as a background for data analysis and theorizing as it focuses on specific concepts in ST, not the entire concepts of ST. It is often claimed that Giddens prefers ST to be used in small concepts rather as a whole because it allows a more meaningful and thorough exploration of the problems under



investigation (Sharma, Barnett, and Clarke 2012). Therefore the analysis results are believed to provide better description and explanation which contributes significantly to theorizing. This does not mean that anyone should disregard any connection between specific concepts and the general ST themes. On the contrary, scholars (Walsham and Han 1991) advocate that specific application of ST concepts should always be related to the general ST themes. In short, ST is employed in this dissertation as a *sensitising device* for data analysis rather than a prescribed guideline for data collection and analysis. Giddens illuminates on the sensitising device in the following way:

There is, of course, no obligation for anyone doing empirical research, in a given localized setting, to take on board an array of abstract notions that would merely clutter up what could otherwise be described with economy and ordinary language. The concepts of structuration theory, as with any comprising theoretical perspectives, should for many research purposes be regarded as sensitizing devices, nothing more. That is to say, they may be useful for thinking about research problems and the interpretations of research results. (Giddens 1984, p.326).

**Figure 2.2 The relation of ST variations with the research aim and questions**



This dissertation employs three variations of ST. The first variation, which is applied in RQ1 (see: section 1.5), is a straight application of a specific ST concept, that is, the concept of human agency. The second variation, applied in the explorative part of RQ2, is a critical engagement of ST with ANT which indicates interactions between human and machine agencies in ERP use. Even though the name of this concept suggests that it is applicable to ERP systems alone, in my opinion it can also be applied to other IS technologies as well. The third variation is a straight application of

a specific ST concept, which is the concept of contradiction. This concept is consistently used to examine the rest of RQ2. Figure 2.2 portrays a clear indication of how these three different variations of ST are employed in relation to the overall research aim, research questions and chapters. The proceeding sections give short descriptions of the three ST variations used in the dissertation.

### 2.6.1 Human agency

The essence of ST mandates that social phenomena are not the mere products of either social structures or human agency, but of both. However, the transformation capacity belongs only to human agencies in their interpretation of social structures. This is because Giddens's view of human agency is strongly *voluntaristic* in comparison to the social structure (Jones and Karsten 2008). In his own words, Giddens argues that, with the exception of cases where human agencies have been drugged and abused by others, they always have "the possibility to do otherwise" (1979, p.258) based on their purposes, reasons and needs. In their attempts to influence social phenomena, human agents interpret existing social structures in terms of what the structures constrain and enable them to achieve. Though human agents' attempts to influence the social processes are not always successful due to bounded rationality, they recurrently engage in the process.

The concept of human agency has been widely applied in IS research especially to explain how and why individuals use and not use certain IS technology. Boudreau and Robey (2005) use the concept to address resistance to and use of ERP systems in both intended and unintended ways. Ignatiadis and Nandhakumar (2007) use the concept to explain how users drift away from procedures embedded in the ERP system for their local use. In addition, the concept is used to explain improvised learning in ERP system use (Orlikowski and Hofman 1997).

The concept of human agency guides RQ1 to describe and explain how business controllers (the human agencies in Giddens's terms) perceive IS technologies in relation to the flexibility and integration domains in budgeting. In the light of the prior application of human agency in IS research, it is argued that the concept is appropriately applied in relation to the research question to uncover business controllers' perception of IS technology. An examination of business controllers' purposes, reasons and needs will help us discover why they decide to use or not to use certain IS technology to support the budgeting process.

Criticisms of this concept are presented in the literature. Giddens' critics argue that an equation of human agency with action is problematic in three ways. First, although it is necessary from a structuration perspective to equate human agency with actions in order to explain its duality with structure, "it does not mean that all agential effects are the products of activity" (Jones, Orlikowski and Munir, 2004,

p.310). For example, it is indicated that in well-ordered institutions like monasteries, social rule may dominate social reproduction in a way that human actions are insignificant or absent. Second, it is argued that Giddens ignore the fact that social structures especially material structures may restrict agents' choices far more than Giddens suggests (Jones, Orlikowski and Munir, 2004). In specific to IS technology research, Storper (1985) suggests that "the *durée* of the material, although not imposing absolute constrains on system change, does mean that at any moment not everything is possible" i.e., a video-on-demand service is very much dependent on the quality and the availability of the Internet service in a particular country or area. Third, Archer (1982) points out that this concept is contradictory to the most basic ST principle which holds that social reproduction is an account of both human agency and social structure. The fact that Giddens gives more weight to human agency in determining social reproduction just brings the entire ST back to the old duality thinking.

### **2.6.2 The human and machine agency in ERP use**

The human and machine agency framework (Ignatiadis and Nandhakumar 2009) is based on Giddens' works. It can be classified as a critical engagement with ST (see: section 2.3). The framework represents an attempt to overcome conflicting conceptualizations of agency at the level of reference discipline (Rose and Jones 2008). At a general level, agency is defined as "the capacity to make a difference" (Giddens 1984) or something that makes an effect or change (Rose, Jones, and Truex 2005). The two popular social theories, ST and ANT, offer conflicting and different accounts regarding agency (see: section 2.5.1). According to ST, only humans can have agency while IS technology (the machine) lacks any capacity to act independently with consequences. Here the human agency dominates. In ANT, both human agent and machine can become agents/actants and they are both treated symmetrically. Here the machine is equivalent to the human agent. The problem presented is that, when these two theories are applied in the IS context, ST cannot give an account of how the machine might affect future outcomes. ANT, on the contrary, cannot explain how machines act in relation to humans. The human and machine agency framework then argues that neither ST nor ANT can satisfactorily explain the complex interplay of different agency forms found in real-life phenomena (Rose, Jones, and Truex 2005). As a result, the framework presents a new way of thinking about agency in a typical IS phenomena.

The framework differentiates between machine and human agencies following the conceptualisation of ST which is missing in ANT as that theory posits that all agents (machine or human) are equal. It explains that both agents perform actions which have consequences for each other. Activities performed by human agents form intentionality toward the machine agent. Such intentionality is deemed as superior to

affordances, defined as actions performed by the machine agent toward the human agent. The concept assumes that these two agencies are not separate but intertwined and propagated, which is strongly influenced by the concept of duality presented in ST. The framework is presented in numbers of empirical publications especially in the ERP domains, such as Dogerty, Coombs, and Loan-Clarke (2006), Rose and Jones (2008) and Ignatiadis and Nandhakumar (2009).

The framework is employed to guide the analysis in the explanatory part of RQ2 in order to investigate how and why business controllers use or do not use different variants of “accounting solution” (ERP systems, hybrid ERP and BoB) to support the budgeting process. The concept is deemed appropriate as it opens up the possibility of studying the human agent (the business controller) and the machine agent (the accounting solution) as well as the interactions between them in order to uncover why business controllers use or do not use “accounting solutions” to support budgeting.

Even though the concept is applied outside the scope of the original ERP system, as the name of the framework suggests, it is argued that the application of the framework to accounting solutions in general (the ERP system, hybrid ERP and BoB) is appropriate. There is no specific instance in the framework which suggests that it should be strictly applied to the ERP system alone.

### **2.6.3 Contradiction**

Although largely ignored in the literature, the concept of contradiction contained in the original ST can be said to be the heart of ST (Walsham 2002). This is especially the case when considering that Giddens explicitly suggests:

Don't look for the functions social practices fulfil, look for the contradiction they embody! (1979, p.131)

Giddens defines contradiction as;

An opposition or disjunction of structural principles of social systems, where those principles operate in terms of each other but at the same time contravene one another. (1979, p.141)

To supplement contradiction which occurs at the structural level, he conceptualises conflict which is thought to occur at the level of social practice. In his own words, conflict is a “struggle between actors or collectives expressed as definite social practices” (Giddens 1979, p.131). Based on Giddens' original writing, Walsham (2002) interprets conflicts as the real activity and contradiction as the potential basis for conflict which arises from structural contradictions.

The concept is applied to guide the response to RQ2 in order to explain how and why business controllers use or do not use certain IS technologies to support the budgeting process. It is argued that a thorough examination of contradiction and

conflict in social structures can reveal important tensions and ambiguities inherent in the structuration process between social structure and human agent (Robey and Boudreau 1999; Schultze and Orlikowski 2001). Empirical application of this concept in the IS context is strictly limited. To date, an empirical work from Rodón and Sesé (2010) on inter-organisational information systems (IOIS) adoption, and Walsham (2002) on a cross cultural software use, are the only works that employ this concept. The Rodón and Sesé paper examines a structural configuration of the system before and after adoption of the system. It explains that “the contradictions between the initial social structure and the structure enacted in the use of an IOIS can be a cause of non-adoption” (2010, p.637) . The Walsham paper uses this concept to examine contradictions in a case of geographic information system (GIS) transfer where users decline to use the system once a negative consequence arises from using the system. Apart from the two empirical papers that apply the concept, it has long been suggested that the concept can be applied to examine the problem of system use and non-use (Walsham and Han 1991).

Inspired by these examples, the concept is employed in the budgeting context to describe and explain how IS technology (seen as a social structure) is contradictory to budgeting process (also considered as a social structure conducted by human agents) (Orlikowski 1992). The use of this concept further emphasises *the technology as structure group* in the ensemble view of technology (Orlikowski and Iacono 2001) that this dissertation supports, as previously mentioned in section 2.4 .

Having specified the three ST concepts in relation to the research aim and the research questions, I have endeavoured to strictly follow Walsham and Han’s (1991) advice that an exclusive use of any individual ST concept must be related back to the overall ST theme since a lack of such reference indicates an incomplete application of ST.

## 2.7 Summary

This chapter presents an overall discussion of structuration theory (ST) which is the leading social theory adopted in IS research. At the most basic principle, ST offers a new way of thinking toward social reproduction that it is a result of interactions between social structure and human agency. Although the main thesis of ST is widely received in academic research, criticisms of the theory are expressed, such as the contradictory assumptions as well as the difficulty of application of ST in empirical settings. In comparison with other dominant theories in IS research, such as actor-network theory (ANT) and institutional theory, ST is deemed the most appropriate theory applied in the context of the research aim and questions. This dissertation employs ST as a sensitizing device in data collection and analysis in three variations:

human agency, human and machine agency in ERP use, and contradiction. These ST concepts will be used in this dissertation in close connection with the overall ST theme.



# 3. Research methods

The purpose of this chapter is to introduce the research methods on which this dissertation is based. This discussion is carried out in connection to the research purpose and the research questions. It starts with a general discussion on paradigms in scientific research, then discusses three general paradigms in the IS research tradition and proceeds to discuss the research design of the dissertation. The discussion includes the choice of research paradigm selected, the research method chosen, and the research strategy applied. Lastly the chapter spells out the research process. Topics articulated include case sampling strategy, case descriptions, data collection methods and data analysis. The chapter finishes with a short summary of the key ideas presented herein.

## 3.1 Paradigms in scientific research

The dynamic and development of IS as a research discipline (Baskerville and Myers 2002), which draws upon other academic disciplines, has caused a broad variety of research approaches to IS (Niehaves and Stahl 2006). These differences in research approaches are generally referred to as “paradigms”, a concept popularised by Thomas Kuhn in his influential book: *The structure of scientific revolutions*.

Kuhn describes paradigms as “some accepted examples of actual scientific practices – examples [of] which include law, theory, application, and instrumentation together – provide models from which spring particular coherent traditions of scientific research” (1996, p.10). Paradigms can be said to be the very element of science addressing the following four main concerns in scientific research;

- What is to be observed and scrutinized,
- What questions are supposed to be asked for answers for a certain scientific domain,
- How these questions should be presented,
- How scientific results should be interpreted.



In short, the main function of a paradigm is to provide puzzles as well as tools to solve them for a common group of scientists. However it was clear to Kuhn that a paradigm does not last eternally but it changes and shifts to a new form once scientists lose their confidence in the old paradigm to solve the puzzles. This stage is referred to as a paradigm crisis, which consequently is followed by a revolution when the old paradigm is superseded by a new rival paradigm. Comparison between the old and the new paradigms is not straightforward. Kuhn posits that there is no way that we can compare puzzles and solutions developed under one paradigm against those developed under a different paradigm because there is a lack of common measure between them. Kuhn refers to the lack of comparison between paradigms as “incommensurability”.

The concept of incommensurability in Kuhn’s remarks can be distinguished into three causes. First on the methodological cause, there is no common measure between different paradigms because the methods employed to solve puzzles change over time. Second, on the perceptual/observational cause, the nature of perception and the interpretation of observations changes according to the paradigm to which they adhere, therefore it is not possible to compare theories arising from one paradigm against others. Third is the semantic cause which refers to the change in scientific languages over paradigms. As a result, terms and classificatory schemes used in an old paradigm are not inter-translatable into a new paradigm. The problem of paradigm incommensurability will be further discussed at the end of the next section when the dissertation has discussed how the paradigms are applied in the context of IS.

Despite Kuhn’s strong influence over the development of the term paradigm, critics argue that Kuhn does not use the term paradigm in a very consistent manner. Masterman (1970) shows that Kuhn has used the term in at least twenty-one different ways. For example, Kuhn at one point calls a shared scientific commitment among a group of scientists a “disciplinary matrix” (1996, p.182) but he uses the term “paradigm” elsewhere. However this criticism does not seem to diminish Kuhn’s influence over the scientific community. Recently a new direction of criticism has developed that Kuhn’s work is Eurocentric, which implies that Kuhn ignores the contributions from Arabic, Chinese, ancient Egyptian and Indian traditions that also shaped the modern science (Bala, 2006). The criticism is made in connection to Kuhn’s own statement (1996, p.168) that he considers only “the civilizations that descend from *Hellenic Greece*” (emphasis added) to be relevant to the science that he is interested in.

In short, paradigms are fundamental to the scientific community because they govern the design and conduct of research. Paradigms exist in many forms and compete against one another for dominance. The problem of paradigm incommensurability, or the suggestion that it is not possible to compare puzzles and solutions produced in

one paradigm with others, prohibits the view that science progresses in an accumulative manner.

## 3.2 Paradigms in IS research

Applied in the context of social science research, various social science paradigms govern how people view and make sense of social reality in practice (Bhattacharjee 2012). By analogy, the paradigms that people hold are like coloured glasses which govern how people view, structure and think about what they see in the world. In IS research, the term paradigm can be used in many different ways. Niehaves and Stahl (2006) suggest that there are three different ways the term paradigm is normally referred to in the IS research discipline.

- Behavioural and design science research paradigm
- Positivism and interpretivism research paradigm
- Critical research and non-critical research paradigm

The first widely adopted paradigm to systematise IS research is to distinguish it into behavioural and design science paradigms<sup>5</sup> (March and Smith 1995; Hevner et al. 2004). The fundamental concern for separating between these two paradigms is that they address different yet related interest in research. The behavioural research paradigm fundamentally concerns explanation and prediction of social phenomena such as human behaviours and IS technology functions as well as other phenomena of similar nature. Theory development is a generally accepted advance in this paradigm as it is commonly hold that a new development/refinement will allow us to explain the truth in social phenomena better (Hevner et al. 2004). Through the new truth, the function of the design science paradigm is to build and evaluate IS technology artefacts based on the insights offered in the behavioural paradigm as the main aim of the design science paradigm is not to seek the truth, but to produce utility. Hevner et al. (2004, p.80) argue that these two paradigms are complementary to each other, as they state:

Truth and utility are inseparable. Truth informs design and utility informs theory. An artefact may have utility because of some as yet undiscovered truth. A theory may yet to be developed to the point where its truth can be incorporated into design. In both

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<sup>5</sup> It should be noted that Hevner et al. (2004)'s view is not the only absolute view toward paradigm distinction, other views such as the work from Iivari, Hirschheim and Klein (1998) are also available and should be taken into consideration.

cases, research assessment via the justify/evaluate activities can result in the identification of weaknesses in the theory or artefact and the need to refine and reassess.

Briefly, the behavioural and design science paradigms are considered to be complementary to each other. It is also important to remind that this is contradictory to the concept of paradigm incommensurability suggested earlier. The aim of the behavioural paradigm is to seek truth in social phenomena. The aim of the design science paradigm is to seek utility. A flaw presented in one paradigm can be discovered through the other paradigm, thus a mutual dependence between these two research paradigms will enhance the over IS research process. Once again, it should be observed that the complimentary characteristic of the behavioural and design science paradigms contradicts to the fundamental paradigm concept in Thomas Kuhn that paradigms are incommensurable to one another.

The second paradigm distinction is between positivism and interpretivism. The positivism paradigm originated from a French philosopher, Auguste Comte (1798–1857). This paradigm emphasises that scientific contribution should be on precision, or the measurement of things. Therefore positivism researchers (often) employ various quantitative-based methods to measure, collect and reason social phenomena (Weber 2004). Positivism puts a strong emphasis on “empiricism”, which is blind faith in observed data and rejects any attempt to reason beyond observable and measurable data. Therefore, positivism researchers rely exclusively on theories which can be directly tested and falsified in order to establish a generalised theory across time and space. However, as one could have guessed, the nature of the positivism paradigm is against the very nature of human behaviours which are neither measurable nor observable with precision (Flyvbjerg 2006). Frustration with the positivism paradigm led to the development of post-positivism or interpretivism in the mid to late twentieth century. The interpretivism paradigm holds that social reality is viewed and interpreted by individuals based on the ideological positions they possess (Weber 2004). Reality has multiple layers; therefore it can have many interpretations depending on how individuals might see it. Science or knowledge generated from this paradigm is not precise, but probabilistic because it is based on many contingencies (Bhattacharjee 2012, p.18). The knowledge about a phenomenon is adopted when the level of understanding about the phenomenon is probed in various unexplored dimensions or contingencies. This is a sharp contrast to the positivism school which aims at establishing relationships among components.

In brief, the two major paradigms represent two poles of an IS paradigm. Even though they share a similar ontological assumption that a real world is existent, they represent two distinctive epistemological views of how we can envision a social reality (Niehaves and Stahl 2006). The positivism paradigm stands for a strict separation between humans and reality, therefore it believes in objectivity, measurability, predictability, laws and rules of human behaviour. The interpretative scheme, on the contrary, posits that it is impossible to separate humans and reality because humans

understand and explain their social phenomena based on a stream of experiences that they have had throughout their lives. Therefore interpretivism represents understanding, interpretations and sense-making of human behaviours which are neither measurable nor stable over time. Whether or not the positivism and interpretivism paradigms are commensurable is still an open debate. There are IS researchers who advocate integration between these two paradigms (Lee 1991; Trauth and Jessup 2000; Beachboard 2004) and those who do not consider such attempts worthwhile (Deetz 1996; Weber 2004).

The last paradigm distinction is between critical and non-critical research traditions. It is important to notice that the concept of non-critical research does not exist in reality; it is just a logical complement to the critical research to signify that there are certain researchers who do not adopt the critical perspective. Therefore, this section will mainly discuss what critical research is. The critical research paradigm is often seen as the third alternative to the two traditional paradigms of positivism and interpretivism (Carlsson 2004; Mingers 2004). However, Niehaves and Stahl (2006) argue that we should not consider critical research as an exclusive alternative to the positivism and interpretivism paradigms but rather as a complementary perspective to them. This is similar to the view advocated in Carlsson (2004, p.334) and Walsham (2005; 2006). In essence, critical research focuses “on what is wrong with the world rather than what is right” (Walsham 2005, p.112). Critical researchers find that certain things are wrong in the world, so they try to initiate changes in the status quo of reality; that is they try to promote emancipation in social reality. Since there is no clear description of what critical research might stand for (Mingers 2004; Niehaves and Stahl 2006), there are many views toward what critical research is.

Walsham (2006), for example, suggests that a motivation to research taken-for-granted assumptions about organisations and IS technology, and a dialectic analysis which attempts to reveal contradictory social practices is the most important stance in identifying whether or not such research falls into a critical research tradition. On the contrary, a recent call for a special issue on critical research in the *MIS Quarterly* journal (Mingers, Mutch, and Willocks 2011) suggests that the unique characteristic of critical research can be summarised into three points. First, critical research holds neither the positivism view which reduces the world to the empirical observations nor the interpretivism view which reduces the world to the human knowledge of it. Second, critical research recognises that human access to the empirical domain is limited and is influenced by perceptions and theoretical lenses applied to approach the research puzzle. Thereby, it accepts that knowledge is historical and local dependent (known as “epistemic relativity”) but it does not accept that every view point to knowledge is equally valid (referred to as “judgemental relativity”). Note that this is in strong contrast to the interpretivism which holds judgemental relativity as an important attribute. Third, critical research accepts that knowledge exists in many forms – physical, social, and conceptual. As a result, it requires a mixture of research methods and research methodologies to access it. The first suggestion from Walsham

lies at the heart of what critical research is about. The second comment from Mingers, Mutch and Willocks complements Walsham's statement through a vivid comparison of critical research against the traditional positivism and interpretivism distinction.

In summary, traditionally critical research is often seen as the "third" research paradigm representing an alternative to the traditional distinction between positivism and interpretivism. However some researchers propose that it should be seen as a complementary paradigm, rather than exclusive from the traditional paradigm distinction between positivism and interpretivism. In principle, critical realism is about initiating changes in society and it holds dissimilar meta-theoretical assumptions from the traditional positivism and interpretivism paradigms.

Following the short descriptions on the three main paradigms in IS research, Table 3.1 (after Niehaves and Stahl 2006) provides a summary of key similarities and differences among paradigms. As the table indicates, each paradigm seems to have a different focus on answers and questions as well as assumptions about knowledge and the world in general. There seems to be a consistent discussion that the behavioural and design science paradigms are commensurable to each other. However, there is no consistent agreement whether the positivism and interpretivism paradigms are in fact commensurable or not. Some researchers call for a joint approach to integrate them, others see that it is not worthwhile due to fundamental differences between them. Lastly the paradigm of critical research is logically not commensurable to the logical paradigm of non-critical research. This is based upon a basic logic that things cannot be "A" and "non-A" at the same time, i.e., one cannot have an intention to change society and not-to-change it at the same time. In conclusion, the problem of paradigm (in)commensurability is still an open debate within the social science discipline. The concept of paradigm incommensurability suggested by Thomas Kuhn seems to be applicable to the IS research discipline in selected instances only. Clearly, more work on paradigm classification is warranted.

Having described and discussed different paradigms in IS research, the next section employs the paradigm concept discussed in this section to develop the research design.

**Table 3.1 Core qualities of distinct paradigms and paradigm sets in IS (Niehaves and Stahl, 2006)**

	Behavioural science research	Design science research	Positivism	Interpretivism	Critical research	Non-critical research
Core question	(1) What is the stage/phase of the research process?	(2) What is the stage/phase of the research process?	(2) What is the (epistemological and ontological) worldview?	(3) What is the purpose of research?		
(In)commensurability	Imperative to combine Behavioural and Design Science Research	Imperative to combine Behavioural and Design Science Research	Discussion on (in)commensurability is still open.	Critical and non-critical research logically exclude each other		
Core answers	Problem understanding phase	Problem solving phase	Objective knowledge can be achieved in principle	Knowledge is always subjective	Change of reality; emancipation	Description of reality
Assumptions regarding the stages of research	Problem understanding	Problem solving	Open	Open	Open	Open
Epistemological assumption	Open	Open	Epistemological realism	Epistemological constructivism	Open	Open
Assumption regarding problems in society	Open	Open	Open	Open	Society is conflictual (history is history of class struggle)	Usually not explicitly reflected; naive assumption of harmony

### 3.3 Research design

Benbasat (1984) suggests that research design is a result of the nature of the research topics, research goals and the current knowledge of the research phenomena. Gregor (2006), on the other hand, offers a rearward view, proposing that the type of theory under development in the research can influence the choice of epistemological approach and therefore the research design. These suggestions together suggest that topics, aims, epistemology, and outputs correspond to one another in determining the research design. The main interest of this section is to discuss the research design of this dissertation. The dialogue in this section is presented in connection to the paradigm discussion presented earlier, for it is undeniable that the paradigm choice determines the overall research process (Weber 2004). To establish the research design upon which this dissertation is based, this section begins with a discussion of the research paradigm employed. This is because the paradigm determines the research method. After that, a discussion of the research method follows. Next this section presents a discussion on a specific research strategy; multiple case study research. Here the section concentrates on a general discussion about the suitability of the multiple case study research applied in this dissertation in relation to the research aim and the two research questions

#### 3.3.1 Paradigm choice: Interpretivism

Given the dissertation's purpose to develop a theory in the light of the IS paradigms presented earlier, I consider the interpretivism research paradigm to be the most suitable. This is because the interpretivism paradigm allows researchers to study complex and unique situations, especially in business and management research (Saunders, Lewis, and Thornhill 2006, p.107). Researchers following the interpretivism tradition can capture a rich complexity of social situations, which in turn permits research to capture subjective meanings behind people's action. This is very useful to a theory development process (Kaplan and Maxwell 1994).

Following the interpretivism paradigm, this dissertation subscribes to an ontological position, which is the view of the nature of reality which holds that reality is multiple and complex. Therefore there is no direct access to reality. The ontological position selected aligns with an epistemological position, or the relationship between researcher and reality, which holds that knowledge of reality is socially conditioned based on one's personal experiences of the world. Taken together, research that follows the interpretivism paradigm focuses on articulating the full complexity of

human sense making in real social settings (Kaplan and Maxwell 1994; Weber 2004). This is appropriate here, in the light of the overall purpose of this study to develop a theory to describe and explain IS technology use.

### **3.3.2 Research method: Qualitative method**

Following a decision to adopt the interpretivism paradigm, a qualitative research approach is deemed the most suitable approach to study the phenomena (Weber 2004). The qualitative research allows researchers to collect data in natural settings through conversations and words from people who are directly situated in the phenomena under investigation. The qualitative research is primarily inductive by nature, i.e., it aims to infer theoretical concepts and patterns about observed empirical data (Eisenhardt 1989; Kaplan and Maxwell 1994). Therefore it does not test any concepts or patterns formerly generated from theory using new empirical data. In connection with the discussion presented in the first introductory chapter (see: section 1.1) that the type of research that this dissertation pursues is rare, inductive (theory building) research appears to be more valuable than deductive (theory testing) research because it generates new insight which is missing from the knowledge stock (Bhattacharjee 2012, p.4).

In addition, the suitability of the qualitative method can be considered in connection to the nature of the research questions posed. Kaplan and Maxwell (1994) suggest that the qualitative method should be applied to study “how a system’s users perceive and evaluate that system and what meanings the system has for them”. They argue that the IS knowledge on users’ perspective is not advanced. Therefore it is difficult to describe these phenomena through the application of strict quantitative method. The qualitative method can contribute to an explanation for system use behaviour in connection with contingency factors surrounding users. In addition, Kaplan and Maxwell further argue for an application of qualitative method to study “the influence of social and organisational context on systems use”. They suggest that IS technologies do not operate in a vacuum. On the contrary, IS technologies operate in connection to social and organisational contexts. Therefore there is a real need to treat these social and organisational contexts as an intrinsic part of the object of study, rather than as an external part. Once again, IS knowledge on how the social and organisational context might affect system use is not advanced. As a result, there is a need to apply the qualitative method to develop insights into this complex phenomenon. It should be observed that the arguments from Kaplan and Maxwell are consistent with RQ1 and RQ2 in this dissertation (see also: section 1.4). Therefore it is argued that an application of qualitative method is suitable.



### 3.3.3 Research strategy: Multiple case study

Discussion of research design is not complete without a discussion of the research strategy employed. The primary research strategy employed in this dissertation is that of a case study because it investigates a single phenomenon, namely, the complementary use of IS technologies in budgeting. This is claimed to be the most common usage of a case study definition (Gerring 2004). Walsham (1993, p.14) argues that a traditional longitudinal in-depth case study is the most suitable method in the interpretivism school. He recommends that such a case study should be conducted over a reasonable period of time because it allows researchers to properly observe and interpret unfolding circumstances in the fullness of time. The case should be complemented with historical detail about the case settings which will help researchers and readers further develop their understanding of the phenomena. Furthermore, the case should be compared with other case(s). In other words, at least two cases should be presented in a research design for comparative purposes.

This dissertation agrees with the fundamental indication that case study is an appropriate method to apply in the interpretivism tradition (Benbasat, Goldstein, and Mead 1987; Walsham 1993; Gregor 2006). Nevertheless I am sceptical of Walsham's thesis that only the longitudinal case study is the way forward for the research tradition (Eisenhardt and Graebner 2007). Hence an alternative research design, the multiple case study method, is applied.

The multiple case study considers a variant of the case study approach which includes two or more observations of the same phenomenon (Santos and Eisenhardt 2004). In the light of the research aim and the research questions posed in this dissertation, it is argued that multiple case study research is more suitable to obtain the results intended, for the following reasons.

First, the aim of the dissertation is to describe and explain an overall pattern entailed in the budgeting processes. In this case respect, the multiple case study is more appropriate than the traditional longitudinal case research because the multiple case study is interested in finding a pattern while the longitudinal case research yields a microscopic examination of processes (Leonard-Barton 1990).

Second, the multiple case study gives an opportunity to establish external validity which is the focus of research which examines a process, i.e., the budgeting process, across organisations. Eisenhardt and Graebner (2007) argue that the power of external validity in the multiple case study is significant for theory building. The choice of research design is advantageous because it generates a theory which is deeply embedded in rich empirical data. Therefore it is more robust, generalisable and testable than a theory developed from a single case design (Eisenhardt and Graebner 2007).

Lastly, the multiple case study is more appropriate to establish construct validity, which is the degree to which a test measures an intended hypothetical construct. The multiple case study is directed at establishing a consistent prediction of relationships between the construct and other variables which fits into the research aim to describe and explain an overall pattern (Leonard-Barton 1990).

Nevertheless, I acknowledge that there are certain limitations to the multiple case study method. For example, multiple case study researchers are at risk for accepting self-reported stories and interviews as truth. This is because the researcher is not that deeply involved in the organisations, processes and phenomena under study. Therefore, it is more likely that they will “buy” certain stories told by participants in the research. Silverman (2007, p.38) criticises a sole reliance on self-report stories because they do not always represent the real phenomena. He suggests researchers should look for naturally occurring data, i.e., data that occurs in real organisational settings, such as people interactions, documents etc. to support the self-reported data. In addition to that, in multiple case study research, researchers are less likely to be aware of internal validity. Since people are less likely to be aware of causal relationships in a process under a research investigation, their accounts of how things actually happen are in most cases oversimplified (Leonard-Barton 1990).

Generally, it can be concluded that each research method has its own strengths and weaknesses as it is often suggested that all research methods are flawed. The multiple case study method is adopted in this dissertation without any explicit temporal component, in response to the primary purpose for theory development (Eisenhardt 1989) and the two main research questions (RQ1 and RQ2). The theory emerges from the empirical data in the sense that it is situated and recognised through relationships among constructs within and across cases, which is also commonly known as external validity.

The research design discussed in this section builds a case for the discussion presented in the proceeding section. The multiple case research design based on the interpretivism paradigm will be put into action in the next section.

### 3.4 Research process

The discussion of research design presented earlier leads on to the research process which will be thoroughly discussed in this part. The section starts off discussing a case sampling strategy following the multiple case study choice previously discussed. Next, it presents four categories of the companies selected in this dissertation based on the IS technology they adopt for budgeting. These four categories are (1) best-of-breed (BoB), (2) ERP system, (3) BI and (4) spreadsheets. Brief descriptions of the companies are also provided. Following that, the section articulates on the data

collection methods employed. The section closes with a discussion and examples of data analysis techniques employed.

### 3.4.1 Case sampling strategy

As suggested in Miles and Huberman (1994, p.26-30), case sampling is a critical step in conducting a qualitative research study since it will define the boundaries of later analysis on what researchers can say and cannot say about their data and findings. Therefore the purpose of this section is to establish the case sampling strategy employed in this study.

Yin (2009) argues that the logic for case sampling is similar to that of a replication strategy, that is, we should select cases that either (1) predict similar results (or a literal replication) or (2) produce contrary results for predictable reasons (or a theoretical replication). This dissertation follows the literal replication strategy because it aims to describe and explain business controllers in a similar generalizable way; therefore it selects case companies with similar profiles which will be discussed later in the latter part of this sub-section.

Thailand is selected as the country of interest for empirical data collection because there are a number of research publications which emphasise that there is a considerable difference in IS use between western and non-western countries (Soh, Kien, and Tay-Yap 2000; Thanasankit 2002; Avison and Malaurent 2007; Jack and Kholeif 2008) due to local environments. Each country has its own specificities: organisational, cultural, political and economic. These specificities have a strong influence on IS technology use. Therefore it would be beneficial to the IS research community if there were more studies which study IS technology use in non-western countries (Thanasankit 2002).

Table 3.2 tabulates the details of all sixteen companies included in this dissertation. In short, the characteristics of these companies can be attributed into four types according to the IS technologies they use to support the budgeting process.

First, I selected companies that adopt BoB as the main “accounting solution”. The four companies selected which fall in this category are RealEstate, HotelChain, HotelBeach and FrozenFood. Although these companies use BoB as the main accounting solution, three of the four companies (HotelChain, HotelBeach, FrozenFood) have adopted the “hybrid ERP” strategy. The hybrid ERP approach means that the organisation cherry-picks a number of off-the-shelf applications and then integrates them in order to create management software for various business functions similar to that of the ERP system. The objective in choosing the companies with BoB and hybrid ERP is to find out whether BoB and hybrid ERP adopters face the same problems of non-use of the system for budgeting as do ERP system adopters or not. **Chapter 6** in this dissertation examines the BoB and hybrid ERP companies

against an ERP company. In total, five companies are presented which were selected based on the characteristics of their IS applications for management purposes. The characteristics are as follows: (1) using a fully integrated standardized software package such as a full ERP system; (2) using a sort of BoB approach, meaning that the organisation adopts specific software for a specific purpose; and (3) using a hybrid ERP approach, meaning that the organisation cherry-picks a number of off-the-shelf applications and then integrates them in order to create management software. The selection followed this approach and one company was selected that follows the integrated standardised software package strategy (ConsumerGood), one company that follows the BoB strategy (RealEstate), and three companies that have adopted the “hybrid ERP” strategy (HotelChain, HotelBeach, FrozenFood). The hybrid ERP category deserves more companies than the previous two categories because the IS integration structures across the companies are diverse; some employ only packaged software; some employ a combination of in-house with packaged software. It is believed that more companies will help highlight some interesting aspects of this group.

The second type of IS technologies selected is the ERP system. Companies that fall into this category are companies A–K as listed in Table 3.2. Even though the ConsumerGood company also has the ERP system, this company is not included in the analysis of ERP presented in **chapter 7** since the company was purposely selected to compare with the BoB and hybrid ERP companies in chapter 6. These eleven companies are selected because they meet the following three selection criteria. First, these companies have installed and used an ERP system for finance and accounting functions for at least two years, hence they have system maturity (Nicolaou 2004). Second, they employ budgeting as the main management accounting control. Third, they are listed on a stock exchange, hence there is some consistency of size and internal control due to stock market regulations (Grabski, Leech, and Schmidt 2011).

The third type of IS technology selected is BI. Companies that have adopted BI for budgeting purposes are companies A, B, E, F, I, J and K respectively. Altogether there are seven companies which fall into the BI category, these are analysed and presented in **chapter 8**. To be included in the study, these companies are subjected to the same three criteria listed for the ERP system companies, however the focus is that these case companies have access to BI instead of the ERP system. BI is presented in this dissertation in two forms: “off-the-shelf BI” and “own BI”. Off-the-shelf BI refers to a situation where an organisation adopts a packaged BI available from a vendor. This type of BI is referred to directly in the dissertation by the BI vendor name. “Own BI” refers to a situation where an organisation internally develops its BI for budgeting in cooperation with IS/IT consultants.

Table 3.2 An overview of the sixteen companies

No.	Company	Main Activities	Main accounting solution		Other budgeting IS	
			BoB	ERP	BI	Spreadsheets
1	ConsumerGood	Personal care products	-	SAP	Hyperion	Excel
2	RealEstate	Real estate developers	Express	-	-	Excel
3	HotelChain	Hotel management	SunSystems	-	-	Excel
4	HotelBeach	Hotels	Carmen	-	-	Excel
5	FrozenFood	Frozen food processing	Alpha <sup>6</sup>	-	-	Excel
6	A	Power plant	-	SAP	Magnitude	Excel
7	B	Oil and Petrochemical	-	SAP	Cognos	Excel
8	C	Oil refinery	-	SAP	-	Excel
9	D	Frozen food processing	-	SAP	-	Excel
10	E	Drinks and dairy products	-	SAP	Magnitude	Excel
11	F	Drinks	-	SAP	Own BI	Excel

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<sup>6</sup> This is a fictional software name. The real software name is removed to protect the identity of the company.

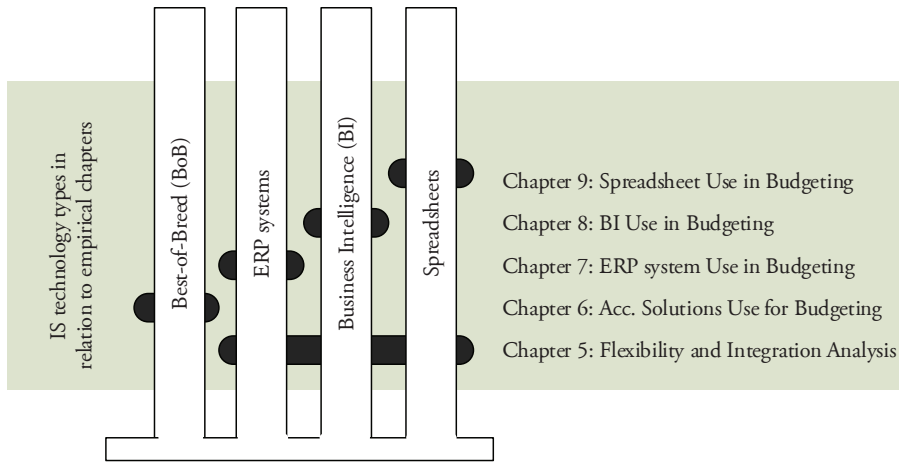
12	G	Agricultural products	-	BCPS	-	Excel
13	H	Truck distributor	-	SAP	-	Excel
14	I	Automobile parts	-	SAP	Own BI	Excel
15	J	Electronic appliances	-	JDE	Own BI	Excel
16	K	Hotels and apartments	-	Oracle	IDeaS	Excel

The fourth type of IS technology selected is spreadsheets. The case companies that are featured in **chapter 9** are the same as those companies (companies A-K) found in the ERP system case companies. Nevertheless these case companies are selected because they use spreadsheets in the budgeting process instead of the ERP system or BI.

**Chapter 5** presents an analysis of the ERP system, BI and spreadsheet categories altogether which are subjected to the similar selection criterion discussed earlier. Companies A-K are included in the analysis in this chapter.

Figure 3.1 provides an overview of the four types of IS technology featured in this dissertation in relation to the five empirical chapters previously mentioned.

**Figure 3.1 Overview of the four IS technology types in relation to the five empirical chapters**



With regard to the company descriptions, which are necessary to build a fundamental contextual understanding about the case companies selected (Walsham 1993), the first five case companies in the BoB category (ConsumerGood, RealEstate, HotelChain, HotelBeach and FrozenFood) represent diverse industries. ConsumerGood is a global consumer packaged goods manufacturer specialising in soap and shampoo products. RealEstate is an independent housing development company in the south of Thailand. It builds and sells detached houses and commercial buildings for the medium to low-end market.

HotelChain is a worldwide hotel management company that has a regional head office in Thailand. HotelBeach manages two three-star hotel properties at a popular resort destination in Thailand. One hotel is operated under its own brand; the other is under HotelChain’s brand. Altogether it operates 500 hotel rooms, as well as restaurants, bars, shops, and spas. FrozenFood is a leading frozen seafood processor

and exporter in Thailand. It implements an integrated supply-chain strategy from fishing and processing to sales and marketing. Most sales are from contracted manufacturing for US and European markets

The remaining eleven companies (Companies A–K) featured in the ERP system, BI and spreadsheet categories represent core industries of Thailand such as the energy industry (Companies A–C), the food industry (Companies D–G) and the automobile industry (Companies H and I). The energy group is the backbone of Thailand's energy production chain, which accounts for more than half of the country's energy demands. The food industry group includes business units of global food companies and Thai food conglomerates which export foods worldwide. The automobile industry group is directly involved in the production and distribution chains of the world's leading automobile brands. For the two remaining companies, Company J is a Thai business unit of a global household electronic appliance company. Company K is a Thai hospitality conglomerate which operates numerous five-star hotels and luxury serviced apartments through the Asia Pacific region. Please note that the industry categorisation is applied in these companies only as a mean to facilitate an explanation on company descriptions. It is not used with an intention to suggest that an industry that a company operates in may influence the choice of IS technology used for budgeting in any manner. Detailed descriptions of all the sixteen companies are presented in Appendix A: Company descriptions.

In conclusion, this section presents four categories of the companies selected in this dissertation based on the IS technology adopted for budgeting. These four categories are (1) BoB, (2) ERP, (3) BI and (4) spreadsheet. It spells out in detail how each empirical chapter examines which category. Alongside the four company categories, short descriptions of the sixteen companies are provided. The next section presents the data collection methods that this dissertation employs.

### **3.4.2 Data collection: Interview and others**

This section discusses the data collection methods used in this research. It starts with a general introduction to data collection methods in qualitative research then proceeds to discuss data triangulation. Subsequently it spells out data collection methods that this dissertation employs which are interviews, direct observation and documentation.

Information from the sixteen Thai companies included in this dissertation is divided into two rounds. The initial data collection was conducted in autumn 2010 with the first five companies (ConsumerGood, RealEstate, HotelChain, HotelBeach, FrozenFood). The second data collection was conducted in summer–autumn 2011 with the remaining eleven companies (companies A-K). The detailed descriptions as to



how these companies are approached are included in Appendix A: Company descriptions.

Qualitative data which focuses on “naturally occurring, ordinary events in natural settings” (Miles and Huberman 1994, p.10) can be obtained from various sources. Three main strategies for data collection are; interviews, observation and documentation (Bhattacharjee 2012, p.106). Interviews represent a more personalised form of data collection than the other data collection methods. Researchers get a chance to discuss with interviewees the particular phenomenon they are interested in. Observation represents a data collection method in which researchers observe human activities in their natural settings. Researchers can choose to play an active role, which means that they directly participate in the activities. This is commonly referred to as the participant observation method. Alternatively, researchers can decide to play an inactive role, i.e., they are a neutral and passive external observer. This is generally known as a direct observation method. Documentation is the third technique, where external and internal documents, e.g. memos, electronic mails and annual reports, are used to gain further insights.

However, due to resource constraints, e.g., money and times, researchers must decide on primary and secondary data collection methods since it is not possible to pursue all data collection methods equally. For this dissertation I decided to employ interviews as the primary data collection method and supplement it with observation and documentation. Interviews are primarily selected as the primary data collection method due to the efficiency this method offers in comparison to observation and documentation (Leonard-Barton 1990).

Arguments for secondary data to supplement the primary data source obtained through interviews are established by many researchers (Leonard-Barton 1990; Silverman 2007, p.38). This is mainly due to a limited amount of time that researchers spend at a particular site. The short time span does not allow researchers to fully develop a full account of a causal relationship of interest, therefore they are more likely to buy into manufactured data that some interviewees might give to them for certain reasons.

Specifically, the empirical data included in this dissertation is collected from many primary and secondary sources including face-to-face interviews with 26 key participants in 16 for-profit companies, direct observation during the interviews as well as other documentations such as internal documents, annual reports, and company websites.

Semi-structured interviews were conducted with all interview participants. These interviews lasted on average an hour. Table 3.3 presents information about the interviews included in this dissertation including the positions of interviewees interviewed in each case company, interview length and number of words in interview transcripts. In brief, 26 business controllers from 16 case companies are interviewed in approximately 26 hours of interview time which were transcribed into

approximately 210,000 words. Prior to every scheduled interview, a list of questions was sent in advance to the interviewees so that they have a reasonable amount of time to review the questions in advance. This practice facilitates the interview process because it allows an interview session to begin immediately without going into details to describe the nature, context and objective of the research to interview participants. The interviews were conducted at participants' own locations; therefore there was an opportunity to observe their working processes as well as to examine supplementary documentation. Interview participants are primarily business controllers, responsible for budgeting in the companies such as chief financial officer (CFO), accounting vice president, planning vice president, accounting policy vice president, financial analyst and information technology (IT) manager. The choice of predominantly business controllers is informed by established academic arguments regarding how these business controllers, who normally are middle managers in organisations, influence strategic and operational practices in organisations (Westley 1990; Rouleau 2005).

After it has been decided that interview is the main data collection method to be adopted, an interview guide is developed. An interview guide developed in connection to the research questions and aim of this study is provided in Appendix B: Interview guide. In short the interview guide is developed according an amended management control framework which is built upon a viable system model created by Stafford Beer. This framework postulates relations between IS technologies with other budgeting functions in organisations.

Table 3.3 Business controllers interviewed and interview hours

No.	Case company name	Business controllers interviewed	Number of interviewees	Interview hours	Number of words
1	ConsumerGood	Financial Analyst Manager	1	1	5,540
2	RealEstate	Accounting Manager	1	1	5,779
3	HotelChain	Business Analyst	1	1	6,242
4	HotelBeach	Deputy General Manager	1	1	6,486
5	FrozenFood	Accounting Manager	1	1	10,932
6	A	Head of Accounting	1	1.5	9,735
7	B	Accounting Manager, Senior Accountant, Planning Vice President, Business Analyst	4	3.5	29,510
8	C	Treasurer	1	1.5	15,147
9	D	Corporate Accounting Manager, Strategic Manager	2	2	15,573

10	E		Management Accounting Manager	1	1.5	13,868
11	F		Financial Planning Manager	1	1.5	9,551
12	G		Central Accounting Executive, Senior Management Accounting Manager, Senior Accountant, Senior Costing Manager	4	2.5	19,589
13	H		Chief Financial Officer, IT Manager	2	2	11,550
14	I		Vice President, Vice President Information Technology	2	1.5	10,170
15	J		Chief Financial Controller Accountant	2	2	30,119
16	K		Customer Intelligence Manager	1	1.5	10,707
			Total	26	26	210,498

### 3.4.3 Data analysis

The next important step in conducting qualitative research is to conduct a data analysis. The purpose of this section is, therefore, to spell out the data analysis procedure employed in this dissertation.

As stated above, interview is the main data collection method employed. All of the interviews conducted were recorded, transcribed and analysed digitally. Nivo8 is the analysis software adopted to help the data analysis process.

I used the inductive coding technique (Miles and Huberman 1994, p.61) to guide the analysis. Coding is performed in two iterative steps; first an open-ended general etic coding followed by a more specific emic coding in order to allow a maximum level of interweaving within the data analysis. Table 3.4 and Table 3.5 give examples of how the data analysis is carried out in this dissertation. Four extracts from the interview transcripts are selected to demonstrate the etic and emic coding technique used. Table 3.4 shows two selected coding examples presented in **chapter 6**. Table 3.5 shows two further coding examples which are presented in **chapter 5**.

Table 3.4 Coding examples from chapter 6

Interview text	<u>Etic</u> (underline) and <i>Emic</i> (italic) Coding	Themes emerging from selective coding
<p><b>Business Analysis, HotelChain company</b></p> <p>SAP is good because it allows you to link many things. For example, anything – it does not have to be accounting related – can be keyed in to SAP in order to store the data in the database. But SAP does not have the brain to analyse or compare in order to tell you that this happens then that happens. It simply cannot be used like that. When I want to delve into detail or compare information, it is always done in Excel.</p>	<p> <u>Analysis inappropriate</u>            ]  <i>Conditions</i>            ]            ]            ]  <i>Consequences</i>            ]         </p>	<p>Comparing this passage to other passages about variance analysis, a theme (<u>analysis inappropriate</u>) emerges, namely that SAP ERP is not designed in a <i>condition</i> which will allow the system to be effectively used for variance analysis purposes (<i>consequence</i>).</p>

**Accounting Manager, FrozenFood company**

With regard to the importance of budgeting, a budget is a plan for a company. It tells us in financial terms...it tells us in money units how the business operation will be and if we face this kind of situation or this kind of risk how we will deal with it? A budget refers to the skill of forecasting or estimating...or it can be anything else which will tell us what is to happen in the future. Do you follow? In order to forecast what will happen, we must use many technical resources at different points. Following this we combine all of the information which we have in the form of an initial profit and loss statement. The forecast or estimation processes for each business area are totally different from one another. For example there are several types of sale revenues. In order to be able to plan them we must understand the nature of sales operations. We must understand how sales happen in order to estimate the sales revenue next year.

Participation

] *Consequences*

] *Conditions*

] *Processes*

Comparing this passage to other passages about budgeting and rolling forecast, a theme (*participation*) emerges, namely that budgeting is a *process* in which one must understand the business *conditions* surrounding it. In response to different business conditions, business controllers conduct a budgeting *process* which employs various technical resources in different departments (*consequences*).

Table 3.5 Coding examples from chapter 5

Interview text	<u>Epic</u> (underline) and <i>Emic</i> (italic) Coding	Themes emerging from selective coding
<p><b>Central Accounting Executive, company G</b></p> <p>I think that the people who conducted the system survey were not good enough. Personally I do not believe that Cognos cannot do it. I just do not see why Cognos cannot do it when Excel can do it. With Excel, people can construct their own formulas. They can link this with that depending on how they want to design it. But I think Cognos underestimated us. I never see how Cognos would work for us except in the case that we had one simple legal entity separated into departments. But we are a group of companies; we have many legal entities and many business lines. On occasions, we have the same legal entity working on two separated business lines. This is the point where Cognos failed miserably in our case.</p>	<p> <u>Organisation-in-focus</u>,  <u>Operation basis entity</u>    ] <i>Consequences</i>    ] <i>Condition</i>    ] <i>Consequences</i> </p>	<p>Comparing this passage with other passages from other companies, a theme (the <u>organisation-in-focus</u> neutral proposition) emerges, namely that organisations need to focus on operational entity (the <u>operation basis entity</u> value proposition) (<i>consequences</i>) in doing budgeting. The Cognos BI failed to recognise the difference and complication (<i>conditions</i>) in separation between legal and operational entities (<i>consequences</i>).</p>



**Vice President of Information Technology, company I**

Actually we did this development gradually. We had a template on Excel for them so that they could upload the budgets on SAP. That is the good point of SAP which is you can upload data into the system. On that Excel template, we required them to punch in budgeting numbers, for example, by accounting code and by funding number. The accounting department would upload these budgets into the system. However we allowed them to revise their uploaded budgets because it is the nature of budgeting that you have to fix this and that. We labelled this a simulation version on SAP which is not used until it is finalised. If they wanted to change something, they could do it. Using this approach, the issue was that business units did not submit budgets on time so we implemented a web tool. Through a web tool, we can announce that we allow them to upload budgets until this day, and then we will close the system. It imposes time discipline on them.

Personal requirements,  
Collective requirement

]  
] *Conditions*

]  
] *Consequences*

]  
] *Conditions*

]  
] *Consequences*

Comparing this passage with other passages from other companies, a theme (the personal requirement neutral proposition) emerges, namely that organisations must focus on a collective requirement (the value position) in doing budgeting. The old strategy used to employ Excel spreadsheets for budgeting (*conditions*) caused (*consequences*) the business entities to submit budgets whenever they wanted to. Therefore a new budgeting own BI solution is implemented (*conditions*) to improve the time discipline among them (*consequences*).

## 3.5 Summary

This chapter clarifies the methodological view point central to the research method adopted in this dissertation based on four relevant topics: paradigm in scientific research, paradigm in IS research, research design and research process.

Section 3.1 introduces the idea from Thomas Kuhn of a paradigm as a shared belief among scientists. The role of a paradigm is to provide puzzles for scientific research as well as the tools to solve those puzzles. The section ended with Kuhn's rejection of the commensurability of paradigms – the suggestion that puzzles and solutions generated across paradigms are not comparable. Thus scientific knowledge does not progress in an accumulative fashion.

Section 3.2 presents the three common paradigm sets in the IS tradition: behavioural and design science paradigm, positivism and interpretivism paradigm, and critical and non-critical research paradigm. The nature of each research paradigm is discussed. At the end the three research paradigms are compared against one another. Each paradigm seems to have a different interest for the type of question asked and answer sought. With regard to the problem of paradigm (in)commensurability, there is no clear conclusion to the problem. Certain paradigms are argued to be commensurable while some are not. Clearly more work is needed to warrant the (in)commensurability of paradigms.

Section 3.3 presents the overall research design for this dissertation. Overall the dissertation follows the interpretivism paradigm using the case study research method. Case study is the research method often recommended in the interpretivism paradigm because it allows researchers to focus on understanding the dynamics of a particular setting. Anyhow, this dissertation does not follow the traditional longitudinal case study research design. It is argued that the multiple case study research design is more appropriate given the research aim and the research questions to describe and explain IS technology use in budgeting.

Section 3.4 presents an overall idea of how the research design articulated previously is carried out in action. It begins with a short description of case sampling strategies following the multiple case study research design. Four categories of companies are presented based on the type of IS technology used in budgeting: (1) best-of-breed (BoB), (2) ERP system, (3) BI, and (4) spreadsheets. It also sets out how these categories are featured in the remaining five empirical chapters.

Following that, data collection methods including interviews, observations and documentations are presented. Interviews are the main source of data collected for this study. However, they are supplemented with observation and documentation

since they help reducing respondent biases. Lastly the section discusses the inductive data analysis technique adopted. In addition it provides some examples of the data analysis performed.

The key message presented in this chapter is that a research method is a constellation among many factors, such as paradigm, aim, questions, outputs etc. Therefore this is a critical and necessary step in ensuring the satisfactory quality of any particular research as well as its contribution to science.

Part II: Business controllers'  
perceptions of IS technologies



# 4. IS technologies' constraining and enabling powers in budgeting

Wipawee Victoria Paulsson

This chapter is based on a chapter published in *Advances in Enterprise Information Systems II* (2012), edited by C. Møller and S. Chaudhry. London: CRC Press, pp.277-290.

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**ABSTRACT:** Budgeting is one of the oldest and the most popular organisational decision making mechanisms in management accounting. Although not new, information system (IS) technologies are not developed to support the process fully. Based on the structuration theory, this chapter uses the concept of human agencies to examine how business controllers interpret different types of IS technology, which are commonly used in budgeting, such as ERP systems, spreadsheets and business intelligence. The research question is: what are business controllers' perceptions of the enabling and constraining powers of different IS technologies used in budgeting? The secondary empirical data suggests that there is a mismatch between the flexible and integrative nature required in budgeting and the IS technologies employed. The chapter concludes that no single IS technology tool is ideal for budgeting. Business controllers must constantly extract, transfer and load information between systems in order to exploit the enabling powers fully and to avoid the constraints embedded in each system.

## 4.1 Introduction

Jones and Karsten (2008) call for further investigations into how information system (IS) technologies, such as enterprise resource planning (ERP) systems, may restrict human agencies in certain ways. Inspired by their statement, this chapter focuses on how business controllers perceive different types of IS technologies used during the course of budgeting, which is a fundamental business control process.

Research on the effects of ERP systems and management accounting (Booth, Matolcsy, and Wieder 2000; Granlund and Malmi 2002; Caglio 2003; Hyvönen 2003; Granlund and Mouritsen 2003; Scapens and Jazayeri 2003; Lodh and Gaffikin 2003; Spathis and Constantinides 2004; Grabski, Leech, and Sangster 2009) suggests that ERP systems have a moderate impact on management accounting practice. It is noticeable that ERP systems directly affect business controllers and management accounting systems. For example, the role of business controllers is changing from one of bean-counters to one of business partners (Caglio 2003; Granlund 2009). They spend more time and skills on analysing business information than on gathering reports, due to the improved transactional processing capability offered post-implementation (Grabski, Leech, and Sangster 2008). However, it is observed that there are insignificant changes in management accounting practices and business processes post-implementation (Jackling and Spraakman 2006). Indeed, ERP implementation appears to have a minor impact on the adoption of innovative management accounting technologies, such as activity-based costing and the balanced scorecard (Booth, Matolcsy, and Wieder 2000).

Rather than taking a general management accounting approach, this study places emphasis specifically on one fundamental business control activity in organisations: budgeting. It is chosen as the social phenomenon under investigation over other management accounting practices because it is one of the most traditional and long-standing processes. Relatively dissimilar to other mechanisms, budgeting is primarily used for decision-making purposes. Anyhow, the budgeting emphasis in decision-making shifts according to the environmental condition. In a typical steady environment, business controllers focus on using internal business information to forecast and control business operational results. In a turbulent environment, business controllers focus on using external information to make vital business decisions. Regardless of its objectives, budgeting represents a process in which organisations attempt to forecast future business results and provide guidelines for individually expected performances. Budgets are constructed based on both internally generated hard financial information and externally dependent soft information, such as economic indicators. It is well-documented that business controllers employ three main types of IS technologies in budgeting: ERP systems, budgeting business intelligence (BI) and spreadsheets (Granlund and Malmi 2002; Jackling and Spraakman 2006; Rom and Rohde 2006).

Business controllers in organisations have long used IS technologies to improve the efficiency and effectiveness of budgeting processes, such as preliminary industry analysis, business forecasting, budget construction and variance analysis. Spreadsheets are a classic IS technology used in budgeting; a recent advancement in IS technology has introduced many additional tools, such as ERP systems and BI, into the picture. These new tools seem to be somewhat insufficient because they can never eliminate spreadsheets from budgeting (Cragg and King 1993; Fearon 2000; Panko 2006; Rom and Rohde 2006). For example, Granlund (2009) reports the case of a paper mill in which the top management reveals that all the budgeting functions are carried out in an ERP environment. In contrast, the business controllers admit that the actual budgets are made in spreadsheets and then are copied and pasted into the ERP for distribution. Uppatumwichian et al. (2011) found a similar instance even in a BI environment in a multinational organisation. Prior studies (Granlund and Malmi 2002; Hyvönen 2003; Rom and Rohde 2006; Chapman and Kihn 2009) observe that ERP systems constrain users in terms of flexibility in budgeting, yet they do not specify why this is the case. A few academic publications approach an explanation for ERP inflexibility from a human agency perspective, such as Boudreau and Robey (2005) and Ignatiadis and Nandhakumar (2007); however, there is no research pursuing a similar approach to spreadsheets and BI. Orlikowski (1991), Granlund and Mouritsen (2003) and Granlund (2009) suggest that different technology enables and constrains users in different ways; therefore, there is a research opportunity to expand our knowledge into spreadsheets and BI.

In answer to Jones and Karsten's (2008) call and the research gap constituted by the lack of spreadsheet and BI literature, this chapter addresses the following research question: what are business controllers' perceptions of the enabling and constraining powers of different IS technologies used in budgeting? Through a sensitising device, the structuration theory, the concept of human agencies is employed to investigate how business controllers (users) interpret different types of IS technologies in the budgeting process.

Secondary empirical data is collected from various publication outlets, such as academic journals and theses as well as reports from advisory and research firms. This chapter employs the three-step literature review research approach suggested by Webster and Watson (2002). Leading academic journals in the accounting, accounting information systems and information systems disciplines are reviewed in order to identify the key publications. An extensive review of journal ranking publications in each discipline is conducted. Journal ranking papers from the accounting discipline namely Chan et al. (2009), Herron and Hall (2004), Lowensohn and Samuelson (2006), and Bonner et al. (2006) are used to identify key journals from the accounting discipline. Journal ranking papers from the accounting information systems discipline including Poston and Grabski (2000), Baldwind et al. (2000) and Hutchison and Hunton (2012) are used to identify key journals from the discipline. Lastly the journal ranking publications from the information system



discipline including Willocks et al. (2008), Nord and Nord (1995), Lowry et al. (2004) are used to identify key journals from the information systems discipline. Appendix C: Journal ranking provides more information on how the key journals are identified. In short, the process identified eight journals from the three different disciplines, namely *Accounting, Organizations and Society, Journal of Accounting Research, The Accounting Review, Information and Management, Journal of Management Information Systems, MIS Quarterly, International Journal of Accounting Information Systems* and *Journal of Information Systems*, from 1991 to 2011.

In addition, a keyword search, using terms such as enterprise resource planning system, business intelligence, spreadsheets and budgeting, was conducted on Google and the Google Scholar, ScienceDirect and EBSCOHost databases to identify key publications from academic and practitioner sources. This process was meant to compensate for an absence of conference reviews due to complications in obtaining conference publications. After the key contributions were identified, backward and forward analysis of these papers was conducted to identify additional relevant publications (Webster and Watson 2002). The search result revealed that the richest data source lay in technology vendors' own publications, but they are excluded because they contain biases towards specific products and vendors. One limitation of this data collection approach is that certain issues cannot be explored as wished due to the lack of appropriate data documented, especially with regard to how users interpret the IS technologies in use. However, the author is convinced that this is an appropriate step prior to expensive fieldwork data collection in order to gain an insight into a largely untouched research area, such as this one.

This chapter proceeds as follows. Section 4.2, the next section, reviews the concept of human agencies used in this chapter from Anthony Giddens' structuration theory. Section 4.3 presents background information on budgeting and the IS technologies used in the process, including ERP systems, spreadsheets and BI. Section 4.4 illustrates the concluding arguments presented in the previous section with real-life examples from various sources, which are based on business controllers' interpretations of each system used. Section 4.5 summarises the findings. Finally, concluding remarks and future research directions are provided in Section 4.6.

## 4.2 Human agency

Many psychologists (e.g., Bandura 1989) and sociologists (e.g., Giddens 1979) recognise the importance of human agency in interpreting and reacting to social systems. Giddens, for example, argues that human agency possess a capacity to transform social structures in a voluntaristic manner (Jones and Karsten 2008)

because they always “have the possibility to do otherwise” (Giddens 1979, p. 258) based on their purposes, reasons and needs.

Many IS theories have been developed based on Giddens’s structuration theory, such as the duality of technology (Orlikowski 1992) and the adaptive structuration theory (DeSanctis and Poole 1994; Markus and Silver 2008). These frameworks direct attention towards human agencies, social interpretation and enactment as explanations for social outcomes. Though these IS-applied frameworks are useful, this chapter intends to draw on Giddens’s original account of human agencies. This approach is intended to overcome the limited interpretation of Giddens’s work in IS research according to Jones and Karsten (2008). In addition, this approach allows a more detailed and meaningful exploration of a problem under investigation. Giddens advocates this approach over a theory application in its entirety. He sees no reason for any researcher to apply “vain efforts in defining contextual boundaries and finding oneself imprisoned within them” (Sharma, Barnett, and Clarke 2012).

Some criticisms of Giddens are present in the literature. For example, Archer (1982) points out that the voluntaristic nature of human agencies is problematic to the fundamentals of structuration theory because it implies that human agencies do not have to adhere to social structures in the structuration process. Fuchs (2001) argues that using a human agency to explain variations in social phenomena is nothing but an effect of “failures at prediction” (p. 34). In a reply to his critics, Giddens (1989) argues that everything other than his concept of human agency contributes to a form of determinism that is compelling those subjects to it. This clearly implies his strong determination on the power that social structures have on human agencies.

According to the structuration theory, social phenomena are not the mere product of either social structures or human agencies, but of both. However, the transformation capacity belongs only to human agencies in their interpretation of social structures. In their attempts to influence social phenomena, human agencies interpret existing social structures in terms of what the structures constrain and enable them to achieve, and then they try to work around these enabling and constraining powers. Although it is acknowledged that human agencies’ attempts to influence social phenomena are not always successful due to bounded rationality, agencies continually engage in this process.

In response to the research question discussed in the previous section, the enabling and constraining powers of social structures through business controllers’ (human agencies) perceptions are applied to the research question. The next section discusses the characteristics of budgeting and how different IS technologies enable and constrain human agencies in budgeting.

## 4.3 The enabling and constraining powers of IS technologies

This section provides a background to the budgeting and IS technologies commonly found in the budgeting process in real organisational practices. Firstly, the flexible yet integrative nature of budgeting is examined. Secondly, based on the flexible and integrative requirements in budgeting, the nature of ERP, spreadsheets and BI is discussed.

### 4.3.1 Budgeting – flexible yet integrative decision-making tool

Budgeting, the main formal and widely adopted management accounting tool (Davila and Foster 2007), is considered in this study as a continuum, which is based on a degree of innovation and sophistication that organisations have incorporated into their budgeting practices. At the most conservative end, budgeting, in the traditional sense, is a futuristic financial plan that provides a basis for directing and evaluating the performance of individuals or business units as well as coordinating responsibilities within organisations (Bruns and Waterhouse 1975). Due to volatile business environments, certain organisations might find traditional budgeting insufficient as a decision-making tool. Thus, a new budgeting innovation called “better budgeting”, such as activity-based budgeting, zero-based budgeting, value-based management, profit planning and rolling budgets and forecasts, is being introduced in several organisations to overcome the traditional budgeting limitations (Neely, Bourne, and Adams 2003). At the opposite end of the budgeting spectrum, an innovation called “beyond budgeting”, which intends to move away from budgeting practice, is being introduced in response to recent criticism that budgeting is non-value-adding and obsolete for modern enterprises (Hope and Frazer 2003). Beyond budgeting is not a management accounting tool per se, but it is a new management philosophy, which is based on real-world applications, to create a flexible organisation using already-existing tools, such as the balanced scorecard, rolling forecast and customer relationship management. Many recent studies in North American (Libby and Lindsay 2010) and Nordic regions, like Finland (Ekholm and Wallin 2000) and Sweden (Arwidi and Jönsson 2010), confirm that although beyond budgeting seems to be a hot topic among practitioners and academia, companies are far from abandoning budgeting practice or adopting the beyond budgeting concept. On the contrary, companies tend to adopt techniques that enhance current budgeting practice or better budgeting. In this study, the definition of budgeting is limited to

covering the grounds of both traditional budgeting and better budgeting, but not beyond budgeting.

Budgeting is a process overarching necessary budget-related activities, such as budget construction, budget negotiation and variance analysis. Simons' levers of control (1994) as well as previous research on budgeting (Abernethy and Brownell 1999) suggest that two out of the four control systems embedded in the levers of control, namely interactive and diagnostic control systems, are directly related to budgeting. It is suggested that budgeting can be used interactively and diagnostically to assist decision-making. Simons argues that top-management has a full discretion to determine how these control systems should be combined in a specific context. This dual role of budgeting requires the process to be more flexible in response to contingencies unique to problems at hand, yet more integrative for efficient monitoring (Chapman and Kihn 2009). The term *flexibility*, which is used in this context, refers to a discretion over the use of a budgeting system for decision-making (Ahrens and Chapman 2004). On the contrary, the term *integration* refers to the standardisation of data definitions and structures, through using common conceptual schema across a collection of data sources to assist decision-making (Goodhue, Wybo, and Kirsch 1992).

Budgeting is futuristic in nature because it represents an attempt to forecast future business operating results, which are only imaginary at the time of formation. In order to construct a budget, business controllers need both hard financial information, such as profitability, volumes and cash flows by responsible units, and soft intellectual knowledge about the business, for instance, the business process, market growth, customer satisfaction, price trends, etc. It can be argued that budgeting needs an equal weight of hard transactional data and soft intellectual knowledge about the business; any information source inequality is likely to determine budget effectiveness as a decision-making tool.

In comparison with other traditional management accounting practices, such as product costing, budgeting is more flexible and less standardised because of (1) management participation, (2) strategic alignment, and (3) contingency factors. Firstly, members of management are more willing to participate in a budgeting development than an accounting system development, since budgeting allows management to apply power and control over the business (Arwidi and Samuelson 1993). A good budgeting execution will allow management to maintain control throughout organisations. Secondly, budgets are perceived as one of the links between strategy and operational planning. Strategy formulated at the top-management level is translated into action plans to which the middle and operational levels must conform (Anthony and Govindarajan 2003). Thirdly, many contingency factors, such as environmental uncertainty (Chapman 1998; Abernethy and Brownell 1999; Chenhall 2003), task complexity, task uncertainty (Brownell and Dunk 1991), task interdependency (Chenhall 2003), decentralisation, size (Bruns and Waterhouse 1975) and conservative business strategy (Govindarajan 1988), are reported to have

an influence on the flexibility of the budgeting process. When the degrees of these contextual factors are high, budgeting's role on decision-making becomes very significant. Organisational participants are required to be more communicative to decide and plan best for changing circumstances.

Even though budgeting is flexible, due to reasons specified above, individual business unit budget information must be integrated together to obtain an overall budget plan. An integrated budget represents an organisational master plan. It is subsequently used for performance monitoring purposes, so that management can identify irregularities in business operations. Given both the flexible and the integrative conditions required, it is deemed that budgeting requires flexibility at the unit level, yet needs integration at the organisational level.

These flexible yet integrative requirements of budgeting call for many types of IS technology in the process, such as ERP, spreadsheets and BI (Granlund and Malmi 2002). Prior survey studies of management accountants (Hyvönen 2003; Chapman and Kihn 2009) suggest that ERP systems represent a flexibility issue in the budgeting process, these studies cannot elaborate on why this is the case. Granlund and Malmi (2002) rationalise users' skipping of ERP in budgeting as being caused by the inadequate quality of ERP systems per se. This chapter proposes that each IS technology enables and constrains users in a different way. A strength of any certain IS technology represents a severe weakness in dissimilar circumstances. ERP systems, for example, excel in transactional data processing but have a limited capability to provide the soft business information that is much needed in budgeting. The next section reviews the related IS technologies used in budgeting, which are: ERP, spreadsheets and BI, respectively.

### **4.3.2 Choice of IS technology – a trade-off between flexibility and integration**

Different types of IS technologies are designed for specific purposes and circumstances. Therefore, advantages of certain technologies can become disadvantages if applied for other purposes in other circumstances. This section reviews the enabling and constraining capabilities of each IS technology in the budgeting process – ERP, spreadsheets and BI – based on the flexibility and integration capabilities offered by each system.

A key premise of an ERP system is the reference model that segments a business into diverse yet related functions. The reference model reflects the preferred business model and enforces the underlying data, process model and organisational structure (Kumar and Van Hillegersberg 2000). This ultimately creates a system that standardises input and output data through pre-specified procedures that need to be

followed strictly throughout the organisational task executions (Kallinikos 2004). For this reason, ERP packages are known to be extremely inflexible at the unit level, once they are configured and implemented (Kallinikos 2004; Grabski, Leech, and Schmidt 2011). Though the idea of an integrative system might sound seductive at the organisational level, ERP represents many mismatches with other organisational aspects, such as cultures, business practices, control mechanisms (Strong and Volkoff 2010) and organisational objectives (Kumar and Van Hillegersberg 2000). These mismatches can produce many severe problems in the adopting organisations. ERP represents a high capacity for data integration at the organisational level, but a low capacity for flexibility, especially at the unit level.

Spreadsheets are one of the most widely used business applications developed by end-users (Govindarajulu 2003), and are typically used in budgeting (Granlund and Malmi 2002; Jackling and Spraakman 2006). The main advantages of spreadsheet applications, like Microsoft Excel, are the low-learning burden as well as the powerful yet flexible capacities for complex decision-making, because users are free to enter any data and information into a spreadsheet model (Fischer et al. 2004). Despite the flexibility offered, spreadsheets represent many potential pitfalls to organisations. Spreadsheets threaten data integrity and security (Govindarajulu 2003; Fischer et al. 2004). They cause culpable violations, such as frauds, and blameless errors after pure unintentional human errors (Panko and Aurigemma 2010). This pitfall magnifies itself as spreadsheets become more complicated or when spreadsheets are integrated. Spreadsheet violations and errors are difficult to detect. The data contained in spreadsheets are often isolated and disconnected from other systems, thus crosschecking is not an option. Although spreadsheet pitfalls are real and sour, accountants and/or business controllers, strangely enough, cannot live without them in their daily work (see: Cullen 2003). Spreadsheets represent a low capacity for data integration at the organisational level, but a high flexibility capability at the unit level.

Business intelligence (BI) is a computer application that combines “data gathering, data storage and knowledge management with analysis to evaluate complex corporate and competitive information for presentations to planners and decision makers” (Negash and Gray 2008). BI users mash up the structured data available from the ERP system and data warehouse with unstructured data scattered throughout the business operations. This unstructured data includes, for instance, e-mails, telephone conversations, and economic indicators. BI allows users to create meaningful business reports that are useful for decision-makers (Negash 2004). Research by the Gartner Group (Sallam et al. 2011) differentiates the BI market into two platforms: the traditional enterprise platform and the data discovery platform. The traditional platforms, such as IBM Cognos, Oracle Hyperion and SAP Business Objects, focus on monitoring and reporting business operations. On the contrary, the data discovery platforms, such as QlikTech QlikView, are search-based applications. The data discovery BI enables business analysis and offers an interactive graphical user interface, which makes it easy to use and which lowers the deployment time. Specific

budgeting BI is often available from mega-vendors, such as IBM Cognos, Oracle Hyperion and SAP Business Objects, in the traditional enterprise platform. However, they often remain static, compared with the data discovery platform, because they focus more on budget data integration, reporting and analysis functionalities. This chapter focuses primarily on the traditional BI platform because it is designed specifically for budgeting. Therefore, the designed-for-all-purposes data discovery platform is ignored. Specifically, the traditional enterprise BI represents a high degree of data integration at the organisational level and a high degree of flexibility at the unit level.

Having presented the background information on budgeting and different IS technologies in this section; in the next section the secondary empirical data in line with the research question is explored.

## 4.4 Practical argument – IS technologies used in budgeting

This section begins with a discussion on how an actual budgeting practice is carried out in organisations. Then, it presents empirical data about the nature of budgeting and the enabling and constraining powers offered by each IS technology – ERP system, spreadsheets and BI – respectively.

### 4.4.1 A need to incorporate soft information in budgeting

The soft information required in the budgeting process is acknowledged in the academic literature. The diversity and complexity of this need for soft information, which makes a budgeting process more flexible than any other management accounting technology, especially in the budget construction process and variance analysis, is not well captured. Alexander Eliseev, Chairman of the Board of Directors of Globaltrans, Russia's leading private freight rail operator, comments on the diverse soft information sources that Globaltrans uses in its budgeting process in a PricewaterhouseCoopers Global CEO report (PricewaterhouseCoopers 2011):

Railway transport – our core business – serves many sectors of the Russian economy, so we watch a variety of macroeconomic indicators to see where the Russian economy as a whole is headed. We also monitor trends and forecasts for particular industries that comprise the core of our client base. These industries include oil production, oil processing, ferrous metals production, the coal industry, ore mining, and the construction materials sector. In addition, we follow key indicators having to do with

the financial sector. We probably pay most attention to the Ruble rate relative to other major currencies; and the interest rates at which Russian banks are lending to companies in the real economy. In setting our annual budgets for our holding company and various subsidiary companies, we consider all these indicators.

Key soft external information, suggested in the theory as contingency factors, such as economic indicators, specific industry indicators and financial indicators, are clearly required in budgeting. However, how this information is incorporated into budgeting decision-making is quite problematic. What types of IS technologies will allow users to incorporate this diverse data set into their decision-making processes? What types of IS technologies will allow users to integrate these piecemeal decisions into one single master plan? The next section investigates these questions.

#### **4.4.2 ERP system cannot capture soft information**

The literature contains extensive opinions regarding the constraining and enabling powers of an ERP system, particularly regarding the transaction-processing capability of the system, which embodies strength and weakness in itself. This capability enables the ERP system to work very well at the operational level because the system excels at collecting historical transactional data (Hyvönen 2003; O’Leary 2004; Rom and Rohde 2006). However, it represents a constraint when it is applied to a management accounting function, like budgeting, which needs a combination of external and internal information sources. An ERP system is not designed to collect the diverse set of soft external data, which was discussed earlier. The result in Rom and Rohde’s (2006) study shows that ERP has a non-significant relationship with non-financial, external and ad-hoc management accounting. Dechow and Mouritsen (2005) quote an informant in their case study who observes this contradictory enabling and constraining power of an ERP system:

You know what, the ERP system works reasonably well on the lowest level of plants. That’s where you can go in and get specific data [...]. However on the aggregated level of [the company], then it gets complicated – it is not configured very well to high level reporting. Basically, you can say that it is good for simple bookkeeping. But it’s not good for management reporting.

To incorporate diverse soft external information with internal hard financial data, users often employ other types of IS technologies, such as spreadsheets and BI, to “mash up” hard internal data with soft external data for budgeting, in response to the local budgeting requirements or the flexibility of budgeting. George Henninger, senior vice president for financial operations at Pfizer Inc., comments on this issue in a PricewaterhouseCoopers (2007) budgeting and forecasting study:

The Pfizer planning systems environment included a host of applications including Oracle [ERP], Hyperion [BI], Cognos [BI], and assorted spreadsheet models. In addition, our various business units – commercial, manufacturing, and research – each



approached the planning process with different types of models, data requirements, and forecast calendars.

Using an example, the popular SAP ERP R/3 package, Gosain (2004) describes the ERP system as static, which contradicts the flexibility required in budgeting. He expounds that most organisations are constrained by inbuilt models and assumptions from ERP systems. Organisations often opt for vendor-recommended user profiles and business processes. They do not have enough knowledge to reflect upon their own business rules and operational contexts during the implementation stages. No doubt, this practice backfires on them because the system limits them from complying with their own business processes and requirements (Dechow and Mouritsen 2005). This conclusion is similar to the results found by Granlund and Malmi (2002), Granlund (2009) and Uppatumwichian et al. (2011). They postulate that ERP system inflexibility is the main reason why users skip ERP in budgeting works as well as why an ERP system does not change management accounting practices (Booth, Matolcsy, and Wieder 2000; Jackling and Spraakman 2006).

#### **4.4.3 Flexibility pursued through spreadsheets**

In the quest for flexibility, in order to incorporate soft information, business units often employ spreadsheets (Jackling and Spraakman 2006; Panko 2006). Carton (2009, p.217) quotes an interviewee who expressed his preference for a spreadsheet over an ERP system:

The beauty of the local systems [e.g. spreadsheet] was...you could get any information about anything, a spreadsheet, a data base...you could make some really good business decisions quickly. Now, in SAP [ERP], it's an absolute nightmare.

Spreadsheets are often the tools selected for a budgeting process because they are flexible and require low-learning effort from a user's perspective. PricewaterhouseCoopers (2007) reports in a budgeting survey that 70 per cent of respondents implement spreadsheets in budgeting. Panko (2006) remarks that a company can use up to 200 spreadsheets in a budgeting process. Spreadsheets, in particular, are often large, complex and very important for business operations, yet they are increasingly labour-intensive and inefficient, especially for budget data integration.

Ulf Åhman, CFO of Zehnder Group Nordic AB, mentions in Nordstrand and Åhman (2011) that the company used to integrate subsidiaries' budgets data through a "cut-and-paste" procedure, which was labour-intensive, inefficient and error-prone. Similar practices are also reported by Granlund (2009) and Uppatumwichian et al. (2011). This weak integration capability of spreadsheets causes a large amount of inefficiency in budgeting processes. PricewaterhouseCoopers (2007) reports that 56 per cent of budgeting effort is spent on low-value activities, such as distributing,

receiving and integrating spreadsheets, and checking for errors. This unnecessary step slows the entire budgeting process and causes business controllers to shift away from value-generating data analysis to non-value-generating manual data integration. Such a practice contradicts the assertions (Caglio 2003; Scapens and Jazayeri 2003; Jackling and Spraakman 2006) that the role of management accounts will change from one of bean-counters to one of consultants, due to new IS technologies (Jack and Kholeif 2008). In conclusion, spreadsheets allow users to incorporate soft external information flexibly into budgeting, but it is inefficient and error-prone to integrate various individual budgets into a single master budget.

#### **4.4.4 Automated budget data integration with BI**

BI is often installed in organisations for budget data integration in order to improve efficiency. According to Ulf Åhman, CFO, Zehnder Group Nordic AB, in Nordstrand and Åhman (2011), the company has experienced a great improvement in its budgeting process since the installation of a Hyperion Financial Management BI. The company claims that the budgeting lead time is shortened to two months, which is a large decrease in lead time, compared with the old manual budget data integration process with spreadsheets. The financial data stored in Hyperion BI is ready for an update at a quarter-end; therefore, the business controllers do not need to rework the entire process like they did before. Although Ulf Åhman comments that Hyperion BI installation takes a long time and requires changes in the accounting structure, product codes and corporate structures, he considers that BI is an absolute necessity:

[BI] is one thing that a company must work on; it is not possible otherwise. I do not understand how a company with four billion [SEK] sales like Zehnder could cope with this [manual budget data integration] work before.

Though the top management might see the importance of BI for budgeting purposes, the real use practice is similar to that of the ERP system reported in previous publications (Granlund and Malmi 2002; Granlund 2009). Data from spreadsheets are simply fed into Hyperion BI for integration purposes, as a Financial Analyst Manager at a global consumer company reveals in Uppatumwichian et al. (2011):

I use [budgeting] data from Excel and put it into Hyperion. Excel is the working file, but when I get the result I put it into Hyperion. To prevent confusion between Excel and Hyperion, I design a form on Excel that looks like the form on Hyperion, then I can link the information from Excel to Hyperion.

Perhaps such BI practice in budgeting is the reason why Rom and Rohde (2006) do not find significant relationships between budgeting and BI in their survey study on the impact of ERP and BI on management accounting.

Another advantage of BI, which is typically claimed by BI vendors, is its superior data analysis capability. However, this point remains vague to date. A Gartner report (Sallam 2011) criticises BI applications for being complicated, hard to use and failing to meet business criteria. Consequently, these complications cause users to underutilise BI functionalities. Users frequently restrict use around static report viewing and not data analysis purposes, as intended. A Datamonitor report (Trifkovic and Gower 2007) condemns the weak interoperability and integration of BI with other enterprise applications, such as ERP systems, and the lack of advanced analytical capabilities of BI applications. BI vendors clearly need to work on this analytic shortcoming in order to gain market momentum. In a nutshell, BI applications are strong on data integration but are considerably cumbersome in data analysis. Therefore, it is important to keep in mind that BI is not a silver bullet for excellent budgeting. Many components, such as user mental models and institutional memory, remain uncaptured in BI applications. Indeed, many conditional factors are needed to support BI. These are, for example, people, skills, business processes and strategic initiatives (Granlund 2011).

It is observed that budgeting BI offers a trade-off between ERP systems and spreadsheets. BI is more flexible than ERP, even though users have to align their account charts and corporate structures with the BI software, similar to an ERP implementation. A data structure in BI is easier to change, in comparison with one in an ERP system, because it is not directly connected to other business functions. Instantaneously, BI is more appropriate for budget data integration than spreadsheets because it eliminates a high-risk manual budget data integration process and improves efficiency.

In relation to the two questions posed at the end of the budgeting discussion, spreadsheets and BI are probably the most suitable IS technologies for budget construction because they allow users to combine soft and hard data. ERP systems and BI, on the other hand, are more appropriate for budget data integration purposes. The next section summarises the discussions in this section into a perspective which is based on the enabling and constraining powers embedded in each system.

## 4.5 Putting enabling and constraining powers into perspective

Based on the review of ERP, spreadsheets and BI presented in the previous sections, this section puts these different IS technologies into perspective. ERP systems offer a high integration capability from their transactional data processing origin; however, they may not be an appropriate tool for budgeting because they do not respond well

to the flexible nature of budgeting. Spreadsheets, on the other hand, respond very well to the flexibility needed in budgeting, but represent a data integration weakness. Manual data integration with spreadsheets is time-consuming, expensive and error-prone. The traditional budgeting platform, BI, which is the focus of this study, might be the most suitable IS technology for budgeting since it offers a high data integration capability, but offers a medium-to-high flexibility capability due to the limitations presented in terms of the lengthy and complicated installation process and limited advanced analytical capability. In general, BI is rated the highest according to both the integration and the flexibility criterion, compared with ERP and spreadsheets applications. However, the system is still far from being an ideal application type that allows a high level of both data integration and flexibility for budgeting.

Since each IS technology represents both strengths and weaknesses, data extraction, transfers and loading between these three systems are common in budgeting practice. Transactional data is often downloaded from an ERP system in order to answer the simpler analytical questions about past performances, such as: What happened? When did it happen? How much did it cost? Where did the problem occur? When the past trend is observed, business users often perform the more sophisticated analysis in spreadsheets or BI to answer questions, such as: What is going to happen? What if the past trend continues? What is the best action to forecast future performance? These questions are unstructured by nature, thus they require a high level of interpretation of structural and unstructured data from many sources, in combination with understanding and knowledge about the business, the competitors and the industry. Once the preliminary data analysis is completed, the individual budgets are constructed and transferred to BI or ERP applications again for data integration purposes. Variance analysis can be performed in budgeting BI applications; however, sophisticated and ad-hoc analysis still needs to be complemented with spreadsheets. The data extraction, transfers and loading during the course of the budgeting life cycle confirm the finding that no single tool is ideal for budgeting purposes. Therefore, users must constantly pick and choose among systems in order to overcome the constraining and enabling powers represented by each system.

## 4.6 Summary

Through the concept of human agencies in Giddens' structuration theory, this chapter demonstrates how business controllers (users) experience a flexibility and integration trade-off from different IS technologies, such as ERP systems, spreadsheets and BI, throughout a budgeting cycle. The chapter shows that no single IS technology perfectly meets the requirements for flexibility yet integration in the budgeting process; therefore, users constantly have to transfer, download and extract data among these systems.

From an academic perspective, this chapter contributes to the academic literature by addressing how ERP systems, spreadsheets and BI constrain and enable business controllers in certain ways, and by demonstrating that business controllers need to work around these enabling and constraining powers throughout their budgeting processes. From a practitioner perspective, this study recommends business controllers to develop informed IS strategies for budgeting purposes. Given the potential pitfalls of spreadsheets, business managers should consider investing in an ERP system and in BI applications in order to automate budget data integration and improve efficiency.

There are many research opportunities available in this line of study. Future empirical data collection is needed to confirm the findings presented; a survey could be the most interesting research method at this point to confirm whether business controllers agree or disagree with the enabling and constraining powers embedded in IS technologies. Further research also has the opportunity to demonstrate whether and how technology requirements fluctuate throughout the entire budgeting process.

# 5. Analysing flexibility and integration needs in budgeting IS technologies

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**ABSTRACT:** The duality characteristics of budgeting between the flexibility and the integration functions as a decision-making tool inspired this chapter to investigate how the flexibility and integration domains influence controllers' choices of IS technologies used in budgeting. This includes the enterprise resource planning (ERP) system, business intelligence (BI) and spreadsheets. Guided by the human agency concept, twenty-one controllers in eleven companies in Thailand were interviewed. The analysis shows that flexibility and integration in budgeting IS technologies can be viewed as four domains: organisation-in-focus, personal requirement, business requirement and reporting requirement. The analysis shows that there are conflicts between these four domains. It is found that spreadsheets are used when flexibility is needed. However, the ERP system and BI are employed to support integration. The major implication is that business controllers apply several IS technologies to support budgeting because each IS technology is designed for its own respective purposes and intentions.

## 5.1 Introduction

Granlund (2011) states that current accounting information system (AIS) research should focus more on decision-making issues in connection to modern IS technologies. This is in agreement with Jones and Karsten (2008) who feel that modern IS technologies like the enterprise resource planning (ERP) system may restrict users in business processes. Inspired by them the present paper responds to these two previous research gaps by investigating decision-making in a budgeting context with a view to identifying how IS technologies enable and/or restrict business controller choices of IS technologies used.

Budgeting, as one of the oldest yet most popular accounting controls (Libby and Lindsay 2010), is defined as a process undertaken to achieve a quantitative statement for a defined period of time (Covaleski et al. 2006). A review of “levers of control”<sup>7</sup> (Simons 1994) suggests that budgets can be used to support decision-making either diagnostically in order “to monitor organisational outcomes and correct deviations from pre-set standards” and/or interactively so that managers “regularly and personally involve themselves in the decision activities of subordinates”. Traditional budgeting literature often associates budgeting with management control (Otley and Berry 1980). Nonetheless recent literature has indicated that increasing numbers of organisations are turning to budgeting as a decision-making tool through an adoption of better budgeting practices (Neely, Bourne, and Adams 2003) such as rolling forecast, due to rapid technology changes (Abernethy and Brownell 1999), local contingencies (Chenhall 2003), and intense competition (Frow, Marginson, and Ogden 2010). This chapter builds on Simons’ work and postulates that it is up to top management to determine how to combine the diagnostic and interactive roles of budgeting; therefore it is deemed that budgeting incorporates both roles in varying combinations.

The dual roles of budgeting require the process to be more flexible, in response to local contingencies and intense competition, yet more integrative for efficient monitoring (Chapman and Kihn 2009). The flexibility in budgeting calls for a participative budgeting approach in order to collect diverse information, such as hard financial and soft intellectual information sources, for constructing budgets at unit levels. On the contrary, the management control foundation calls for a company-wide

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<sup>7</sup> The levers of control concept is used in line with previous interpretations in budgeting research, namely Abernethy and Brownell (1999). Therefore this chapter omits the two remaining control system; boundary system and belief system, since they are not related to budgeting.

integrative performance measurement mechanism, therefore department-specific budgets must be integrated into one solid organisational plan so that the management can verify goal congruence (Arwidi and Samuelson 1993), whilst also monitoring and identifying performances.

Granlund (2011) and Scapens and Jazayeri (2003) confirm that prior research on how IS technologies are used to support decision-making in budgeting is limited. Previous research particularly concentrates on the ERP systems, and claims that the ERP system changes the role of business controllers from bean counters to business partners. They spend more time and skills on information analysis due to improved access to relevant and real time information provided by the system (Caglio 2003; Grabski, Leech, and Sangster 2008). Research has suggested that the ERP system as such does not have any direct impact on the financial or non-financial performance of organisations. Indeed the impacts are shown only when the ERP system is used to mediate proper management accounting techniques (Chapman and Kihn 2009; Kallunki, Laitinen, and Silvola 2011). Therefore, the ERP system adoption per se neither promotes an adoption of the advanced management accounting technique (Booth, Matolcsy, and Wieder 2000) nor changes the nature of budgeting ex-post (Granlund and Malmi 2002; Hyvönen 2003). In a study where the ERP system and BI are compared (Rom and Rohde 2006), BI seems to have a slightly better support for budgeting than the ERP system. However the supports for budgeting from both systems are still non-significant. This results in spreadsheets being used as the primary tool in budgeting processes (Uppatumwichian, Johansson, and Carlsson 2011) in both multinational and local organisations despite the existence of ERP and BI applications. None of the aforementioned reports have provided an explanation as to why advanced IS technologies such as ERP and BI cannot defeat simple spreadsheets in budgeting processes. In the quest to unpack the moderate impacts of ERP and BI on budgeting, I am convinced that it is crucial to uncover the nature of budgeting per se in relation to IS technologies. I believe that budgeting offers an excellent social context under which to investigate the complex entanglement between decision-making and IS technologies in response to the research gaps addressed above.

Having identified the nature of budgeting, the chapter dwells here on budgeting as a social conduct and turns to the human agency concept in Anthony Giddens's structuration theory (see: section 5.2) to interpret how business controllers (human agents) may understand control mechanisms embedded in budgeting through their choices of IS technologies such as ERP, BI and spreadsheets. Therefore the research question addressed in this chapter is: how can the needs for flexibility and integration in budgeting IS technologies be explained?

The chapter proceeds as follows. In the next section, the concept of human agency from structuration theory is introduced. Section 5.3 provides vivid examples from the case companies and analysis on the flexibility and integration needs in IS technologies used in budgeting. Section 5.4, the final section, discusses the conclusions and implications of the research.



## 5.2 Human agency

This chapter employs structuration theory as a background to the analysis as it focuses particularly on the human agency concept embedded in the theory. It is claimed that Giddens favours this approach over a vain application of the structuration theory in its entirety because it allows more detailed and meaningful exploration of a problem at hand (Sharma, Barnett, and Clarke 2012). Following Giddens's advice (1984, p.326), the concept of human agency is applied in this study as a sensitising device for data analysis rather than a prescribed guideline for data collection and analysis.

The structuration theory places emphasis on a process whereby human agents and society interact and create social structure. However, Giddens's view of human agency is strongly voluntaristic (Jones and Karsten 2008) compared to the social structure. Giddens argues that except in cases where human agents have been drugged and manhandled by others, they always "have the possibility to do otherwise" (Giddens 1979, p.258). In other words, human agents have an ability to interpret how particular social structures enable or constrain them to achieve certain actions; consequently they attempt to work around these enabling and constraining powers, which might unintentionally generate change in the social structure.

Many writers have questioned whether or not social structures (be it physically or, as Giddens puts it, out of time and space) simply constrain human agents since there are many circumstances in which agents are "forced" to pursue only one feasible option (Bhaskar 1979; Callinicos 1985). In addition, Archer (1982) further comments that the "could-have-done-otherwise" human agency concept is problematic because it implies that human agents do not have to adhere to social structures in the structuration. In response to his critics, Giddens argues that everything else other than the human agency contributes to a form of determinism, forcing those subject to it, which implies his determination on the power that social structures have on human agents.

This chapter employs the concept of human agency in connection to previous works on IS (see for example: DeSanctis and Poole 1994; Boudreau and Robey 2005), especially from Orlikowski (1992) who is clearly influenced by Giddens's human agency as she conceptualises material artefacts as:

The outcome of coordinated human action and hence inherently social [...] [being] created and changed by human action.

Budgeting is deemed to entail the flexibility and integrative requirements previously discussed. Through interviews with business controllers (human agents), I have sought to describe the needs for flexibility and integration in budgeting IS technologies and how these needs are interpreted in their choices of IS technologies to employ. The research method and the company descriptions have already been

discussed in section 3.4.1 and section 3.4.2, therefore the next section proceeds straight to the empirical data and analysis section.

## 5.3 Empirical data and analysis

This section disaggregates the empirical data and analysis into two sections. It begins by analysing how business controllers, through IS technology use, interpret the needs for flexibility in budgeting IS technologies, and continues discussing the same matter with the integration of budgeting. The inductive coding and data analysis suggests that flexibility and integration can be considered from the following four dimensions: organisation-in-focus, personal requirement, business requirement and reporting requirement.

### 5.3.1 Analysing the needs for flexibility

The bottom-up budgeting technique, adopted in response to rapid rates of technological advancement, intense competition, and market vitality, requires budgeting processes to differ from one individual unit to another due to environmental variations, specific company characteristics and prioritised objectives (Abernethy and Brownell 1999). To improve decision quality and reduce the uncertainty inherent in complex decision-making, businesses often employ various assumptions from diverse sources corresponding to individual unit requirements, as the Planning Vice President in company B describes:

To construct a revenue budget, we look into assumptions such as GDP, field oil prices, Dubai oil prices and exchange rate. These things also vary from business unit to business unit. We have a special team working on these assumptions because they determine our revenue budget, hence our ability to predict sales peaks and bottoms.

The term flexibility as used here refers to business controllers' discretions over the use of a budgeting system for decision-making which gains its momentum from advanced IS technologies (Ahrens and Chapman 2004). Spreadsheets and BI are famous examples of IS technologies which allow ad-hoc customisation of routine budgeting information, while the ERP system constantly enforces routine reporting for different recipients. Through the use of these IS technologies in budgeting, I have attempted to interpret what flexibility might mean to business controllers.

**Organisation-in-focus** – budgeting is constructed to reflect actual operations which might be different from legal entities used for financial statement preparation. With this in mind business controllers must therefore make certain adjustments for operational purposes, as the Financial Planning Manager in company F explains:

Planning is more complicated than the normal accounting procedure. [The Accounting department closes their books based on their legal entities, don't they? Let's say it is the legal entity for Thailand, so they close the book and pay taxes. Anyway we have certain departments that do not work entirely for the Thailand legal entity, like legal and IT departments. For planning purposes I must exclude them [using spreadsheets despite the existence of our own BI system].

Intricate separation between legal and operational entities has also caused failure in implementation of the Cognos BI, resulting in a sole reliance on spreadsheets for budgeting, as the Central Accounting Executive in company G comments:

I never see how Cognos [BI] would work for us except in the case that we had one simple legal entity separated into departments. But we are a group of companies; we have many legal entities and many business lines. On occasion we have the same legal entity working on two separate business lines.

It is indicated that for planning and decision-making purposes, business controllers need to separate an operational view from an ordinary legal entity view using IS technologies, that is, spreadsheets which are most suitable for them.

**Personal requirements** – personal requirements and preferences characterise the use of IS technologies in budgeting, especially spreadsheets, as the CFO in company H exemplifies:

Excel [spreadsheets] are built based on a person's experiences and preferences. Like when my selling and administrative (S&A) controller left the company, the new controller must learn how the old guy created formulas and links. It was a lot of work which lasted for a couple months. But in the end, he just gave up and created a new Excel sheet because he was not used to it. He was not familiar with the old formulas and patterns. It was just easier for him to create a new sheet.

In company G, it was my observation that a personal work requirement fuelled with leadership plays a significant role in shaping flexibility beyond the capabilities of the technology, as the Senior Costing Manager in company G points out:

Cognos [BI] can be used for simple budgeting. I mean if you want to get an income statement and a cash flow statement. Fine, that is very easy to do. You can also put in simple assumptions and turn them around but I think our Senior Management Accounting Manager [who is primarily responsible for budgeting] wants "too much" out of it. That is why it did not work.

It has been demonstrated that business controllers approach budgeting from diverse requirements beyond the capacity that any advanced IS technologies can offer; therefore they prefer to use spreadsheets because the technology allows them to exercise their personal discretions in budgeting.

**Business requirements** – Subunit business requirements and needs for locally unique information dictate how budgeting should be carried out at unit level. Business controllers often design the processes to reflect their business nature but often IS

technologies which enforce routine reporting stand in their way. The Accounting Policy Vice President in company B indicates:

Our businesses move very fast. We have non-oil businesses like [a] coffee shop and space rental under one service station. SAP [ERP] does not have any function that will support these extra activities that we have. For a service station, we want to report all business activities that happen. We want to drill down to see how much we are making from petrol, coffee shop and space rental, for example. They all should be treated as segments under that service station but it is very complicated to design this into SAP [ERP].

Ever-changing business environments and strategic compliance obligate budgeting practices to change accordingly but it is not always efficient to alter these requirements in the ERP system, as the Head of Accounting in company A points out:

Budgeting is not fixed like [financial] accounting. If we plan that we will acquire six more companies next year then we have to change SAP [ERP] codes, but we can do this very quickly on spreadsheets.

Even in the case that an IS technology is specifically designed and developed for company-specific budgeting practice, there may be issues of incompatibility with company-owned business requirements. The Financial Planning Manager in company F, who has access to a home-grown budgeting BI (own BI), indicates:

We must share our revenues with our business partners according to certain specific agreements, which it is not an easy round number. Our [own BI] cannot support this revenue sharing requirement so we encourage our regional companies to continue using Excel [spreadsheets].

**Reporting requirements** – reporting represents a very important aspect of decision-making because it allows decision makers to check on progress and resource utilisation, detect problems and decide corrective actions. Therefore business controllers need to look for information from numerous dimensions, namely sales by customers, products and gross margin, based on their personal needs for information processing. Indeed, as the Financial Planning Manager in company F indicates:

My boss is rather creative, he always asks for new dimensions of information.

Spreadsheets are often the IS technology that business controllers turn to in order to generate reports because it is more practical, flexible and faster as the Accounting Policy Vice President in Company B, which has access to both ERP and BI technologies, suggests:

Top management's requirements come and go very fast. So we extract data from the SAP [ERP] and do it on Excel spreadsheets instead. [Apart from that], SAP [ERP] cannot generate reports that we want. The system might have one report that we need but it does not have the other nine reports that we also need.

This statement is supported by another indication from the CFO in company H who confirms that she “hardly uses any reports coming out of SAP [ERP]” because they do not meet her simple reporting requirements. She further explains:

If I look at the actual results from SAP [ERP], it does not mean a thing to me. I need to compare the actual results with budget numbers but we do not have those on [SAP] R/3 [ERP]. After that I need to see variances, you know this kind of thing makes it hard to use any [SAP] R/3 [ERP] report.

At present, the analysis shows that business controllers need flexibility for decision-making in budgeting. They focus on an operational view of the organisation and allow their own individual approach to dominate budgeting practice in response to unique local business and reporting requirements they receive from top management. The next section proceeds to analyse integration in budgeting using the same dimensions.

### 5.3.2 Analysing the needs for integration

Another elementary function of management accounting is to compare performances against pre-determined standards and plans, which calls for complete information integration across data sources. The term integration refers to standardisation of data definitions and structures using common conceptual schema across a collection of data sources with the assistance of IS technologies (Goodhue, Wybo, and Kirsch 1992). The ERP system, which exists in all the case companies, is supposed to bridge information from diverse data sources. However, it seems to be of little assistance due to an incompatible design which fails to integrate the business and the system. This is evident when business controllers use Excel spreadsheets for many budgeting processes, namely budget consolidation and variance analysis, because the integrated ERP system is not compatible with work processes (Granlund and Malmi 2002). The most advanced use of the ERP system for data integration purposes is present in companies A and B where the ERP system is used for budget spending control in connection with procurement and accounting functions. The Planning Vice President in company B explains:

From a workflow perspective, we link budgeting with purchasing. When we buy something, we indicate that it is bought for this budget line and this is the money we have got. Then we reserve the amount in SAP [ERP] so next time we know that this is the money we have left. When the transaction is completed, we use this information for general ledger recording.

This section attempts to interpret what the needs for integration might mean to business controllers in budgeting work.

**Organisation-in-focus** –The bureaucratic multi-divisional organisation structure calls for integrated information through existing IS technologies for financial monitoring.

Although this work is supposed to be achieved through the ERP system, empirical evidence suggests the opposite, as the CFO in company J explains:

All companies [legal entities] in the Southeast Asia region use JDE [ERP] but they are not interconnected so we use the [own BI] to report data instead.

In every company where an own BI is present (companies F, I and J), it is used solely for budget and/or actual data submission in compliance with group reporting policy, therefore it does not allow any of the complicated data manipulation needed for analysis. The remaining companies, including company B which seems to have the most advanced integrated IS from an integration of budgeting data on both ERP and BI, perform a partial budget consolidation on Excel spreadsheets. The Planning Vice President in company B explains:

The issue is that some of our affiliated companies [legal entities] are not yet ready for Cognos. So now we use Cognos for consolidation if we can. For those that are not ready, we get Excel sheets from them instead. Then we combine Cognos with Excel in order to get a consolidated statement for the entire group.

This indicates that at the organisational level, the multi-divisional organisation focuses on integrated information based on a legal entity for business monitoring purposes. Many IS technologies are used for budget information integration, that is, BI with the assistance of spreadsheets. The ERP system, an integrated IS technology, is supposed to facilitate budget consolidation but the empirical evidence suggests otherwise.

**Personal requirements** – Common conceptual schema information is fundamental to management control because it allows business controllers to track performance against pre-set standards. IS technology enables common data definition across local units, therefore it works against personal data definitions and requirements (Chapman and Kihn 2009). Indeed, the Customer Intelligence Manager in company K explains:

A consequence after the central database implementation is standardisation. Properties used to report whatever they wanted to because it did not affect anyone else, now they have to conform to a reporting standard.

The positive impacts of a collective work approach, which relies on common data definition based on integrated IS technologies, are time discipline and information accuracy. First the Vice President of Information Technology in company I explains how an internally developed own BI can improve time discipline through discretionary reduction among business units:

The issue was that business units did not submit budgets on time so we implemented a[n] [own BI] [instead of spreadsheets]. Through [own BI], we can announce that we allow them to upload budgets until this day, and then we will close the system. It imposes time discipline on them.

Second, the Planning Vice President in company B further mentions that information accuracy benefits from using integrated IS technologies:

When working with spreadsheets, there is no way to verify that the information is correct. When we use Cognos [BI], it is a whole new story. Now it is a system practice.

From this I deduce that the collective-work approach and IS technology alignment are not only essential to budget data integration but also generate many positive effects for organisations as a whole.

**Business requirements** –The multi-divisional organisations establish enterprise-wide business requirements and performance goals for subunits which need to be monitored closely. In company B, budgeting information is integrated from the BI to the ERP system for control purposes since the ERP system gives an easy and up-to-date comparison between actual spending versus budgets (Caglio 2003). Integrative advanced IS technologies help business controllers to monitor subunit performance as the Customer Intelligence Manager in company K discusses:

After we have implemented the BI and a central database depository, it is easier to work. Like when I want to plan a brand promotion, I do not have to call properties up anymore. I just log on to the system and see the trend.

Despite this she acknowledges that a lack of fully integrated budgeting information on one single IS depository is a hindrance as she further suggests:

Since the actual performance is on Oracle [ERP] but the budget is not on there, somehow I feel that there is a lack of synchronisation between performance and budgets.

The results shown in this section are consistent with Chapman and Kihn (2009) who conclude that IS integration enables control.

**Reporting requirements** – External financial statement reporting standards like Generally Accepted Accounting Principles (GAAP) or International Financial Reporting Standards (IFRS) may have an impact on budgeting especially for listed companies because a management team must make performance commitments to a board of directors and shareholders based on a compiled financial statement format. Integrated IS technologies ensure that business controllers conform to financial statement reporting standards. The Financial Analyst in company B observes:

Using Cognos [BI] is better for budget consolidation. Cognos [BI] follows GAAP but you can never be sure with Excel [spreadsheets]. I can track eliminations of intercompany transactions in Cognos [BI] which is not always possible to do in Excel [spreadsheets].

A similar reason is evident in company A where IFRS compliance is the major driver behind their ERP system upgrade, as the Treasurer comments:

We decide to upgrade to SAP [ERP] ECC 6.0 because of IFRS8. It will come into effect this year so we set the timeline that the upgrade had to finish before the year started.

The analysis demonstrates the need for budgeting integration in management accounting by monitoring business legal entities through a collective approach in response to enterprise-wide and external reporting requirements. The next section presents the conclusion of the analysis with regard to the flexibility and integration domains in budgeting as well as any possible future research.

## 5.4 Conclusions and contributions

It can be concluded that budgeting works clearly combine the flexibility and the integration functions into the process. This statement is in line with the suggestion from Simons (1994) that it is up to the management to make their own decisions in specific contexts on how these control mechanisms should be combined. Through the concept of human agency building on the flexibility and integration use of budgeting, I will further analyse how business controllers interpret the entanglement of budgeting IS technologies, namely the ERP system, BI and spreadsheets, in connection with the flexibility and integration conditions. The analysis shows that business controllers perceive flexibility and integration from the four dimensions: organisation-in-focus, personal requirements, business requirements and reporting requirements. Table 5.1 summarises the findings based on the analysis of the empirical data from the eleven companies.

The first organisation-in-focus dimension demonstrates that there is a struggle between the operational and legal entity view of organisations. It is clear that both views are needed in a budgeting process, however, for contradictory purposes. The operational view assists local decision-making, unlike the legal view for monitoring and control. This means that spreadsheets are often called upon to assist data manipulation based on the operational view while advanced IS technology like BI is often used for supporting budget consolidation according to the legal view. An interesting finding is that despite the existence of the ERP system in all the case companies, none of the case companies use ERP for budget consolidation.

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<sup>8</sup> The Federation of Accounting Professions (Thailand) plans to align the existing Thai Accounting Standards (TAS) with IFRS effective from 2011 onwards commencing with Thailand's fifty largest listed companies. (Source: [www.fap.or.th](http://www.fap.or.th)).



**Table 5.1 Contradictions between flexibility and integration in budgeting**

<b>Dimensions</b>	<b>Flexibility</b>	<b>Integration</b>
Organisation-in-focus	Operational basis entity	Legal basis entity
Personal requirements	Individual requirements	Collective requirements
Business requirements	Local business requirements	Enterprise-wide business requirements
Reporting requirements	Individual reporting compliance	External reporting standard compliance

Regarding the personal requirements dimension, the analysis displays a contradiction between individual and collective requirements. Business controllers at local level often require distinctive information, structured around one's personal requirements, preference and experiences, to support decision-making. Once again the findings show that spreadsheets are the main IS tool used to tailor data according to one's requirements because it is not possible to retrieve this unique set of data from advanced IS technologies like the ERP system and BI. Indeed these technologies are designed and operated according to the collective requirements for data gathering across organisational units.

From the analysis of the business requirement dimension, it can be stated that it represents an incongruity between local business requirements and enterprise-wide business requirements. Business controllers' comments that advanced IS technologies, especially the ERP system and BI restrict them to comply with local requirements. In order to react to the restrictions imposed, business controllers maintain their own separate spreadsheets suitable for a decision-making context. On the contrary, they acknowledge the importance of integrative advanced IS technologies, configured according to enterprise-wide business requirements, especially when they need to monitor and collect information from various data sources for strategic planning.

The analysis of the reporting requirement dimension portrays a conflict between internally driven reporting requirements against externally accepted accounting standards. The internally driven reporting requirement is tailored to fit specific, unpredictable and fast-changing situations, directly affected by external environments. Spreadsheets are once more employed to assist these unstructured reports due to cost and time efficiency. However advanced IS technologies, particularly the ERP system and BI, are employed to support structured reports, namely GAAP compliant budgets, presented for a public audience.

The major implication of this analysis is that in general business controllers must apply budgeting IS technologies to fit the nature of budgeting tasks. When budgeting is used for unstructured decision-making, namely preparing budgeting to conform to

operational purpose and management reporting, business controllers should employ IS technology that allows maximum discretion over data manipulation. This could certainly be seen as one reason why business controllers use spreadsheets. The rational view of decision-making requires a complex data model (on an IS technology) to formulate all the essential dimensions of the environments as well as to determine and evaluate the best possible alternatives before a decision can be made. The use of advanced IS technologies like ERP or BI for the daunting task of decision-making could be seen as inappropriate because these systems are not primarily designed to support any unstructured data model needed for decision-making. On the contrary, it could be recommended that business controllers should employ advanced IS technologies, especially the ERP system and BI, to assist integrative activities, namely monitoring of actual performance in relation to budgets and preparation of GAAP compiled financial statements for budgets. These activities are characterised by certainties which can be directly translated into IS technologies as has been discussed above for an IFRS-ready ERP system (company A). These advanced IS technologies are deemed to be the most effective with regard to the integrative functions. In addition, integration of budgeting information between these advanced IS technologies is recommended, that is, a complete integration between ERP and BI, to ensure efficiency and accuracy of information in data monitoring.

Having analysed the needs for flexibility and integration in budgeting IS technologies using the concept of human agency in ST, I concur with Granlund and Malmi (2002), Rom and Rhode (2006), and Hyvönen (2003) that the ERP system and BI applications have a moderate impact on budgeting practice. Indeed it has been shown that business controllers (the human agencies) only choose to employ these technologies when they are applicable to management accounting functions. Specifically, budgeting practice does not change according to these advanced IS technologies. Building on previous research, the internally-developed “own BI” appears to have a similar moderate impact on budgeting, which is no different from the ERP system and off-the-shelf BI. The main conclusion thus far is that the needs for flexibility and integration in budgeting influence to a high degree which IS technologies are used. Business controllers often choose to use spreadsheets since they see this software as fulfilling their needs for flexibility. Future research could well investigate whether budgeting should be led by any of these advanced IS technologies, ERP or BI? Although it is not possible to say that budgeting practices employed in the case organisations under study are flawless, I do not think that budgeting, or any other business practices, should be driven by any kind of IS technologies. Businesses would be in a very dangerous position if the ERP system, for example, is used for local decision-making since the system is not designed to collect local data and/or present data in a way that is useful for local decision-making. The same applies to BI applications, which receive a moderate preference over the ERP system in academic research (see for example: Rom and Rohde 2006). I question the validity of the comparison approach because these systems are designed for completely different

purposes. Therefore they should not be compared for any reason. Indeed, I propose that it is more appropriate to employ a contingency approach to determine the circumstances which deliberately reinforce and weaken ERP and BI use in budgeting or other accounting control activities. Industrial research (Trifkovic and Gower 2007; Sallam 2011) is ahead of academic research with regard to this point, having already criticised the BI system for having a weak interoperability and integration with the existing ERP system as well as complications in system design. These lead the industrial research to conclude that users do not prefer using BI for more complicated analytical works as it should be.

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# Part III: Business controllers' use of IS technologies



# 6. Use of accounting solutions for budgeting in ERP, hybrid ERP, and BoB: An explorative study

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The chapter is based on the proceeding of the fifteenth Asia-Pacific Conference on Information Systems (PACIS 2011), Brisbane, Australia, 7–11 July, 2011, edited by Peter B. Seddon and Shirley Gregor.

**ABSTRACT:** This study explores whether off-the-shelf “accounting solutions” are used or not used in management accounting. In particular, it explores business controllers’ use of accounting solutions such as ERP, hybrid ERP, and best-of-breed (BoB). Previous research highlights the problem that ERP has a “moderate” impact on management control but no study addresses whether hybrid ERP and BoB adopters experience the same problem. The explorative study investigates two budgeting activities – annual budget and rolling forecast construction, and variance analysis – in five case companies in order to explore and explain if and why off-the-shelf accounting solutions are used or not used. Due to a poor fit between user intentions and system functionality, all the case companies use non-accounting solutions such as Excel and Hyperion business intelligence budgeting. In the first activity, business controllers can achieve budgeting accuracy but the accounting solutions offer poor forecasting ability. In the second activity, business controllers can identify management control problems but the accounting solutions offer poor analysis functions, for example poor visual presentation. We conclude that adopters of hybrid ERP and BoB accounting systems experience the same problems as adopters of

ERP because non-use or “workaround” of accounting solutions is related to both technical and social problems.

## 6.1 Introduction

Previous research (e.g., Granlund and Malmi 2002; Hyvönen 2003; Catt 2008) has found that the relationship between ERP (enterprise resource planning) and a management accounting function like budgeting is multifarious. Catt (2008) analyses SAP ERP forecasting functionality and concludes that it has several limitations in accordance with published business forecast practices. Therefore, he recommends practitioners should perform significant forecasting steps outside SAP ERP in order to improve forecasting accuracy. Granlund and Malmi (2002) find that fewer than half of their ten case companies operate budgeting in ERP systems. However these companies only use ERP to assist budget consolidation processes; as a result there is no significant change in the budgeting process after the ERP implementations in any case company. Hyvönen (2003) reports in a survey of IS technologies and management accounting practices in Finland that budgeting is the only area in which ERP adopters seem to have more problems than non-ERP adopters. Nevertheless, thanks to the limited nature of the study, Hyvönen did not further elaborate on the causes. Past research tends to conclude that there is something odd about using ERP for budgeting, but still offers a limited view on why this is the case.

An advertisement for the position of business controller at Sony Ericsson (2010), for which the job description involves budget development, rolling forecasts and variance analysis, further confirms the complex relationship between ERP systems, non-ERP systems like Microsoft (MS) Excel and business intelligence (BI), and a management control system such as budgeting. The advertisement emphasises the importance of applicants' Excel spreadsheet skills to perform extensive analytical tasks and values ERP skills in the form of SAP knowledge significantly less (“must have” versus “good-to-have”). A quick search on the web page of SAP (2010), which is the biggest ERP vendor and also Sony Ericsson's ERP vendor, shows that SAP's ERP solution provides all the management control functions specified in the job advertisement. “SAP ERP provides powerful analytic software that enables powerful financial analysis to help you analyse your business. [SAP ERP] support[s] traditional budgeting, rolling forecasts, and collaborative planning.” That Sony Ericsson is searching for a business controller who has more knowledge and experience of a non-ERP system like Excel than of the SAP ERP system is a clear indication that in the work tasks related to the job a non-ERP system is of greater importance than the relatively costly ERP system. The job advertisement example confirms earlier findings (e.g., Granlund and Malmi 2002) that ERP systems have an insignificant impact on management accounting practices because most advanced and traditional management accounting works are

operated in separate systems, i.e., in Excel (Panko 2006) and BI (Granlund and Malmi 2002). Business controllers are reported to download historical data from ERP systems, furbish the data outside the system, and load new data back into the system during the course of budgeting.

The practice of bypassing the ERP system is connected to the growing literature on workarounds, which are defined as “staff actions that do not follow explicit or implicit rules, assumptions, workflow regulations, or information system designers” (Koppel, Wetterneck, Teles and Karsh 2008). Users create workarounds when working with several IS technologies such as an ERP system (Soh, Kien and Tay-Jap 2000; Boudreau and Robey 2005; Newman and Westrup 2005; Alvarez 2008; Ignatiadis and Nandhakumar 2009), a hotel reservation system (Davern and Wilkin 2008; 2009), and a health information system (Azad and King 2008; Koppel et al. 2008). Most papers attempt to classify these workarounds using various instances such as functionality and faithfulness (Davern and Wilkin 2008; 2009), context of use (Azad and King 2008; Koppel et al. 2008; Ignatiadis and Nandhakumar 2009), and stage of use (Soh et al. 2000). We find that the typology of Davern and Wilkin (2008) is the most useful to date because of its general applicability and recognition of beneficial (Ciborra 2002) and harmful (Boudreau and Robey 2005) consequences of workarounds.

One thing we have noticed is that the limited literature on workarounds (Ignatiadis and Nandhakumar 2009) focuses attention on workaround typologies but does not attempt to open the black box (Azad and King 2008; Ciborra 2002) as to why they happen. The few examples that we have seen are interpretative flexibility, which is a broad interpretation of the malleability of organisational artefacts unlike the specific interpretation of IS technologies addressed by Orlikowski (1992), in Azad and King (2008), and misfit, defined as the gap between the functionalities offered by IS technologies and organisational requirements, in Soh et al. (2000).

When a workaround occurs in the context of budgeting, it might improve the efficiency of the process because business controllers do not have to deal with inappropriately designed systems, but it raises a concern for the integration capability of the ERP, data integrity, audit trails, and knowledge management within a company’s financial processes. The data contained in non-ERP systems like Excel or BI are often disconnected from ERP systems such that most data downloads and transfers from ERP systems to other systems are performed manually. This use practice is prone to errors, opens up an opportunity for fraud, and limits future learning opportunities (Panko 2006). These issues should concern both academia and practitioners.

ERP workarounds in budgeting, which we have addressed above, are not something new, but are taken for granted (Granlund and Mouritsen 2003). As a result, knowledge gaps exist in this line of study (Berry, Coad, Harris and Otley 2008). First, although ERP systems are significant and critical systems that have been researched in



many previous studies, they are certainly not panaceas in accounting (Rom and Rhode 2007). Many different accounting solutions exist for management and accounting purposes in real organisations. In accounting, IS applications were first introduced in general ledgers and financial reporting in the 1960s, in the form of a standalone “best-of-breed” (BoB) solution (e.g., Markus 1983). Since then, IS applications have widened their functionalities to support other managerial purposes through data and software/hardware integration (Booth, Matolcsy, and Wieder 2000) or the hybrid ERP approach. Companies that adopt BoB and hybrid ERP approaches are not exposed to the same degree of constraint imposed by vanilla ERP implementation; at least they have a certain degree of freedom to pick and choose software packages from as many vendors as they wish. As far as we know there is no other research that sets out to compare the use of ERP, hybrid ERP, and BoB in budgeting practice. Thus in this study we will set out to explore whether adopters of hybrid ERP and BoB experience the same problems as ERP users, as prior research has addressed (e.g., Catt 2008; Granlund and Malmi 2002; Hyvönen 2003). The second knowledge gap is that previous ERP research in management accounting often addresses this problem from either a technological (Catt 2008; Granlund and Malmi 2002) or social deterministic perspective (Hyvönen 2003). Previous research ignores the potential to offer “insightful accounts of IS phenomena” (Orlikowski 2005) from a soft-deterministic perspective, which defines technology as a product of human actions that is employed by humans to achieve certain actions (Orlikowski 1992).

Based on the two knowledge gaps identified, we undertake an explorative study to examine two activities in budgeting, which is a cornerstone in the management accounting and control process (Hansen, Otley and Van der Stede 2003), in order to explore and explain if and why off-the-shelf “accounting solutions” are used or not used. Budgeting is an umbrella term covering both the set of numbers used for management control purposes and the process of arriving at a budget, in contrast to the term “budget” or “budgeting process” (Covaleski, Evans, Luft, and Shields 2007). The Chartered Institute of Management Accountants (CIMA) official “Terminology of Management Accounting” defines a budget as: “a quantitative statement for a defined period of time, which may include revenues, assets, liabilities and cash flow” (CIMA 2004). A budget provides a framework for control. It is traditionally developed to cover a one-year financial period or to be produced annually. Due to volatile business environments in the current economy, it is more likely that an annual budget will quickly become obsolete for management control purposes. Thus a new innovation, a rolling forecast technique, is introduced to enhance the annual budget. A rolling forecast is similar to the annual budget but it is prepared at shorter time intervals, usually quarterly, monthly, or weekly, depending upon the business conditions. Since it is prepared over a shorter period of time it is more likely that a rolling forecast will be more useful for management control purposes than the annual budget (CIMA 2004). In the first activity, we treat annual budgeting and a rolling forecast as one due to the similarity between them, except for their time interval

aspect. The second activity is variance analysis, which refers to the comparison of the annual budget and the rolling forecast with the actual operation results after a period ends. Usually it is performed on a monthly basis but practices may vary based on management's judgement about the business conditions.

The knowledge gaps guided us to address the major research question: if and why off-the-shelf accounting solutions are used or not used in budgeting.

The rest of this chapter is structured as follows. Section 6.2, the next section, describes the framework for analysis of human and machine agencies used in this research. Section 6.3 presents empirical data and analysis at both case and cross-sectional levels. Finally, section 6.4 summarises the research and its contributions.

## 6.2 Analysis framework: Human and machine agencies

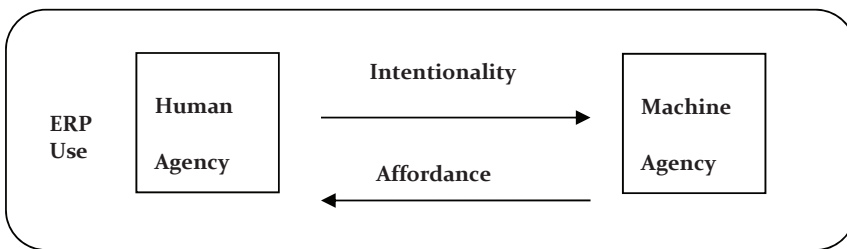
Three streams of research exist on development and use of IS in organisational studies: the technology, social and soft deterministic perspectives. The technology and social deterministic perspectives hold that there is a single agency, either machine or human, respectively, that influences IS outcomes. The soft deterministic perspective, on the contrary, holds the perspective that technology is a product of human action, which is employed by humans to achieve certain actions. Therefore it holds that the agency influencing IS outcomes lies in both humans and machines. Orlikowski (1992) calls this co-agency the duality of technology and argues that technology is interpretatively flexible due to interactions between human and machine agents in the development and use stages.

Although the soft-deterministic perspective offers major possibilities, the current theoretical grounds hinder the ability to offer "insightful accounts of IS phenomena" (Orlikowski 2005). For instance, the actor network theory (ANT) does not differentiate between human and non-human agents. Therefore it cannot be used to study the interaction between agents. Structuration theory (ST), on the other hand, assumes that the agency and structure specifically belong to humans in their social practice (Giddens 1979, p. 7); as a consequence it rules out the machine agency.

New theories based on the soft perspective are being developed to overcome the current limitations (e.g., Orlikowski 1992; Rose and Jones 2005; Markus and Silver 2008; Ignatiadis and Nandhakumar 2009). Ignatiadis and Nandhakumar's concept of "human and machine agency in ERP use" based on ANT and ST is selected because it fits the nature of our explorative study. Although the institutional properties can be important, they are not addressed in this study. Ignatiadis and

Nandhakumar’s framework differentiates between human and machine agencies, where both agencies perform actions with consequences but the characters are not equivalent. Human agency is superior because it has an intentionality to form awareness and purposes. Machine agency, on the contrary, is thought of in terms of affordance, which is the actual property of the machine, i.e., what it can or cannot do. The two kinds of agency are not separated but intertwined and propagated. Figure 6.1 The human and machine agency in ERP use (Ignatiadis and Nandhakumar 2009) depicts the framework.

Figure 6.1 The human and machine agency in ERP use (Ignatiadis and Nandhakumar 2009)



## 6.3 Empirical data and analysis

This chapter sets out to explore and explain if and why off-the-shelf accounting solutions are used or not used in budgeting in different kinds of management information system arrangements, from ERP and hybrid ERP to BoB, according to the research method and case descriptions presented in section 3.4.1. The analysis is conducted on two levels; case analysis and cross-sectional analysis. We first present the case-level analysis then follow this with the cross-sectional analysis.

### 6.3.1 Case-level analysis

In the case-level analysis, data from the five case companies are analysed using the framework presented in section 6.3 considering two activities, annual budget and rolling forecast (A1) and variance analysis (A2), following the human agency (HA) and machine agency (MA) domains. The analysis shows the following results.

### 6.3.1.1 *The human agency and intentionality*

The role is a triple concept: (1) identities assumed by social participants, (2) patterned social behaviours, and (3) the expectations that are understood by all the participants and govern their behaviours (Biddle 1986). The concepts are useful to establish the human agency in budgeting. Accounting and finance personnel typically assume the social identity of business controller in organisational budgeting. They use annual budget, rolling forecast, and analysis tools as the patterned social behaviours to govern business performance and monitor the behavior of organisation members, as it is expected and understood by all the organisation members. This is true in all the companies except for the ConsumerGood company, in which the role of human agency advances to that of a business partner who gives strategic advice on investment decisions. In line with the role definition, budgeting exercised by human agency is a social process. It is equipped with power, self-interest, and political advocacy ( Hofstede 1981; Covalski and Dirsmith 1988).

**A1: Annual budget and rolling forecast** – Annual budget construction is the first activity considered. A budget is a business roadmap, as the Accounting Manager at FrozenFood notes:

A budget is a plan for the company, it tells us in financial terms [...] how the business operation will be and if we face this kind of situation or this kind of risk, how we will deal with it.

It is vital that a budget is constructed to reflect strategic goals so that it can be benchmarked against future operations. Therefore the most important intention for budget construction is to create a budget that best forecasts future operations, or to achieve a budget accuracy aim. The HotelChain company makes this point explicit; it includes budget accuracy as a key performance indicator (KPI). However, in order to achieve the budget accuracy aim, several intentions of the human agency (HA) are explicated in the companies:

- HA1: Participation – To achieve the goal, budgets are typically constructed through a bottom-up participative approach. Forecast techniques are applied based on a specific business and product nature:

We have to use many technical resources at different points [...] because the forecast or estimation process for each business area is totally different from others. (The Accounting Manager at FrozenFood)

- HA2: Attention to detail – Budgets are developed in a detail-oriented manner, e.g., a sales revenue budget is typically constructed by customer and product types;

Here we have [differentiated customer types into groups:] business individual, business group, leisure individual, leisure group, crew, conference and [conference attendances]... The more detailed information we get about our customers, the better we can prepare budget and forecast. (The Business Analyst at HotelChain)

This information is usually complemented with market and industry analysis reports prior to budget construction.

- HA3: Reviews and revisions – The process involves several rounds of reviews and revisions, which usually take between two and six months to complete. The HotelBeach company highlights the social aspect of budgeting in the review and revision process (Covaleski and Dirsmith 1988; Hofstede 1981), which entails trust and politics:

[HotelChain] typically do[es] not [reject our budget]. Our general manager [...] knows trends and estimations better than the [HotelChain] group. ... [Besides] we need to lobby the process beforehand. (The Deputy General Manager at HotelBeach)

Therefore, a budget is a product of negotiation through social interaction. Once a budget becomes effective, a rolling forecast allows managers to keep their fingers on the pulse of a changing environment. The increasing use of rolling forecasts means that budgets have become more forward-looking and are better aligned with strategic plans because the assumptions on which the budget numbers are based change at a fast pace (CIMA 2004).

- HA4: Consideration of the nature and state of business operations – Three out of five case companies employ a three-month rolling forecast practice. The exceptions are the FrozenFood and RealEstate companies. FrozenFood prepares a rolling forecast on a weekly basis because of high volatility in the agriculture business, especially from raw material cost fluctuations. RealEstate does not employ a rolling forecast due to stable market conditions. As a result, it is fair to conclude that business controllers consider the nature and condition of their business operations in order to determine the frequency of a rolling forecast.
- HA5: Consideration of the rolling forecast in business control – Since a rolling forecast is a future projection at a shorter time interval, i.e., on a weekly, monthly, or quarterly basis rather than annually, it is more likely that a rolling forecast will provide a better estimation. As a result, a rolling forecast is more helpful from a business control perspective (CIMA 2004), as noted by the Business Analyst at HotelChain:

We understand that a[n] [annual] budget is something that they have prepared over a year ago. If there is a big variance between a budget and an actual [result], it is okay. What is more important is that on the average level, it stays on the budget. However if there is a big variance between an actual [result] and a [rolling] forecast, there is a problem.

All things considered, an annual detail-oriented budget is still significant because it provides a basis on which to work, especially when something does not go as planned. It is important not to lose sight of what was budgeted before.

In conclusion a rolling forecast is similar to an annual budget but is performed at more frequent time intervals depending on the nature of the business, thus the aim of a rolling forecast is similar to that of an annual budget: accuracy.

**A2: Variance analysis** – After the month ends, business controllers debrief the operation results for the month. They compare the actual operation results with the budgeted and/or rolling forecast figures in order to conclude whether operations went as planned or not. If not, it is asked what caused the actual performance to deviate from the estimations.

- HA6: Quantitative analysis – Variance analysis is typically monitored on a monthly basis in all the companies except for the FrozenFood company. FrozenFood’s variance analysis is similar to its rolling forecast practice, which is performed on a weekly basis. The aim for business controllers at this point is to highlight the results that are not as planned, as the Business Analyst at HotelChain suggests:

I don’t analyse [the] budget in detail. I concentrate my efforts on monitoring variances.

To investigate causes of variance, business controllers usually rely on expertise and knowledge from specific departments. The Financial Analyst Manager at ConsumerGoods reveals:

I will have to ask the sales department. The sales and marketing department can best explain what happened.

In the process of variance analysis, human knowledge and expertise are superior to those of a machine. The Deputy General Manager at HotelBeach notes that:

The program cannot tell us what happened. The program only shows us historical data and calculates for us how much our last year’s expenses were and how much more this year’s expenses are than last year. But it cannot give reasons why it is over or under our budgets. We have to rely on people from that particular department to explain why it happened.

It is clear that business controllers tend to highlight variances in this activity, thereby identifying management control problems.

### *6.3.1.2 The machine agency and affordance*

In order to fulfil the role of business controller, a human agent employs machine agency – different kinds of IS software such as accounting solutions, Hyperion BI, and Excel – to achieve the task it wants to accomplish. In all the case companies, accounting solutions are implemented and used for accounting purposes. However, their influences on budgeting practices are “moderate”, according to Granlund and Malmi (2002). We interpret the situations for the machine agency (MA), the accounting solutions, in terms of what the systems allow human agency to do or not to do in relation to budgeting tasks. Once again we consider the two activities; annual

budget and rolling forecast (A1) and variance analysis (A2). The analysis shows the following results.

**A1: Annual budget and rolling forecast** – Referring back to the aim for accuracy described in relation to the human agency in this activity set, numerous forecasts must be conducted to assist the planning and forecasting process. Despite the existence of accounting solutions, none of the case companies, regardless of their IS structures, use accounting solutions for this task. All the case companies use Excel except for ConsumerGood, which employs Hyperion budgeting BI in addition to Excel. We interpret the workaround of accounting solutions as follows:

- MA1: Poor forecasting ability – The systems sometimes do not allow users to enter certain key information, which is crucial for budgeting and forecasting purposes. The Accounting Manager at FrozenFood reveals:

There are also cases where the main system does not allow us to key in numbers, e.g., billing cycle, we might calculate for estimation on the secondary system [e.g., Excel].

The accounting solutions are not flexible enough to accommodate budgeting and rolling forecast needs for extensive ad-hoc calculations:

I can use old data and consider the industrial trend but I think it is a lot more than putting in the percentage and multiplying it with the old numbers. [...] Working on budgeting is not something like that. We need to see more than that; we need to calculate more than that. (The Financial Analyst Manager at ConsumerGood)

The bottom line is that users feel that accounting solutions cannot accommodate their forecasting needs so they turn to Excel. Even though Hyperion budgeting BI is present in the ConsumerGood company, Excel is still the primary tool used in the budget construction and forecasting process. Only final results are entered into Hyperion for budget consolidation purposes. The Financial Analyst Manager at ConsumerGood reveals:

I use data from Excel and put it into Hyperion. Excel is the working file, but when I get the result I put it into Hyperion. To prevent confusion between Excel and Hyperion], I design a form on Excel that looks like the form on Hyperion, then I can link the information from Excel to Hyperion.

The conclusion that accounting solutions offer limited forecasting ability is in line with previous research by Catt (2008) and Granlund and Malmi (2002). However we believe that the fact that budgeting BI does not have an influence on the budget construction and forecasting process is new. At this point we conclude that Hyperion is not used in the budgeting construction process since the use practice is for consolidation purposes only. Unfortunately we do not have enough data to elaborate more on why this is the case but we will follow up this point in later studies.

- MA2: Unfamiliarity – As mentioned earlier, budgets are often constructed through a participation process, in which several departments are involved. The Deputy General

Manager at HotelBeach notes that people outside an accounting department are typically unfamiliar with the accounting solutions:

There are not many people who know how to use the system.

For those outside the accounting and finance world, an accounting solution can be quite threatening. The Financial Analyst Manager at ConsumerGood comments:

I think Excel [spreadsheets] are more user-friendly than SAP. I think people who use Excel do not find it threatening. They do not have to think if they should put a number in this and that gap or not.

An inadequate training policy is the source of this problem. In most companies, no official system training policy is in place. Training usually comes in the form of informal advice and suggestions from colleagues. However, once users are familiar with the system, they often admit that accounting solutions are straightforward. The Business Analyst at HotelChain even remarks that it is “too easy to use”.

- MA3: Inaccessibility or unavailability – Accounting solutions are not accessible to other departments. This is the situation in all the case companies except for ConsumerGood, which employs an ERP solution. This is especially true for RealEstate, which only adopts accounting software in which access to the system is strictly limited to accounting personnel. Unavailability of budgeting functionality is true in all the hybrid ERP companies; HotelChain, HotelBeach, and FrozenFood. HotelChain has the possibility to purchase this function from its software vendor but since it cannot force its hotel chains to comply with the IT policy, this function will be of little value. The Deputy General Manager at HotelBeach admits:

Well, the [HotelChain] do[es] want us to use SunSystems but I do not comply. I am not using it and other hotels are not using it either. It is not 100 per cent enforceable.

Since they are not using the same software, it is impossible to use accounting software for budgeting. HotelBeach and FrozenFood, on the contrary, employ locally developed accounting software specifically developed for their business areas, thus the function is not available in the packages. However, we are not convinced that a lack of budgeting functionality is a truly convincing factor that explains accounting solution workarounds with regard to budgeting. Had this budgeting function been available, other departments would neither have access to the systems nor be interested in using the systems due to unfamiliarity and poor forecasting ability, as suggested earlier.

Three reasons for workarounds based on a machine agency perspective are suggested above. The next section proceeds to analyse the other activity in budgeting, variance analysis (A2), based on the same machine perspective.

**A2: Variance analysis** – The intention for business controllers at this point is to highlight the operational results that are not as planned. They are able to perform a preliminary quantitative analysis to detect the causes but they typically depend on



knowledge and expertise from departments that are related to the issues in order to investigate the causes. Similar to budgeting and rolling forecasts, none of the case companies use accounting solutions. Instead Excel and Hyperion BI are called upon for this task. We interpret the situations as follows:

- MA4: Presentation rigidity – Visual presentation such as graphs, colours, shading, underlining, and formatting play an important role in helping users to identify critical and deviating information and/or understand the information better. Accounting solutions often offer limited possibilities for users to display data for analysis purposes. The Financial Analyst Manager at ConsumerGood notes:

If I want to do a gross profit analysis [...]. I can choose variances to be shown in green or red colours. I can do this in Excel [spreadsheets]. I am not sure if SAP can do that.

The Business Analyst at HotelChain states:

[With Excel] you can arrange columns and rows as you wish. You can select the period that you want it to display. You can choose to use local currency or global currency. [...] Compare it with SAP, you cannot customise it. You cannot take this to compare with that in SAP.

- MA5: Analysis task inappropriateness from a system design perspective – Analysis work in management accounting is significantly different from accounting work (Anthony 1965, p. 114; Granlund and Mouritsen 2003). Analysis deconstructs a situation, i.e., a budget variance, and seeks the underlying relationships among the elements in order to account for why it happened. This analysis must be performed in a timely manner or it will lose relevance. Financial accounting, on the contrary, focuses on reporting historical financial events. Timeliness is not critical but information accuracy and completeness are:

The thing is we do not need much accuracy and completeness for budgeting [i.e., management accounting]. It is not [the] substance of budgeting, given that accuracy and completeness do not affect budgeting. But it is not the same for [financial] accounting. Accuracy and completeness are the main substances in [financial] accounting. (The Accounting Manager at FrozenFood)

Hence accounting solutions are designed for data-gathering and reporting purposes, not data analysis, as the Business Analyst at HotelChain points out:

SAP is good because it allows you to link many things. [...] Anything [...] can be keyed in to SAP in order to store the data. But SAP does not have the brain to analyse or compare data in order to tell you that this happens then that happens. It just cannot be used like that.

In the case of ConsumerGood, where users have access to Hyperion budgeting BI, we interpret that users prefer Hyperion to Excel for analysis tasks as the Financial Analyst Manager reveals:

[I prefer Hyperion to Excel because] when I upload budgets into Hyperion, I can retrieve them later for comparison purposes. If I use Excel I will have to pull data [manually] from many sources and I will have to write my own formulas.

We conclude that Excel and Hyperion budgeting BI are more appropriate for analysis tasks, although there is a slight preference for Hyperion over Excel for these tasks since Hyperion can automatically retrieve past data for analysis purposes.

### 6.3.2 Cross-sectional analysis

Before we proceed to present a cross-sectional analysis, we first summarise the findings presented in the last section. The analysis conducted from the soft-deterministic perspective based on the interaction between human and machine has provided an insight into workarounds of accounting solution for budgeting purposes. It shows that business controllers do not use, or work around, an accounting solution because the system cannot respond to the goals that users would like to achieve. We describe this situation as a misfit between a user's intentionality and a system's affordance, according to Soh et al.'s (2000) definition in Table 6.1.

In the first activity, annual budget and rolling forecast (A1), business controllers (users) would like to achieve budget and forecast accuracy. Therefore they employ a participative approach to budgeting (HA1) in which each department employs various forecasting techniques (HA2) suitable for its own respective area and proposes a budget/rolling forecast to top management for review (HA3). An annual budget is typically prepared once a year but users will consider the nature of the business in order to determine the frequency (HA4) and significance (HA5) of a rolling forecast to complement the annual budget. Accounting solutions cannot respond to these requirements because they do not allow business controllers to insert certain key information that users believe to be very important for budget accuracy (MA1). Budgeting collaboration within organisations means that all the departments are part of the process and thus they must collaborate using a similar IS platform. However, this is not easy for two reasons. First, budget construction teams outside accounting/finance departments are often not familiar with accounting solutions (MA2). Second, accounting solutions are not available outside accounting/finance departments (MA3). The only case company where accounting solutions can be made available outside an accounting domain is ConsumerGood, which employs a full ERP. Even though both Excel and Hyperion BI are reported to be involved in this process, we only conclude that Excel is useful in this activity since it is suggested that Hyperion only serves data integration purposes and not budget construction purposes.

In the second activity, variance analysis (A2), business controllers aim to identify management control problems. Therefore, they conduct a quantitative analysis

among an annual budget, a rolling forecast, and an actual performance result (HA6). Accounting solutions cannot respond to user needs. For instance, they do not allow users to achieve the kind of visual presentation that they would like. Colours, such as red and green, play a very crucial role in helping users identify business problems (MA4). Some users note that accounting solutions are not best designed for data analysis purposes (MA5) but they accept that they are excellent for transactional data storage. Therefore such users choose Excel and Hyperion budgeting BI to perform an analysis task instead.

Having represented the general conclusion, Table 6.2 tabulates the empirical data by company in order to identify patterns among the case companies. We find strong consistency across the companies and concluding points, except for poor forecasting ability (MA1), which is presented in only two companies, ConsumerGood and FrozenFood.

In the business controller domain, budgeting reviews and revisions (HA3) and quantitative comparison (HA6) are empirically found in all the companies. Three additional concluding points are found in at least four out of the five companies, which are participation (HA1), attention to detail (HA2), and consideration of the nature and state of business operations (HA4). In the accounting solutions' affordance, we do not find any concluding point that our empirical data thoroughly support in all the companies. However, we believe that there is good data consistency among the companies since all the concluding points except for poor forecasting ability (MA1) are shown in at least four out of the five companies.

**Table 6.1 Misfits between human and machine agencies in budgeting**

Activity	Business controllers' intention	Accounting solution's affordance	IS use practices for budgeting to overcome misfits
A1: Budget and rolling forecast	To achieve budgeting accuracy by means of: HA1: Participation HA2: Attention to detail HA3: Reviews and revisions HA4: Consideration of the nature and state of business operations HA5: Consideration of the rolling forecast in business control	Misfits that result in non-achievement of business controllers' intentions: MA1: Poor forecasting ability MA2: Unfamiliarity MA3: Inaccessibility or unavailability outside accounting/finance departments	- Budgeting and rolling forecast practice in Excel - Extract of transactional data from accounting solutions
A2: Variance analysis	To monitor business control problems by means of: HA6: Quantitative comparison between an actual result and an annual budget and/or a rolling forecast	Misfits that result in non-achievement of business controllers' intentions: MA4: Presentation rigidity MA5: Analysis task inappropriateness from a system design perspective	- Variance analysis in Excel and Hyperion BI - Extract of transactional data from accounting solutions

At present, we do not find any patterns in the workarounds across the five companies representing ERP, BoB, and hybrid BoB adopters. Consequently we conclude that hybrid ERP and BoB adopters experience the same problem as ERP adopters that accounting solutions do not have an impact on the budgeting process.

## 6.4 Conclusions and contributions

A technological deterministic-based analysis, e.g., those by Catt (2008) and Granlund and Malmi (2002), reveals that accounting solution workarounds happen because the system is not yet well designed for budgeting purposes. Solutions to the problem focus on achieving better-designed software through actions such as software customisation, software-designer education, and user participation in the software design. On the contrary, a social-deterministic-centred analysis such as those by Alvarez (2008) and Hyvönen (2003) reveals that software workarounds take place because people simply do not comply with the system or resist it. Policies such as formal software training, user participation, and management persuasion and/or enforcement are encouraged to remedy the workarounds.

In comparison with previous literature, our analysis based on the soft-deterministic perspective that persists in interaction between human and machine agencies has provided an insight (Orlikowski 2005) into the problem of whether and why business controllers use or do not use accounting solutions for budgeting purposes, which is not revealed from either the technological- or the social-deterministic perspectives. It shows that a workaround is a mixture of both technical and social problems. It is a technical problem because accounting solutions do not provide business controllers with enough flexibility and functionality, e.g., the data input, data display, and data retrieval options are often very limited. Excel and Hyperion budgeting are more suitable for budgeting, even though we note that we find Hyperion BI's functionality to be rather limited for budget construction but better than Excel in terms of automatic data retrieval and data comparison in variance analysis. It is a social problem because accounting solutions do not align with organisational structures and people. Accounting solutions are typically accessible only in accounting/finance department(s) when they should be made available to all the departments that take part in the budgeting process. The knowledge and skills required to use accounting solutions are often scarce outside accounting/finance departments, even though experienced business controllers often admit that using accounting solutions is easy.

Table 6.2 Case comparison based on human and machine agency analysis

IS solution type	Company	Business controllers' intentions						Accounting solutions' affordance								
		A1			A2			A1			A2					
		HA	HA	HA	HA	HA	HA	MA	MA	MA	MA	MA	MA			
ERP	ComsumerGood	X	-	X	X	X	X	X	X	X	X	X	X	X	X	X
BoB	RealEstate	-	X	X	-	-	X	-	X	X	X	X	X	X	X	-
Hybrid ERP	HotelChain	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
Hybrid ERP	HotelBeach	X	X	X	X	-	X	-	X	X	X	X	X	X	-	X
Hybrid ERP	FrozenFood	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

At the opposite end, organisations could hypothetically embrace a centralised management accounting approach at the risk of losing relevant and insightful information, which is at the heart and soul of management accounting. Alternatively they could promote a decentralised management accounting policy by making accounting solutions available everywhere, at the risk of financial information security, and bear hefty training fees in real money and time spent to ensure that all the potential users learn how to use the system. We are not sure that there is any better remedy for the problem of accounting solution workarounds since it seems that none can be achieved except at the cost of something more significant. Is it better to accept that Excel and BI software like QlikView or Hyperion are a de-facto standard? They are here to stay regardless of the claims of accounting solution vendors, especially those of ERP vendors, about their superior systems.

From an academic perspective, this study contributes to a theoretical account of the weakness of accounting solutions in management accounting functions. We do not only confirm earlier findings that ERP is not appropriate for budgeting, but we also report that accounting solutions may be found lacking regardless of a company's choice of adopting ERP, BoB, or hybrid ERP systems. We conclude that different sets of tools such as Excel and BI are needed for budgeting. From a practitioner perspective, this study informs managers to set realistic expectations of accounting solutions so that they can develop informed strategies for IS investments, including training, recruitment policy, and software and hardware investments.

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# 7. Understanding the use of ERP systems in budgeting

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**ABSTRACT:** This chapter investigates the use of enterprise resource planning (ERP) systems in budgeting in order to explain how and why ERP systems are used or not used in budgeting practices. Budgeting is considered as a social phenomenon which requires flexibility and integration to support decision-making. The analysis at the activity levels, guided by the concept of “conflict” in structuration theory (ST), suggests that ERP systems impede flexibility in decision-making. However, the systems have the potential to facilitate integration which is also needed in decision-making. The analysis at the structural level, guided by the concept of “contradiction” in ST, concludes that the ERP systems are not widely used in budgeting. This is because the systems support the integration function alone while budgeting assumes both roles. This chapter offers an explanation of the non-use of ERP systems from a utilitarian perspective. Additionally, it calls for solutions to improve ERP use especially for the integration function.



## 7.1 Introduction

The advance in information system (IS) technologies has promised many improvements and benefits to organisations (Davenport 1998; Shang and Seddon 2002). However such improvements are often hindered by unwillingness of staff to accept new IS technologies (Davis 1989; Granlund and Malmi 2002). This results in non-use of IS technology (Walsham 2002) and/or workaroud (Taylor and Todd 1995; Boudreau and Robey 2005) and, inevitably, moderate business benefits. For this reason, a tradition of research into IS use has been well-established in the discipline (Pedersen and Ling 2003) to investigate how and why users use or do not use certain IS technologies.

In the field of accounting information systems (AIS), literature reviews have indicated that there is a limited amount of research as well as understanding on the use of enterprise resource planning (ERP) systems to support management accounting practices (Scapens and Jazayeri 2003; Granlund 2011; Elbashir, Collier, and Sutton 2011; Grabski, Leech, and Schmidt 2011). Up to now, the available research results conclude that most organisations have not yet embraced the powerful capacity of ERP systems to support the management accounting function (Granlund and Malmi 2002; Dechow and Mouritsen 2005; Quattrone and Hopper 2005). Many studies have reported a consistent pattern of limited use of ERP in management accounting functions using data from many countries across the globe, such as Egypt (2008), Australia (Booth, Matolcsy, and Wieder 2000), Finland (Granlund and Malmi 2002; Hyvönen 2003; Kallunki, Laitinen, and Silvola 2011; Chapman and Kihn 2009) and Denmark (Rom and Rohde 2006). Several researchers have in particular called for more research contributions on the use of ERP systems in the management accounting context, and especially on how the systems might be used to support decision-making functions (Granlund 2011; Rom and Rohde 2007; Grabski, Leech, and Schmidt 2011). This chapter responds to that call by uncovering the use of ERP systems in budgeting. In relation to other management accounting activities, budgeting is considered to be the most suitable social phenomenon under investigation. This is because budgeting is a longstanding management accounting procedure (Davila and Foster 2007) which continues to soar in popularity among modern organisations (Libby and Lindsay 2010).

Budgeting is a process undertaken to achieve a quantitative statement for a defined time period (Covaleski et al. 2006). A budget cycle can be said to cover activities such as (1) budget construction, (2) budget consolidation, (3) budget monitoring and (4) budget reporting. The levers of control (LOC) framework (Simons 1994) suggests that budgeting can be used interactively and diagnostically. This is in line with modern budgeting literature (Abernethy and Brownell 1999; Frow, Marginson, and Ogden 2010) whose interpretation is that budgeting assumes the dual roles. However, the degree of combination between these two roles varies according to managers'

judgements in specific situations (Simons 1994). This dual role requires budgeting to be more flexible yet more integrative for decision-making. Flexibility in budgeting is a direct response to contingency factors (Chenhall 2003) and intense competition (Frow, Marginson, and Ogden 2010) which characterise today's decision-making. Integration, on the contrary, is perceived from a data integration perspective since it is the main interest in financial and management accounting (Chapman and Kihn 2009).

Given the research gaps addressed and the flexible yet integrative roles of budgeting, this chapter seeks to uncover how ERP systems are used in budgeting as well as to explain why the ERP systems are used or not used in budgeting.

This chapter proceeds as follows. The next section provides a review of the literature on the use of ERP systems with regard to the integration and flexibility domains. section 2.1 discusses the concepts of conflict and contradiction in structuration theory (ST) which is the main theory used. Subsequently, section 7.4 proceeds to data analysis based on the conflict and contradiction concepts in ST in order to explain how and why ERP systems are used or not used in budgeting. Section 7.5 ends this chapter with conclusions and research implications.

## 7.2 The ERP literature review on flexibility and integration

This section reviews ERP literature based on the integration and flexibility domains as it has been previously suggested that budgeting possesses these dual roles. It starts with a brief discussion of what the ERP system is and its relation to accounting. Later it proceeds to discuss incompatible conclusions in the literature about how the ERP system can be used to promote flexibility and integration.

The ERP system, in essence, is an integrated cross-functional system containing many optional software modules which combine to support numerous business functions that a typical organisation might have, such as accounting and finance, human resources, and sales and distribution (Grabski, Leech, and Schmidt 2011). The system can be considered as a reference model which segments organisations into diverse yet related functions through a centralised database (Kallinikos 2004). The ERP system mandates a rigid business model which enforces underlying data structure, process model as well as organisational structure (Kumar and Van Hilleegersberg 2000) in order to achieve an ultimate integration between business operation and IS technology (Dechow, Granlund, and Mouritsen 2007).

The ERP system has become a main research interest within the IS discipline as well as its sister discipline, AIS research, since the inception of this type of system in the early 1990s (Grabski, Leech, and Schmidt 2011; Granlund and Malmi 2002). Indeed, it can be said that AIS gives rise to the modern ERP system because accounting is one of the early business operations which IS technology was employed to facilitate (Granlund and Mouritsen 2003). Dechow and Mouritsen (2005) posit that ERP systems require implementing organisations to set up the systems according to either “accounting” or “logistic” modes which forms a different control locus in organisations. Such indication strongly supports the prevailing relationship that accounting has in connection to the modern ERP system.

In relation to the flexibility domain, research to date has provided contradictory conclusions on the relationship between the ERP system and flexibility. One research stream considers the ERP system to impose a stabilising effect on organisations especially in relation to changing business conditions (Booth, Matolcsy, and Wieder 2000; Light, Holland, and Wills 2001; Hyvönen 2003; Rom and Rohde 2006; Boudreau and Robey 2005; Soh, Kien, and Tay-Yap 2000). Akkermans, Bogerd, Yücesan and van Wassenhove (2003), for example, report that leading IT executives perceive the ERP system as a hindrance to strategic business initiatives. The ERP system is said to have low system flexibility (after it is implemented) which does not correspond to the changing networking organisation mode. This line of research concludes that a lack of flexibility in ERP system can post a direct risk to organisations because the ERP system model might not be suitable to the changing business processes (Soh, Kien, and Tay-Yap 2000; Strong and Volkoff 2010). In addition, the lack of flexibility results in two possible responses from users: (1) inaction, that is, a passive resistance to using the ERP system (Walsham 2002), or (2) actions to reinvent the system or a workaround (Boudreau and Robey 2005). The other stream of research maintains that implementation of an ERP system improves flexibility in organisations (Brazel and Dang 2008; Spathis 2006; Shang and Seddon 2002; Cadili and Whitley 2005). Shang and Seddon (2002), for example, propose that the ERP system contributes to increased flexibility in organisational strategies. This is because a modular IT infrastructure in the ERP system allows organisations to cherry-pick modules which support their current business initiatives. In the same line, Brazel and Dang (2008) posit that implementation of ERP allows more organisational flexibility to generate financial reports. Cadili and Whitley (2005) support this view to a certain extent as they assert that the flexibility of an ERP system tends to decrease as the system grows in size and complication.

With regard to the integration domain, a similar contradictory conclusion on the role of ERP to integration is presented in the literature. One stream of research posits that the reference model embedded in the ERP system (Kallinikos 2004), which enforces a strict data definition across organisational units through a single database, enables integration and control (Shang and Seddon 2002; Quattrone and Hopper 2005; Spathis 2006; Brazel and Dang 2008; Chapman and Kihn 2009). Some of the

benefits mentioned in the literature after an ERP implementation are: reporting capability (Brazel and Dang 2008), information quality (Häkkinen and Hilmola 2008), decision-making (Spathis 2006) and strategic alliance (Shang and Seddon 2002). Another stream of research tends to serious criticism of the view that implementation of ERP will enable organisational integration. Quattrone and Hopper (2006), for example, argue that the ERP system is at best a belief that activities can be integrated by making transactions visible and homogenous. Dechow and Mouritsen (2005, p.725) explicitly support this view by indicating that: “[The] ERP systems do not define what integration is and how it is to be developed”. They argue that it is not possible to manage integration around the ERP systems, or any other IS systems. It is regularly found that any other means of integration but IS is more fruitful for organisational integration and control, such as a lunch room conversation. In many cases, it is argued that integration can only be achieved through a willingness to throw away some data and integrate less information (Dechow, Granlund, and Mouritsen 2007).

### 7.3 Theoretical background

A review of research into IS use (Pedersen and Ling 2003) has indicated that there are three main explanatory views which are widely used to explain IS use. First, the utilitarian view holds that users are rational in their system use. This stream of research often employs a technology acceptance model (Davis 1989) or a media richness theory (Daft and Lengel 1986) to explain system use. Second, the social influence view deems that social mechanisms are of importance in enforcing system use in particular social contexts (Fishbein and Ajzen 1975). The third contingency view (Drazin and Ven 1985) explains that people decide to use or not to use systems due to personal characteristics and situational factors. Factors such as behavioural control (Taylor and Todd 1995), as well as skills and recipient attributes (Treviño, Webster, and Stein 2000), serve as explanations for system use/non-use.

Being aware of these theoretical alternatives in the literature, I chose to approach this research through the lens of ST. I am convinced that the theory has a potential to uncover ERP use based on the utilitarian view. ST is appealing to the study of ERP system use because the flexible yet integrative roles of budgeting fit into the contradictory discussion in social sciences research. It has been discussed that most modern theories (Robey and Boudreau 1999) along with social practices represent contradictions in themselves. Anthony Giddens, the founder of ST, explicitly supports the aforementioned argument. He writes: “don’t look for the functions social practices fulfil, look for the contradiction they embody!” (1979, p.131).

The heart of ST is an attempt to treat human actions and social structures as a duality rather than a dualism. To achieve this, Giddens bridges the two opposing philosophical views of functionalism and interpretivism. Functionalism holds that social structures are independent of human actions. Interpretivism, on the contrary, holds that social structures exist only in human minds. It is maintained that structures exist as human actors apply them. They are the medium and outcome of human interactions. ST is appealing to IS research because of its vast potential to uncover the interplay of people with technology (Walsham and Han 1993; Poole and DeSanctis 2004, p.208).

This chapter focuses particularly on one element of ST, which is the concept of conflict and contradiction. According to Walsham (2002), this concept is largely ignored in the literature as well as in IS research. Giddens defines contradiction as “an opposition or disjunction of structural principles of social systems, where those principles operate in terms of each other but at the same time contravene one another” (1979, p.141). To supplement the contradiction that occurs at the structural level, he conceptualises conflict, which is claimed to occur at the level of social practice. In his own words, conflict is a “struggle between actors or collectives expressed as definite social practices” (Giddens 1979, p.131). Based on the original writing, Walsham (2002) interprets conflicts as the real activity and contradiction as the potential basis for conflict which arises from structural contradictions.

This theorising has immediate application to the study of ERP systems use in budgeting. It is deemed that the flexibility and integration inherent in budgeting are the real activities that face business controllers in their daily operations with budgeting. Meanwhile, ERP systems and budgeting are treated as two different social structures (Orlikowski 1992) which form the potential basis for conflict due to the clash between these structures. The next section presents the analysis based on the method and company descriptions discussed in section 3.4.1.

## 7.4 Analysis

The analysis is presented based on the theoretical section presented earlier. It starts with the “conflict” between (1) the ERP system and flexibility and (2) the ERP system and integration at the four budgeting activity levels. These two sections aim to explain how the ERP systems are used or not used in budgeting. Later on, the chapter proceeds to discuss the “contradiction” between the ERP system and budgeting at a structural level in order to suggest why the ERP system are used or not used to support budgeting activities.

### 7.4.1 Conflict: ERP system and flexibility

Flexibility, defined as business controllers' discretion to use IS technologies for budget-related decision-making (Ahrens and Chapman 2004), is needed throughout the budgeting process. Based on a normal budgeting cycle, there are two important activities in relation to the flexibility definition: (1) budget construction, and (2) budget reporting. These two activities require business controllers to construct a data model on an IS technology which takes into account the complex environmental conditions (Chenhall 2003; Frow, Marginson, and Ogden 2010) to determine the best possible alternatives.

In the first activity of budget construction, this process requires a high level of flexibility because budgets are typically constructed in response to specific activities and conditions presented in each business unit. The ERP system is not called upon for budget construction in any of the case-study companies because of the following two reasons: (1) the technology is developed in a generic manner such that it cannot be used to support any specific budgeting process. The Vice President Information Technology in company I mentions:

SAP [ERP] is too generic for budgeting. [...] They [SAP ERP developers] have to develop something that perfectly fits with the nature of the business, but I know it is not easy to do because they have to deal with massive accounting codes and a complicated chart of accounts.

This suggestion is similar to the reason indicated by the Financial Planning Manager in company F who explains that her attempt to use an ERP system for budgeting was not successful because:

SAP [ERP] has a limitation when it comes to revenue handling. It cannot handle any complicated revenue structure.

(2) The technology is not flexible enough to accommodate changes in business conditions which are the keys to forecasting future business operations. The Central Accounting Manager in company G suggests that the ERP system limits what business controllers can do with their budgeting procedures in connection with volatile environments. She explicitly mentions that:

Our [budgeting] requirements change all the time. The ERP system is fixed; you get what the system is configured for. It is almost impossible to alter the system. Our Excel [spreadsheets] can do a lot more than the ERP system. For example, our ERP system does not contain competitor information. In Excel, I can just create another column and put it in.

In the second activity of budget reporting, all companies run basic financial accounting reports from the ERP systems, and then they further edit the reports to fit their managerial requirements and variance analysis in spreadsheets. The practice is also similar in Companies A, B and E, where the ERP systems are utilised for budget

monitoring (see more discussion in the next section). For example, the Corporate Accounting Manager in company D indicates how the ERP system is not flexible for reporting and how he works around it:

When I need to run a report from the ERP system, I have to run many reports then I mix them all in Excel [spreadsheets] to get exactly what I want.

The Customer Intelligence Manager in company K comments on why she sees the ERP system as not flexible enough for variance analysis:

It is quite hard to analyse budgeting information in the ERP system. It is hard to make any sense out of it because everything is too standardised.

In summary, the empirical data suggests the ERP systems are not used to support the flexibility domain in budgeting since that there is a clear conflict between the ERP system and the flexibility required in budgeting activities. The ERP systems put limitations on what business controllers can or cannot do with regard to flexibility in budgeting. For example, a business controller cannot perform complicated business forecasting which is necessary for budget construction on the ERP system. This conflict is clearly addressed by the Financial Planning Manager in company F who states:

The SAP [ERP] functions are not flexible enough [for budgeting] but it is quite good for [financial] accounting.

### **7.4.2 Conflict: ERP system and integration**

Integration, defined as the adoption of IS technologies to standardise data definitions and structures across data sources (Goodhue, Wybo, and Kirsch 1992), is needed for budget control. Based on a normal budgeting cycle, there are two important activities in relation to the definition of integration: (1) budget consolidation, and (2) budget monitoring. Various departmental budgets are consolidated together at an organisational level, which is subsequently used for comparison with actual operating results generated from financial accounting for monitoring purposes.

In the first activity of budget consolidation, none of the case companies is reported to be using the ERP system for this function. The majority of budgets are constructed and consolidated outside the main ERP system, typically in spreadsheets (except company B, which uses a mixture of spreadsheets and BI). The CFO in company H gives an overview of the company budgeting process:

We do budgeting and business planning processes on Excel [spreadsheets]. It is not only us that do it like this. All of the six [Southeast Asia] regional companies also follow this practice. Every company has to submit budgets on spreadsheets to the regional headquarters. The budget consolidation is also completed on spreadsheets.

Regardless of the choice to bypass the ERP system for budget consolidation, all the case companies are able to use their ERP systems to prepare and consolidate financial statements for a financial accounting purpose at a specific company level, but not necessarily at a group level. These financial accounting statements will be used to support the second activity of budget monitoring.

In the second activity of budget monitoring, three case companies (companies A, B and E) report that they use their ERP systems for budget monitoring purposes. The Planning Vice President in Case B mentions:

SAP [ERP] is more like a place which we put budgeting numbers into. We use it to control budgets. We prepare budgets outside the system but we put the final budget numbers into it for a controlling purpose so that we can track budget spending in relation to the purchasing function in SAP [ERP].

A similar use of the ERP systems is presented in Companies A and E, where budgets are loaded into SAP ERP Controlling (CO) and Project System (PS) modules for budget spending monitoring. Note that only the final budget numbers (after budget consolidation in spreadsheets) are loaded into the ERP system for a control purpose alone. The ERP system does not play a part in any budget construction processes in these three companies, as it was explained in the previous section that budget construction is entirely achieved outside the main ERP system.

In conclusion, the empirical data suggests that the ERP systems are not widely used to support the integration domain in budgeting. However, the empirical data suggests that the ERP systems have the potential to support budget integration as it has been shown earlier that all case companies use the ERP system to prepare financial statements and some companies use the ERP systems to monitor budget spending/achievement. Regardless of the potential that the ERP systems offer, these companies have not widely used the ERP systems to support budgeting practice. Companies have yet to realise this hidden potential of the ERP system (Kallunki, Laitinen, and Silvola 2011) to integrate currently separated financial accounting (e.g. financial statement preparation) and management accounting (e.g. budgeting) practices.

### **7.4.3 Contradiction: ERP system and budgeting**

Based on the discussions at the two activity levels presented in earlier sections, this section builds on the concept of contradiction in ST to explain how and why the ERP systems are used or not used in budgeting.

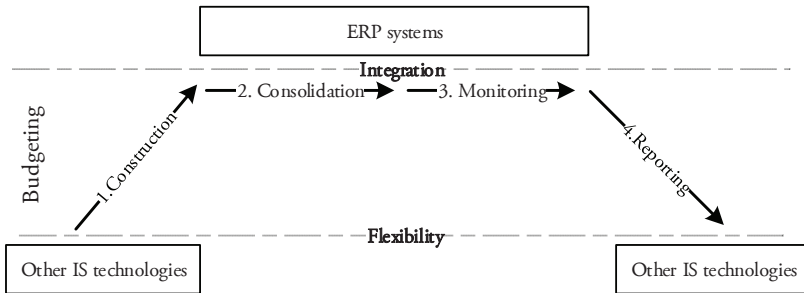
Budgeting as a social practice is deemed to operate in terms of flexibility and integration, while at the same time these contravene each other. It has been shown earlier that the four main budgeting activities in a typical budgeting cycle (budget



construction, budget consolidation, budget monitoring and budget reporting) belong equally to both the integration and flexibility domains. With regards to the four budgeting activities, it has been shown that they remain outside the main ERP systems with the exception of the budget monitoring activity alone. In this activity, a minority of case companies use the ERP systems to support this work function. It is also been noted that the ERP systems have the potential to consolidate budgeting information but it seems that companies have not yet decided to utilise this capability offered in the systems.

Explanations based on the utilitarian view through the conflict and contradiction concept in ST deem that the ERP systems are not used in budgeting activities because the systems have the capabilities to support the integration function alone. Compared with budgeting practice which needs flexibility as well as integration to support decision-making, the ERP systems are obviously not suitable to support budgeting. Figure 7.1 shows the overall discussion about the contradiction between the ERP systems and budgeting at a structural level. It explains the shifts in the roles of budgeting activities from flexibility in activity one, budget construction, to integration in activity two, budget consolidation, and so on. It also elaborates how the ERP systems can have the potential to support some particular activities (such as budget consolidation and budget monitoring) but not the others.

**Figure 7.1 Contradiction between budgeting and ERP system**



Why do the ERP systems support the integration but not the flexibility in budgeting? Despite all the endless fancy claims made by numerous ERP vendors, the basic assumptions of the ERP system are a reference model which enforces underlying data, business process and organisational structure. The procedures described by the system must be strictly adhered to throughout organisational task executions (Kallinikos 2004). Therefore it is hard or even impossible to alter these systems in response to new business requirements or circumstances because such change is contradictory to the most basic principle of the system.

How can the limitations of ERP systems to support the need for flexibility in budgeting be remedied? As Figure 7.1 explains, other types of IS technologies such as spreadsheets and business intelligence (BI) must be called upon to support the activities that the ERP systems cannot accommodate (Hyvönen, Järvinen, and Pellinen 2008). These technologies are built and designed from different assumptions from those of the ERP systems; therefore they can accommodate the flexibility in budgeting. These systems can be combined to support strategic moves made by top management, according to Simons (1994).

## 7.5 Conclusions and implications

This chapter investigates how and why the ERP systems are used or not used in budgeting. It builds from the concepts of conflict and contradiction in ST, which is based on the utilitarian view of IS technology use. Budgeting is treated as a social practice which portrays the two consecutive but contradictory roles of flexibility and integration. Using empirical data from eleven case companies in Thailand, the analysis at the activity level reveals that the ERP systems are not used to support the flexibility domain in budgeting because the systems impede business controllers in performing flexibility-related activities in budgeting, namely budget construction and budget reporting. The analysis of the integration-related budgeting function reveals that the ERP systems are not widely used to support the activities either. However, it strongly suggests the system capability to support the integration function in budgeting as the systems are widely used to generate financial reports along with the evidence that some case companies are using the ERP systems for budget monitoring purposes. The analysis at the structuration level concludes why the ERP systems are not widely used to support budgeting. It is deemed that there is a contradictory relationship between the ERP systems and budgeting because the systems operate only in terms of integration, while the budgeting process assumes both roles. For this reason, other types of IS technologies such as spreadsheets and BI are called upon to accommodate tasks that cannot be supported in the main ERP systems.

This finding concurs with previous research conclusions that the ERP systems may pose a flexibility issue to organisations because the systems cannot be tailored or changed in response to business conditions or user requirements (Booth, Matolcsy, and Wieder 2000; Soh, Kien, and Tay-Yap 2000; Akkermans et al. 2003; Rom and Rohde 2006). Hence it does not support research findings which conclude the ERP systems promote flexibility in organisations (Brazel and Dang 2008). In addition, it corresponds to previous findings which indicate that the ERP systems may assist integration in organisations (Shang and Seddon 2002; Quattrone and Hopper 2005). At least, the ERP systems can support a company-wide data integration which is significant in financial and management accounting but not necessary a company-

wide business process integration (Dechow and Mouritsen 2005; Dechow, Granlund, and Mouritsen 2007).

The use of the utilitarian view to generate explanations for ERP system use/non-use is still somewhat limited. There are many aspects that the utilitarian view cannot capture. For example, the utilitarian view cannot provide an explanation as to why the ERP systems are not widely used to support the budget integration functions despite the system capabilities for financial consolidations and budget monitoring. This suggests that other views, such as the social view as well as the contingency view suggested in prior literature, are necessary in explaining the ERP system use/non-use. Therefore future IS use research should employ theories and insights from many perspectives to gain insights into the IS use/non-use phenomena.

The results presented in this study should be interpreted with careful attention. Case study, by definition, makes no claims to be typical. The nature of case study is based upon studies of small, idiosyncratic and predominantly non-numerical sample sets, therefore there is no way to establish the probability that the data can be generalised to the larger population. On the contrary, the hallmark of the case study approach lies in theory-building (Eisenhardt and Graebner 2007) which can be transposed beyond the original sites of study.

The research offers two new insights to the IS research community. First, it explains the limited use of ERP systems in budgeting from a utilitarian perspective. It holds that the ERP systems have the potential to support only half of the budgeting activities. Explicitly, the systems can support the integration function but not the flexibility function in budgeting. Second, it shows that business controllers recognise such limitations imposed by the ERP systems and that they choose to rely on other IS technologies especially spreadsheets to accomplish their budgeting tasks. Use of spreadsheets is problematic in itself, issues such as spreadsheets errors and frauds are well-documented in the literature. Therefore academia should look for solutions to improve the use of professionally designed IS technologies (e.g., the ERP system or the BI) in organisations and reduce reliance on spreadsheets in budgeting as well as in other business activities.

For practitioners, this research is a warning to make informed decisions about IT/IS investments. ERP vendors often persuade prospective buyers to think that their systems are multipurpose. This research shows at least one of the many business functions in which the ERP systems do not excel. Thus any further IT/IS investments must be made with a serious consideration to the business function that needs support, as well the overall business strategies guiding the entire organisation.

## Appendix 7.1: Interview guide

How do you describe your business unit information?

What IS technologies are used in relation to budgeting procedures?

What are the budgeting procedures in your organisation?

What are the characteristics of pre-budget information gathering and analysis?

How does your business organisation prepare a budget?

How does your business organisation consolidate budget(s)?

How does your business organisation monitor budgets?

How does your business organisation prepare budget-related reports?

How does your organisation direct strategic management?

How does your organisation control normative management?

## Appendix 7.2: Coding example

Interview text	<u>Epic (underline)</u> and <i>Emic (italic)</i> Coding	Themes emerging from selective coding
<p><b>Vice President of Information Technology, company I</b></p> <p>SAP is too generic for budgeting. From what I understand I think SAP is developing an industrial product line but the budgeting function is very small so they think that it might not be worth an investment. First I think that is why they brought in the BI. Second, I think budgeting is something for business students. So they have to develop something that perfectly fits with the nature of the business, but I know it is not easy to do because they have to deal with massive accounting codes and a complicated chart of accounts.</p>	<p style="text-align: right;">] Consequences</p> <p><u>Budget construction,</u> <u>ERP limitations</u></p> <p style="text-align: center;">] Condition</p> <p style="text-align: right;">] Consequences</p>	<p>Comparing this passage to other passages about <u>budgeting construction</u>, a theme (<u>ERP limitations</u>) emerges. Since budgeting is a business activity, ERP developers must develop software which reflects the business processes (<i>condition</i>). Anyhow this is not easy to do because of the complexity in real business environments (<i>consequences</i>), therefore they just develop a very generic software (<i>consequences</i>) instead.</p>

# 8. Understanding the use of BI in budgeting

Wipawee Victoria Paulsson

The chapter is based on a paper titled “An empirical investigation of business intelligence use in budgeting” included in the proceedings of the twenty-first European Conference on Information Systems (ECIS 2013), Utrecht, the Netherlands, 6-8 June, 2013.

**ABSTRACT:** This study addresses the research questions of how and why BI is used or not used to support the flexibility and integration needs in budgeting. Budgeting is considered a process with four main activities, namely; budget construction, budget consolidation, budget monitoring and budget reporting, which belong to the flexibility and integration domains. Empirical data is obtained through interviews with business controllers in seven case companies in Thailand that use BI in budgeting. The analysis is performed using the concepts of conflict and contradiction in structuration theory. The analysis of the four activities shows that BI represents a conflict with the integration and flexibility domains. BI is merely not used to support unstructured decisions which require a high level of the flexibility function. Besides, use of BI in the integration function is not found. Further analysis concludes that non-use of BI occurs from the following contradictions with budgeting: (1) BI cannot support flexibility in budgeting and (2) BI faces integration limitations due to improper enterprise architecture design. This study contributes to the AIS research in three ways. It urges academia and practitioners to consider BI initiatives in a more critical manner. It observes that use of BI for decision-making needs to be complemented with spreadsheets.

## 8.1 Introduction

Information system (IS) technologies have always had a dominant part in commercial accounting processes since their inception in the 1970s (Granlund and Mouritsen 2003). Use of IS technology in accounting spans key activities like the collection and analysis of data and information presentation (Dechow, Granlund, and Mouritsen 2007). Management accounting was one of the first areas in which IS technologies were implemented to assist these activities in business organisations. Over the past few years, advances in IS technologies have brought about “business intelligence” (BI) which is typically marketed as an intelligent IS tool to support management accounting (Adam and Pomerol 2008). Recent literature reviews (Grabski, Leech, and Schmidt 2011; Vakalofotis, Ballantine, and Wall 2011) suggest that there is limited understanding as to how BI is actually used to support management accounting. There is limited knowledge about whether business controllers actually employ BI to support management accounting or if they just work around the system. In the event that they do use the system, what has been the impact of BI on the management accounting process in question? A review of BI literature on management accounting reveals that there are a very limited number of research contributions on this particular topic. Rom and Rhode (2006) conduct a comparison between enterprise resource planning (ERP) systems and BI in management accounting operations. They conclude that a “better match is seen between [BI] and management accounting than between ERP systems and management accounting”. Elbashir et al. (2011) examine the influence of management accounting in relation to knowledge management and resources on BI assimilation in organisations. The study concludes that BI, implemented on integrated and enterprise-wide business databases like the ERP systems, benefits effective management control systems in organisations. It should be noted that there is a consistent indication of the complementary existence between the ERP systems and BI on the enterprise architecture level (Rom and Rohde 2006; Adam and Pomerol 2008; Vakalofotis, Ballantine, and Wall 2011; Sanchez-Rodriguez and Sprakman 2012) in the sense that the ERP systems provide a database from which BI can retrieve data. Nevertheless, there is no guarantee that BI will be properly employed to support management accounting (Grabski, Leech, and Schmidt 2011, p.53).

The limited understandings of BI use as well as the inadequacy of empirical BI research in management accounting motivate this chapter to focus on the use of BI in budgeting, which is a classic management accounting practice in modern organisations (Libby and Lindsay 2010). A new stream of budgeting research building on the levers of control framework (Simons 1994) indicates that budgeting can be used interactively and/or diagnostically to assist budgeting (Abernethy and Brownell 1999; Frow, Marginson, and Ogden 2010). Prior works on the use of IS technologies in budgeting (Uppatumwichian 2013) interpret that budgeting needs flexibility and

integration to support decision-making, which is seen as the main function in management accounting (Anthony 1965). Flexibility is defined as business controllers' discretion over the use of budgeting information to support decision-making (Ahrens and Chapman 2004). Integration refers to standardisation of data definitions and structures across data sources (Goodhue, Wybo, and Kirsch 1992).

Budgeting is considered in this chapter as a process which encompasses four main activities, after a modification of Rockness and Shields (1988). These four activities in budgeting are:

- Budget construction – an activity in which local departmental units make forecasts about future business operations.
- Budget consolidation – an activity in which all departmental budgets are consolidated into an organisational budget according to a generally accepted accounting standard (GAAP).
- Budget monitoring – a continuous monitoring and controlling activity of local department units to ensure that the budget plan is achieved, i.e., in terms of expenditure and income.
- Budget reporting – an activity in which standard and ad-hoc reports are prepared to detect and/or investigate budget deviations.

BI, in essence, is a decision support system (DSS) which “has been given a new lease of life by the availability of new tools and [IS] technologies” (Adam and Pomerol 2008). In recent years, BI has been considered to be a leading initiative among global chief information officers (Gartner 2011) as they tend to believe that BI offers a superior data analysis capability which yields them a competitive edge (Davenport 2006). Despite the recent popularity of BI in business organisations (Gartner 2011), it is possible that BI will be just another “IS fashion” (Baskerville and Myers 2009) as there are many criticisms that BI is just a revamped DSS (Adam and Pomerol 2008; Watson 2009). Anyhow, I am certain that the use of IS technology to support a management accounting function like budgeting will continue to prosper regardless of the IS fashion because the idea existed prior to the invention of any IS technology (see: Anthony 1965).

Having briefly discussed the flexibility and integration functions in budgeting as well as the BI here, section 8.2 provides more discussion on how the four budgeting activities fit into the flexibility and integration domains, alongside a literature review on the use of BI to support the flexibility and integration domains.

The lack of understanding as to how BI is used to support budgeting motivates this study to focus on the research questions: (1) How is BI used or not used to support the flexibility and integration needs in budgeting? and (2) Why is BI used or not used to support these needs? This empirical chapter aims to describe and explain patterns of BI use or non-use in a budgeting context.



In terms of theoretical choice, the dual role of budgeting between flexibility and integration directs this chapter to focus on the contradiction discussions which are a fundamental base for many theoretical frameworks (Robey and Boudreau 1999). The concepts of conflict and contradiction in structuration theory are chosen to underpin this research. Although these concepts are largely ignored in most research disciplines, prior research in IS (Rodón and Sesé 2010; Walsham 2002; Walsham and Han 1991) shows how the concepts can be applied empirically in the IS arena.

This chapter is organised as follows. The next section provides a brief review of BI literature in relation to the flexibility and integration domains in budgeting. Section 8.3 provides a background into the concepts of conflict and contradiction in structuration theory. Section 8.4 presents an analysis of BI use in support of the flexibility and integration needs in budgeting following the concepts of conflict and contradiction respectively. Section 8.5 ends the chapter with research conclusions, suggestions for future research and contributions to academia and practitioners.

## 8.2 Budgeting and BI in the flexibility and integration domains

This section first argues how the four budgeting activities posited in the introduction equally belong to the flexibility and integration domains. It then presents a review of the literature on how BI can be used to support the flexibility and integration domains.

### 8.2.1 Dividing budgeting activities into flexibility and integration domains

In connection to the discussion that budgeting, seen as a decision-making process, possesses a dual role of flexibility and integration, it is argued that budget construction and budget reporting fall into the flexibility domain. The participative budgeting technique, commonly adopted in today's budget construction, is a mechanism employed to reduce organisational uncertainties through the assertion of insights and information from local managers (Shields and Shields 1998). The focus on local business requirements is achieved through an ignorance of the enterprise-wide business requirements, i.e., the ERP systems. Therefore the nature of information presented in a budget construction process is flexible in terms of information sources and forms (Uppatumwichian 2013). For budget reporting,

business controllers need to present and analyse data from multiple dimensions, such as sales categorized by customers, regions and products, in order to detect budget deviations and decide upon corrective action. Business controllers have a full discretion over the format and display of data to support their decision-making. The individual reporting requirement is flexible to fit specific, unpredictable and fast-changing circumstances, therefore it does not correspond to static external reporting standards like GAAP – which is typically programmed into ERP systems (Uppatumwichian 2013).

At the same time as budgeting is flexible, budgeting has also become more integrative (Shields and Shields 1998). It is argued that budget consolidation and budget monitoring serve the integration domain. Organisations, especially listed companies, are required to be transparent in their budgeting procedures. Thus they are required to make a budget commitment to shareholders in the form of GAAP-compliant budgets (Uppatumwichian 2013). The introduction of advanced IS technologies, like ERP systems and BI which enforce a strict data definition throughout organisations from a single database (Kallinikos 2004), has improved business controllers' capability to comply with GAAP in the budget consolidation process. The database allows business controllers to collect and integrate consistent budget data from diverse units of the organisation. In addition, the quality of the integrative database has also enabled efficient budget monitoring across organisational units (Uppatumwichian 2013). The standardisation of data definitions and structure across business units allows business controllers to monitor and control local unit performance effectively (Chapman and Kihn 2009).

### **8.2.2 Use of BI to support flexibility and integration**

Most available academic publications have emphasised the flexibility of BI to support decision-making (Melchert, Winter, and Klesse 2004; Rom and Rohde 2006; Dechow, Granlund, and Mouritsen 2007; Watson 2009). The fundamental IS technologies behind BI, especially online analytical processing (OLAP), data mining and data warehousing, are designed to allow business controllers to make sophisticated multidimensional analyses of financial and nonfinancial information. When business controllers are supported by the flexibility provided by BI, it is supposed that BI should be able to transform the role of business controller from bean counter to business partner, similar to the conclusions made in the ERP system research (Scapens and Jazayeri 2003).

With regards to the integration domain, most available research is not explicit on how BI could be applied to assist it. Melchert et al. (2004) and Bringnall and Ballantine (2004) theoretically demonstrate how BI can be used to support the balanced scorecard process. To date, the recent empirical work from Elbashir et al. (2011) is the only publication which demonstrates how the integrative enterprise architecture

design between BI and ERP systems can support a management control system in organisations. In general, it is implied that the technological advancements behind BI, especially data warehousing, can help organisations to integrate and monitor business performances closely (Watson, Fuller, and Ariyachandra 2004).

### 8.3 Conflict and contradiction concepts in structuration theory

Structuration theory is regarded as a meta-theory in social organisation research which provides a way of thinking about how the world operates (Gregor, 2006). The main thesis that Anthony Giddens offers is a move beyond the primacy argument on the dualism of structure into the duality of structure, i.e., the mutual domination of agency and structure in determining a social process and change. Despite the fact that IS technology is missing from the original theory, structuration theory is still one of the most influential theories adopted in IS as a research discipline (Jones and Karsten, 2008). This is mainly due to the fact that the theory offers a vast potential to determine interactions between people and IS technology (Poole and DeSanctis, 2004)

This chapter applies structuration in two fundamental fashions. First, structuration theory is applied as a sensitising device to guide data analysis rather than as a prescribed guideline for data collection and analysis (Giddens 1984). Second, a selective application of structuration theory concepts, namely the concepts of conflict and contradiction, is elected over an en bloc application. According to Giddens, such selective application of structuration concepts in a “sparse and critical fashion” produces a more meaningful result to the problem under investigation (Giddens, 1998).

The inspiration to focus on the conflict and contradiction concepts is based on Robey and Boudreau (1999)’s argument that IS scholars should adopt theories which employ a logic of opposition rather a standard logic of determination. They argue that theories based on the logic of opposition allow researchers to focus on opposing forces that continuously enable and constrain the use of IS technology. An acknowledgement of such paradox stimulates researchers to critically reason as to how such opposition forces coexist logically. By all means this approach encourages theory building.

Referring to the original writing, Anthony Giddens conceptualises the contradiction as the “disjunction of structural principles of system organisation” whilst addressing the conflict as the “struggle between actors and collectives expressed as definite social practices” (Giddens 1984, p. 198) posits that the structural contradiction takes place

because of a clash between systems which operate in terms of each other whilst at the same time contravening one another. He supplements the concept of contradiction at the structural level with the concept of conflict which is deemed to occur at the level of social practice or at the real activity level (Walsham, 2002). According to Giddens, the relationship between the structural contradiction and the conflict is positively related. It is posited that conditions which influence one are likely to impact the other (Giddens 1979, p.145)

The conceptualisations of these two concepts have an immediate application to the study of the use of BI in budgeting. The conflict concept is deemed to take place between the four main budgeting activities (which are discussed previously in relation to flexibility and integration domains) and BI. Similarly, the contradiction concept occurs between the entire budgeting process and BI.

## 8.4 Analysis

The analysis presented here is organised according to the concepts of conflict and contradiction discussed earlier and the research method and company descriptions posited in section 3.4.1. It starts with an analysis based upon the concept of conflict between BI and the four main budgeting activities which equally belong to the flexibility and integration domains in order to investigate how BI is used. Afterwards it discusses the contradiction between BI and budgeting processes at the structuration level to establish an argument as to why BI is used or not used to support budgeting.

### 8.4.1 How is BI used to support flexibility?: The conflict analysis

The analysis presented here visits the two budgeting activities, budget construction and budget reporting, which require flexibility.

**BI and budget construction** – in budget construction, three of the seven companies (B, F, I) are using BI for budget construction purposes. Company E, which presently has access to Magnitude BI, is in a pilot process of developing yet another budgeting BI in collaboration with an IT/IS consultant. The newly developed BI is expected to accomplish the task of budget construction. Although it has been claimed that BI can be used for budget construction, inquiries with business controllers in these companies reveal the surprising result that they do not use BI for budget construction. Company B makes limited use of Cognos BI. The work function is restricted to revenue budgeting for certain business operations only due to a

complication in configuring Cognos BI for the diverse business operations that company B has. Besides, assumptions for the revenue budget construction are not properly stored inside BI. The assumptions which are sensitive to rapidly changing business environments are stored and updated in spreadsheets. Company F uses its own-developed BI for a limited budget construction purpose. As a Southeast Asian regional business unit, company F uses BI to submit a rough regional budget to the global headquarters. With this said, when it comes to a detailed budget construction at the country level, the company encourages regional companies under its supervision to use spreadsheets. The Financial Planning Manager in company F reports that:

[The BI] is not flexible enough to reflect the differences at the country level. [...] It is not possible to force everyone to comply with the standard [BI].

In company A, the reason for the development of the BI for budget construction is rooted in various spreadsheet errors which have caused a serious delay in the entire process. BI is perceived as a tool which will improve discipline and accuracy in information among business units, but not primarily as a tool to improve decision-making. BI is meant to compensate for a lack of experienced business controllers that company A is facing. The idea is to develop a standard form on the BI so that business units can enter the data into the system, then the system will ensure that the calculation process is correct. For the special case (company E) which is piloting the new BI, the Management Accounting Manager reveals a rather negative experience with the new BI. She states that:

Having the new [BI] might make the picture bigger [for the headquarters] but it is not necessary more detailed [for the local units]. It is the requirements from the headquarters which are not working for business operations. If we do not prepare a budget at the stock-keeping unit (SKU) level [on separated spreadsheets], we will not be able to answer any questions if things go wrong.

To work around this limited capability of the new BI, she expects that spreadsheets will continue to be the shadow system after the new BI installation is completed. The empirical data presented in this section shows that in these companies the use of BI for budget construction is very limited. In all companies where BI is mentioned in budget construction, it is always operated in conjunction with spreadsheets as business controllers notice that BI does not yet offer a full flexibility for decision-making especially with regard to the level of granularity needed for local business operation.

**BI and budget reporting** –only company K seems to clearly benefit from BI for budget reporting activity. The Customer Intelligence Manager in company K mentions:

I do not see any drawback with the BI. Before the BI, if I wanted to get any certain performance reports I had to wait for [hotels] to send reports to me in Excel spreadsheets. There was no way to verify whether those reports are accurate. I would

not even know if they lie to me. Now I can retrieve reports from the BI which is linked to the central database. Now I know that this information is accurate.

The availability of BI-generated reports allows company K to work closely with hotels in strategic areas. Such transformation is similar to the previous conclusion made in the past ERP research (Scapens and Jazayeri 2003), namely that advanced IS technologies can transform the role of business controllers from bean counters to business partners. Nevertheless this effective use of BI is only evident in company K. It should be noted that BI use for budget reporting is still not complete as the interviewee emphasises that she still needs to complement BI with spreadsheets for certain specific reports. The remaining companies (all except company K) predominantly use BI as a static reporting tool in which they submit routine budgets and actual operating results back to their respective headquarters according to a pre-specified reporting format. Although ERP systems are present in all case companies, it turns out that there is a problem with enterprise architecture design in a way that their ERP systems are not properly integrated nationally or internationally. For example, the CFO in company J reveals that the current JDE ERP system that the company is using is not compatible with its global SAP ERP system. There was a plan to upgrade to SAP but it is on hold for the moment due to the global financial crisis. As a result, financial and management accounting information is submitted to the headquarters via the BI. This practice is true for all Southeast Asia regional companies. BI is seen as a workaround solution to connect isolated accounting data silos. Therefore, these BIs have a limited function for multidimensional data analysis needed in budget reporting. The use practice and benefit of BI found in these companies tends to be that of structured/routine reporting, but not as an IS technology that enables multidimensional budget reporting in support of unstructured decisions as it should have been.

**BI and flexibility conclusion** – current BI literature seems to suggest that the recently emerged BI has the flexibility to support decision-making (Rom and Rohde 2006; Watson 2009). However the empirical data summarised in this session suggests a conflict between BI and the flexibility needed for decision-making. BI certainly places limitations on what these business controllers can and cannot do in their budgeting processes. In all companies it is evident that the current BI must be supplemented with spreadsheets to accomplish a maximum level of flexibility which business controllers need to support decision-making. The role of BI to support decision-making has been reduced from an unstructured decision-making role to a structured/routine decision-making role. BI use in budgeting is simply yet another representation of headquarters' requirements (in addition to the rigid ERP systems) which restricts what business controllers can or cannot do with the system. Therefore BI does not support the flexibility necessary at local business levels.

## 8.4.2 How is BI used to support integration?: The conflict analysis

The analysis presented here follows the format applied in the previous section. It visits the two budgeting activities, budget consolidation and budget monitoring, which require integration.

**BI and budget consolidation** – only company B uses BI for budget consolidation purposes. However, since some affiliated companies have not yet installed and used BI for budgeting, much of the data required for budget consolidations is from Excel spreadsheets. The Planning Vice President in company B explains that there are approximately forty affiliated companies which still communicate their budget plans via spreadsheets due to the reason specified in section 8.4.1 about the BI configuration complication. The budget information contained in spreadsheets is loaded back into BI for budget consolidation purposes. This is because BI provides a more accurate consolidation procedure according to the GAAP. The Business Analyst responsible for budget consolidation work in company B reveals that using the Cognos BI might result in a more accurate consolidated budget but not necessarily a faster consolidation time. She states that:

We used to get the budget consolidation done in one day with Excel spreadsheets. Now it takes a couple days in Cognos [BI].

Budget consolidation in Cognos [BI] is taking longer than spreadsheets because Cognos represents a very complex budgeting model, that is, when any assumption in the model has been changed, it will affect other assumptions and thus the entire model must be recalculated. In other remaining companies, use of BI for budget consolidation is not evident. Some companies (e.g. company E and I) are interested in this capability but as of now there is no solid plan to develop BI functions further for this purpose. Despite the availability of BI in these case companies, spreadsheets are the major IS technology on which they rely for budget consolidation processes due to the complication in BI installation company-wide as well as the lack of a proper enterprise architecture design to integrate BI with the ERP system. This point will be exemplified in the next paragraph.

**BI and budget monitoring** – none of the companies is found to be using the BI for this purpose. Some companies (A, B and E) are using the ERP systems for this function by keying final budget numbers from spreadsheets directly into the ERP systems. Thus there is no need for them to rely on the BI as the ERP systems can provide an instant update of actual revenues and expenses in relation to the keyed-in budget numbers. The most important aspect of linking budget data from BI to the ERP systems is that business controllers must be able to properly map data from BI to the data structure on the ERP systems. The Planning Vice President in company B comments:

We have to do a mapping between the Cognos BI and the ERP system. The financial statements from these two systems do not necessarily look the same. In the SAP [ERP] system we have a more detailed chart of account, let's say we have 300-line items. But in the Cognos [BI] we do not need the same level of details, so we reduce them to 100-line items for a profit and loss statement. Anyhow we must be able to tell how they are connected. We have to update this mapping structure all the time when we have new line items in either the SAP [ERP] system or the Cognos [BI].

This statement points to the significance of a proper enterprise architecture design between the ERP system and BI in order to realise a maximum benefit from BI, which is the key area that most companies studied are not good at. This is also the reason why budgeting monitoring using BI is not found in any company. The remaining companies (F, I, J, and K) are using spreadsheets for this function. The normal practice is to download actual financial results from the main ERP systems and compare them with budget numbers in spreadsheets.

**BI and integration conclusion** – In spite of suggestions in the literature that BI can be applied to support the integration function in management accounting (Bringnall and Ballantine 2004; Melchert, Winter, and Klesse 2004; Watson, Fuller, and Ariyachandra 2004), the empirical data has suggested otherwise. It is believed that the main cause, as suggested in the ERP literature, is that the majority of organisations have still not yet implemented a proper enterprise architecture design between the ERP system and BI (Kallunki, Laitinen, and Silvola 2011). Indeed, this is the major reason why the use of BI for the integration function is still limited. This proposition is supported by the empirical findings that spreadsheets are still the major IS technology which most companies rely on for budget consolidation and budget monitoring regardless of the availability of both the ERP system and BI. BI cannot operate in a vacuum without additional data support from other IS technologies especially the ERP system (Sanchez-Rodriguez and Spraakman 2012). When there are potential pitfalls presented in the enterprise architecture design which offers an information link between the ERP system and BI, it affects BI effectiveness. For this reason, it is concluded that BI is not used to support the integration function in budgeting. BI implemented on a poor enterprise architecture design cannot offer any integration capability. Consequently the struggle with BI in budgeting practice leads to the domination of spreadsheets in the budgeting process.

### **8.4.3 Why is BI (not) used to support budgeting: The contradiction analysis**

Based on the analysis presented in the earlier sections as to how BI is used or not used to support the flexibility and integration domains in budgeting, this section elaborates



on why BI is used or not used to support budgeting based on the contradiction concepts.

Budgeting as a popular decision-making tool is deemed in this study to operate in terms of the flexibility and integration domains. The use of BI to support budgeting activities discussed in section 8.4.1 and section 8.4.2 is summarised in Table 8.1. In short, it is concluded that the use of BI to support budgeting activities is limited, with the exception of reporting. However, it is noted that BI is heavily used to support structured/routine reporting but not unstructured/strategic reporting as it should have been.

**Table 8.1 Summary of companies using BI in the budgeting process**

	<b>Flexibility</b>	<b>Integration</b>	<b>Integration</b>	<b>Flexibility</b>
<b>Company</b>	1.Construction	2.Consolidation	3.Monitoring	4.Reporting
A	-	-	-	X
B	X	X	-	X
E	-	-	-	X
F	X	-	-	X
I	X	-	-	X
J	-	-	-	X
K	-	-	-	X

The empirical data from the flexibility domain shows that BI constrains business controllers to achieve the maximum level of flexibility required to support budget construction and budget reporting. A BI implementation project is faced with a choice to support certain aspects or functions of business operation alone, for example, the choice to develop BI according to a global requirement which does not reflect local requirements (company F). Similarly, the empirical data shows that BI represents a conflict with the integration domain. An improperly-integrated BI constrains business controllers to take advantage of the integration function. An inappropriate design of enterprise architecture between the ERP system and BI causes non-use of BI to support the integration domain as well as a heavy reliance on spreadsheets. The example of company B shows that spreadsheets are a significant part of the consolidation process because some of the affiliated companies have not yet installed or started to use the BI system for budgeting. Following these findings, it is concluded BI is not used to support budgeting process because;

1. Budgeting process demands a level of flexibility beyond what BI is capable of offering.
2. Budgeting process demands a level of integration beyond what BI implemented on a poor enterprise architecture design can offer.

The empirical data indicates that BI is at best used in the budgeting process as a solution to fix and/or hasten certain budgeting activities. However there is lack of strategic thinking as to how BI should be used to support the entire budgeting process in cooperation with the ERP systems.

## 8.5 Conclusions and implications

This chapter addresses the research questions of how and why BI is used or not used to support needs for flexibility and integration in budgeting. Empirical data is primarily obtained through interviews with seven companies in Thailand which use BI to support their budgeting processes. The interviews are supplemented with observation and document examination. The analysis is performed using the concepts of conflict and contradiction in structuration theory.

The analysis following the conflict concept reveals that BI impedes the flexibility domain. Business controllers normally rely on spreadsheets to achieve the maximum level of flexibility required for budget construction and budget reporting. Even though it is shown that BI is used in all companies (see: Table 8.1) to support budget reporting, it is highlighted that BI is used merely as an IS technology to support structured/routine decision-making. There is a very little evidence to show BI that is truly used to support a flexible multidimensional budget analysis in support of unstructured decision-making as the literature suggests (Rom and Rohde 2006; Watson 2009). Likewise, an analysis on the integration domain shows that BI is not used to support budget consolidation and budget monitoring (see: Table 8.1) as the literature had predicted (Bringnall and Ballantine 2004; Melchert, Winter, and Klesse 2004). It is shown that BI is not used to support the integration function because the organisations under study have not yet implemented proper enterprise architecture between the ERP system and BI. In short, it is concluded that there is a contradiction between budgeting and BI. Budgeting calls for the flexibility and integration functions but BI cannot support them. This is because of (1) the flexibility limitation that the IS technology itself presents, and (2) the integration limitation that the IS technology faces as it is implemented on an enterprise architecture design that does not fit with other key IS technologies, especially the ERP systems.

In comparison with previous empirical research on the BI, this study does not support Rom and Rohde (2006)'s conclusion that BI offers a better match than the ERP

systems to support management accounting. This study has shown that BI use to support budgeting is not that different from the ERP system, i.e. BI is not used to support budgeting, similar to the findings in the ERP system literature (Granlund and Mouritsen 2003). However it supports Elbashir et al. (2011)'s conclusion that BI implemented on a properly designed enterprise architecture can enable the management control function in management accounting. It is just the matter that no company under this study has yet managed to achieve this long and winding road. Nonetheless one should keep in mind the point made by Grabski et al. (2011, p.53) that a proper enterprise architecture design does not guarantee BI use either. This point clearly deserves more research endeavours.

Having presented this study in the light of previous conclusions, it is clear that more research on use of BI in a management accounting context is warranted. This study represents limitations in two main areas that future research endeavours can pursue. First, since this study is geographically limited to one country, a comparable study can be conducted in another setting to verify whether a similar pattern of non-use of BI is found. Second, this study does not have a chance to confirm the interesting point made in Grabski et al. (2011) that BI implemented on properly designed enterprise architecture does not guarantee BI use. It would be very interesting to verify whether this key observation is valid. If it is as suggested, how business controllers might work around BI and what could have been explanations for their actions.

This research offers three new insights in accounting information system (AIS) research. First, it contributes to the limited research on BI use in management accounting. It could be said that this study is among the very few to offer an empirical insight into this area. Second, it urges academia as well as practitioners to consider any future BI initiatives from a more critical perspective. BI initiatives should be evaluated from the very beginning on the nature of business process in need of support and the intended strategic values that BI could bring about. Later on, readiness of the enterprise architecture should be evaluated especially on the connection with the ERP systems which feed information into the BI. Without careful consideration, BI will not be able to function properly to support the business process. Third it shows that, apart from the ERP systems, BI use for decision-making needs to be complemented with spreadsheets. Although BI is believed to deliver the highest level of flexibility to users, business controllers find that the system cannot yet properly support them in the flexibility domain. Therefore they resort to spreadsheets. Practitioners, especially those who are BI developers, could learn from this and find solutions to offer a seamless integration between BI and spreadsheets.





# 9. Understanding the use of spreadsheets in budgeting

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An earlier version of this chapter was presented at the Ninth International Conference on Enterprise Systems, Accounting and Logistics (ICESAL 2012) in Chania, Greece, 3–5 June 2012.

**ABSTRACT:** This chapter explores the use of spreadsheets in budgeting in order to explain how and why spreadsheets are used or not used in budgeting practice. Budgeting is considered as a social phenomenon which requires flexibility and integration to assist decision-making. Twenty-one interviews with business controllers in eleven leading organisations in Thailand were conducted. The analysis at the activity level, led by the concept of “conflict” in structuration theory (ST), reveals that spreadsheets allow full flexibility over decision-making activities in budgeting. However, spreadsheets are not appropriate for integration as there are many problems and errors associated with the use of spreadsheets. The analysis at the structural level, directed by the concept of “contradiction” in ST, concludes that the weak characteristics of spreadsheets for integration are contradictory to the budgeting process which fulfils the dual roles of flexibility and integration. This study concludes that the use of spreadsheets in budgeting is significant despite the availability of advanced IS technologies like enterprise resource planning (ERP) systems and business intelligence (BI). This study explains that spreadsheets are heavily used because of the flexibility that they provide. This situation is not ideal. Integration activities should be performed with advanced IS technologies because they are specifically designed and tested for this purpose. This research offers as a key idea that no single IS technology is good or bad in itself. Against the contemporary idea that

spreadsheets are not suitable for accounting tasks, it is shown that the flexibility in spreadsheets is more appropriate to support certain activities in budgeting.

## 9.1 Introduction

Recently there have been calls for research into how information system (IS) technology supports the decision-making functions inherent in management accounting (Berry et al. 2009; Sutton 2010; Granlund 2011). A recent literature review suggests that there is an increasing but still limited number of research contributions (Vakalftotis, Ballantine, and Wall 2011). Most publications up to now have concentrated on particular IS technology, such as enterprise resource planning (ERP) systems (Chapman and Kihn 2009; Granlund and Malmi 2002; Hyvönen 2003; Grabski, Leech, and Sangster 2009) and business intelligence (BI) (Rom and Rohde 2006).

Prior research concludes that ERP systems have a limited capability to support the flexibility needed in decision-making due to the immense complexity of the system architecture (Quattrone and Hopper 2005; Granlund 2009). However, these systems have the potential to support the integration function which is also required for decision-making in organisations (Chapman and Kihn 2009). Anyhow the majority of organisations still have not integrated their financial/management accounting functions on ERP systems to realise this potential (Kallunki, Laitinen, and Silvola 2011). BI, on the contrary, seems to attract a limited research interest, according to a recent literature review (Vakalftotis, Ballantine, and Wall 2011). To date, there is only one study, by Rom and Rhode (2006), which examines the use of BI in decision-making in management accounting. The findings attest that the BI system is slightly better than ERP systems to support decision-making. One thing that these studies have in common is that they report that business controllers use spreadsheets to organise and report the information to supplement these advanced IS technologies (Granlund and Malmi 2002; Scapens and Jazayeri 2003; Dechow and Mouritsen 2005; Newman and Westrup 2005). Fascinatingly enough, none of the aforementioned research has addressed how spreadsheets are used in decision-making in response to the research gap addressed. It is unclear why spreadsheets are taken for granted in accounting information system (AIS) research, despite their widespread adoption for management accounting practices (see: KPMG 2012; PricewaterhouseCoopers 2007).

This study responds to the aforementioned research gaps by investigating the use of spreadsheets in budgeting in order to explain how and why spreadsheets are used or not used in budgeting practice. Budgeting is selected over other newly invented management accounting tools, such as balanced scorecard or activity-based costing,

for many reasons. First, budgeting is the heart of organisations (Hansen, Otley, and Van der Stede 2003) and may be the only centrally coordinated activity. Second, budgeting is one of the longest standing and the most renowned management accounting practices (Libby and Lindsay 2010). Third, budgeting can be continuously used diagnostically and interactively to support decision-making (Abernethy and Brownell 1999; Frow, Marginson, and Ogden 2010) in response to the primary research gap addressed. This study views budgeting as a process to achieve a statement for a defined period of time (Covaleski et al. 2006). Therefore it can be said to encompass four main activities: (1) budget construction, (2) budget consolidation, (3) budget monitoring, and (4) budget reporting.

Building on the “levers of control” framework (Simons 1994), the current stream of budgeting research considers budgeting to cover the dual roles of interactive and diagnostic decision-making (Abernethy and Brownell 1999; Frow, Marginson, and Ogden 2010), whereas earlier literature often considered budgeting to fulfil the diagnostic role alone (Bruns and Waterhouse 1975). From these new budgeting researches, it is deemed that the dual roles of budgeting require the process to be flexible and integrative to facilitate decision-making in organisations (Frow, Marginson, and Ogden 2010; Uppatumwichian 2012).

In relation to the research aim to investigate the use of spreadsheets for budgeting activities, flexibility is defined as discretion over the use of spreadsheets to support budget-related decision-making activities (Ahrens and Chapman 2004). In contrast, integration is defined as the adoption of standardised data definition and structures across IS technologies (e.g., spreadsheets, ERP systems and the BI) to support budget-related management control activities (Goodhue, Wybo, and Kirsch 1992).

The dual roles in budgeting of flexibility and integration guide this research to concentrate on the discussion of opposition in many social science theories, such as institutional theory and organisational learning theory (Robey and Boudreau 1999). Having reviewed a number of related theories, I have employed the concept of conflict and contradiction in structuration theory (ST). ST is selected over other theories mainly because of its vast potential to uncover human interactions with IS technology. Therefore this research is interested in how business controllers (the humans according to ST) use spreadsheets in budgeting, which is considered as a social practice (Orlikowski 1992). More discussion on the concept of conflict and contradiction in ST is provided in section 9.3.

This research proceeds as follows. The next section provides a literature review on the use of spreadsheets in relation to the flexibility and integration domains which are the two main functions in budgeting. Section 9.3 discusses the concepts of conflict and contradiction in ST which underpin this study. Section 9.4 presents the data analysis using the conflict and contradiction concepts in ST suggested earlier. The research ends with the conclusions and implications in section 9.5 for both academia and practitioners.



## 9.2 Literature review

This section reviews prior literature on spreadsheets use in relation to the flexibility and integration domains respectively as it is previously discussed that budgeting covers these two roles. It starts with a concise discussion on what spreadsheets are and their relations to accounting in general and budgeting in particular. Next it discusses paradoxical conclusions in the literature about spreadsheets use for flexibility and integration domains separately.

Spreadsheets as we know today are derived from a basic paper-and-pen paradigm of an array of rows and columns for accounting works in 1952 (Power 2004). The electronic version which concentrates on basic functions like automatic updates and information displays was pioneered in 1961 by Professor Richard Mattessich in the seminal paper *Budgeting models and system simulation* (Mattessich 1961) in the Accounting Review journal. With progress in the IS technology industry, many new features such as libraries of statistical and mathematical functions, graphing and charting facilities, graphic user interfaces are added on the software which add to the increasing spreadsheets popularity (Power 2004). Today it is often claimed that spreadsheets have become an indispensable IS technology among business and home users (Baker and Sugden 2003).

In relation to the flexibility domain, research on management accounting suggests that spreadsheets are commonly used to generate reports and analyse information to support decision-making because of the flexibility that they offer (Scapens and Jazayeri 2003; Jean-Baptiste 2009; Newman and Westrup 2005). However, some research has warned that the flexibility in spreadsheets is in fact a double-edged sword. Spreadsheets which allow users to design and present data and information according to their own requirements contain a high rate of errors (Panko 2006). This leads to inaccurate information and poor decisions (Redman 1998; Ross 1996; Teo and Tan 1999). Briefly, it can be said that flexibility in spreadsheets is a conflict in itself. On the positive side, such functionality is ideal to support decision-making because users have a maximum freedom to design and present information in such a way that is useful to them. However, when users are not careful with it, the same functionality thwarts decision-making. The research result to date agrees that spreadsheets are the main IS technology that users rely on to support decision-making activities, however it raises a serious concern toward spreadsheets use due to a high rate of spreadsheets errors.

With regards to the integration domain, many writings suggest that spreadsheets are commonly employed to support many integration-related activities such as budget consolidation and performance monitoring (Croll 2009; Parkinson, Coron, and Sodarelli 2006). A former study has proposed a model on how spreadsheets can be used for budget consolidation (Power et al. 1989). Despite their popularities, there is

a considerable concern relating to how spreadsheets are used for integration purpose. Kyd (2007), for example, refers to this practice as the *spreadsheets hell*. Many accounting affiliations have addressed a similar concern to the profession (Whittaker 1999; CIMA 2008; PricewaterhouseCoopers 2011) especially in connection with the rise of the Sarbanes-Oxley Act and Basel III (Panko 2006; Grabski, Leech, and Schmidt 2011), which specifically address a financial information control weakness from data integration through spreadsheets. These concerns consist of frauds, human errors, qualitative and quantitative errors, planning and execution errors (Panko and Aurigemma 2010). All of these frauds and errors can occur during any step of spreadsheets designs and use. In addition, it is noted that neither users nor companies set out to audit and control their own spreadsheets (Panko 2006). In short, business practices often use spreadsheets for integration purposes but the academic research and many authorities are seriously concerned about the validity and accuracy of the information produced from spreadsheets integration.

This section presents an interesting paradox in spreadsheets use literature. It has showed that spreadsheets are the popular IS technology used to support the flexibility an integration activities. However there are many concerns presented in the literature especially on spreadsheets errors and frauds which are very critical when they are unknowingly presented in financial information like budgeting. The next section proceeds to discuss ST by Anthony Giddens which is the theoretical background underpinning this research.

### 9.3 Theoretical Background

The basic element of ST is an attempt to move beyond the primacy argument in the social science research between agency and structure (the dualism of structure) into the duality of structure. To achieve this, Anthony Giddens argues that agency and structure represent two sides of the very same coin. He thoroughly maintains that social structures exist as human agency applies them; thus they are the medium and outcome of human interactions. Giddens claims that the duality view permits a more satisfactory explanation as to how society proceeds in total in comparison with the old dualism view (Giddens 1979, p.47). Although it is acknowledged that technology is missing from the original theory (Jones and Karsten 2008), ST is still one of the most common theories in IS research. This is because ST offers a vast potential to uncover the interactions between people and technology, which is directly the focal point of IS research (Poole and DeSanctis 2004, p.210).

This research applies ST in two fundamental ways. First, ST is applied as a *sensitising device* to guide data analysis but not as the prescribed guideline for data collection and analysis (Giddens 1984, p.326). Second, this research gives an emphasis on a

specific concept in ST (Jones and Karsten 2008), which is the concepts of conflict and contradiction, while constantly related it back the general principle of ST. Giddens prefers such selective application of ST in a “sparse and critical fashion” (Giddens 1989, p.294) over an *en bloc* application. Giddens usually criticises in his writings that an *en bloc* application of ST seems to create an unnecessary burden empirical and clustered research (Stones 2005, p.2).

As is has been previously mentioned, this research draws on the concepts of conflict and contradiction in ST, which are largely ignored in IS research as well as in other research disciplines (Walsham 2002). Walsham and Han (1991) are the first to suggest how these concepts can be applied to a traditional IS use/non-use research problem by citing an example from the classic work on AIS (Markus 1983). Few examples of empirical research applying these concepts in IS use are Rodón and Sesé (2010) and Uppatumwichian (2013).

Referring to the original writings, Giddens conceptualises contradiction as a “disjunction of structural principles of system organisation” (Giddens 1979, p.131). He explains that contradiction happens because of the clash between systems at the structural level. These systems operate in terms of each other but also at the same time contravene one another. In alignment with the duality of structure, Giddens supplements the contradiction with the concept of conflict, which is assumed to take place at the level of social practice or at the real activity level. In his own words, conflict is a “struggle between actors or collectives expressed as definite social practices” (Giddens 1979, p.131). The relationship between contradiction and conflict is positively correlated. Conditions which fuel conflict are very likely to form contradiction and vice versa (Giddens 1979, p.145).

Applied in the context of this study on use of spreadsheets in budgeting, conflict is deemed to take place between budgeting activities (in relation to the flexibility and integration domains addressed above) and spreadsheets. Likewise, contradiction is considered to occur at the structural level between the entire budgeting process and spreadsheets to represent the clash between the social practice and the IS technology. The next section discusses the research method and the case companies included in this research.

## 9.4 Analysis

This section provides the analysis based on the ST concepts presented earlier. It starts with *conflict* between (1) the spreadsheets and flexibility and (2) the spreadsheets and integration at the activity levels. It later proceeds to discuss the *contradiction* between the spreadsheets and budgeting at the structural level.

### 9.4.1 Conflict: spreadsheets and flexibility

Flexibility, defined as discretion over the use of spreadsheets to support budget-related decision-making (Ahrens and Chapman 2004), is needed in the budgeting process. In relation to the four main budgeting activities discussed in the introduction section, (1) budget construction and (2) budget reporting are the two activities in focus for flexibility. These two activities represent decision making activities which require a high level of flexibility because business controllers are required to observe, interpret and model current business information in addition to business environments in order to forecast future business results as well as detect and solve current business problems (Frow, Marginson, and Ogden 2010).

In the first activity of budget construction, spreadsheets are the main IS technology that all the case companies rely on. Only one (company B) out of the eleven case companies mentioned that it employed a BI system in this activity to some extent. Such use is still strictly limited to the revenue budget construction in certain business operations only. This is because the BI configuration for budgeting is extremely complicated and time-consuming. Therefore BI use for budget construction is still very limited. The Planning Vice President in company B mentions the dominant role of spreadsheets for budget construction:

We are considering how we are going to approach budget construction. We think it might be some kind of external system, but for now there is no explicit system to support this process. Everyone still has his own Excel [spreadsheets].

A similar practice is also evident in every remaining company, as well as the fact that there is no indication toward use of the ERP system for budget construction, despite the system's availability in all the case companies. The Management Accounting Manager in company E gives an overview of how budgets are constructed in spreadsheets:

The Excel [spreadsheets] for the coffee portfolio budget, which is the biggest portfolio of our company, is about ten megabytes. They tend to link everything in the same Excel file. They put in various assumptions [for budget construction] such as volume growth and sales growth, etc. I think there must be at least fifty-five different assumptions, because they follow the format of the profit and loss statement that we have to submit to the headquarters. Each line item has its own assumptions; every line is reflected in the coffee portfolio budget. But overall, this thing varies from person to person.

The quotation makes it clear that budget construction is a complicated decision-making process since it involves large numbers of assumptions as well as personal judgements to best forecast the future business results, which can only be imagined at the time of budget construction.

In the second activity of budget reporting, all business controllers in all the case companies download various basic reports from the main ERP systems, but they further edit them in spreadsheets. This practice is dominant even with the companies that have access to specific IS technologies for budgeting, such as BI for budgeting (companies A, B, E, F, I, J and K). The Customer Intelligence Manager in company K comments on why she still needs spreadsheets for reporting purposes, even though the company has recently invested in the IDeaS BI application:

The BI still has certain calculation limitations. Some things still require a manual grouping [on spreadsheets]. For example, if I want to see the revenues by guest nationality. The [BI] system only provides me with a very general view of guest nationalities and continentals. But I also want to see the information by travel agency. Some travel agencies serve a certain country alone, but some web-based agencies offer flat sales in France, the UK and the US. This type of report cannot be summed on the BI. I have to extract information and sum it manually on Excel [spreadsheets].

The Central Accounting Manager in company G expresses a similar opinion about their reliance on spreadsheets in reporting:

We have to consider what our top management wants to see. If they want to see information in a graph format because they understand it better, we provide them with beautiful graphs using spreadsheets. [...] It is not like we can press any button [on the ERP system] to get the report that we want. Nothing is that easy. We have to rely on Excel [spreadsheets].

In short, she emphasises that reporting is dependent to a very high extent on managerial information needs. The ERP system in itself cannot respond to such unique needs, so they have to rely on spreadsheets. The CFO in company J comments that spreadsheets are a vital part of budget reporting because users cannot take part in the ERP customisation process. He insists:

There will always be some [reporting] works that needs to be accomplished in Excel [spreadsheets]. It is because the [ERP] system has its own standard. It cannot be customised for us. [...] Well, only if we could have taken part in the ERP customisation, but it is not possible. I know it will never be possible.

Spreadsheets are celebrated among business controllers for decision-making related tasks, as it has been shown that they are widely used in budget construction and budget reporting. This is because decision-making is a complicated business process which is highly dependent on personal judgements and preferences as to how best to construct models (such as budgets) and reports to assist the decision-making process. No other IS technologies, whether ERP systems, BI systems or web tools, allow as much flexibility as spreadsheets, as the empirical data has shown. This conclusion does not in any way mean to suggest that the flexibility in spreadsheets is not problematic. The concern that inappropriate use of spreadsheets will lead to poor decision-making raised in the previous research (Ross 1996; Redman 1998; Teo and Tan 1999) is still valid. However, the flexibility advantages offered by spreadsheets are

deemed to exceed the disadvantages inherent in them for the decision-making purposes. The next section proceeds to investigate the conflict between spreadsheets and integration in two budget-related activities: budgeting consolidation and budget monitoring.

### **9.4.2 Conflict: spreadsheets and integration**

Integration, defined as the adoption of standardised data definition and structures across IS technologies (spreadsheets, ERP systems and BI) to support budget-related management control activities, is also needed in budgeting (Abernethy and Brownell 1999). In relation to the four budgeting activities discussed earlier, (1) budget consolidation and (2) budget monitoring are the two activities which require a high level of integration. These two activities require business controllers to consolidate departmental budgets into a single corporate budget which is later used for the budget monitoring purpose in comparison to the actual operating results.

In the first activity of budget consolidation, spreadsheets are the main IS technologies that business controllers rely on. This practice is similar in all the case companies except for company B, in which they are trying to employ Cognos BI for budget consolidation. The practice is working in a limited scope since they have not yet implemented Cognos BI in all affiliated companies. Thus spreadsheets continue to dominate the budget consolidation process. The Planning Vice President in company B elaborates on the group budget consolidation process:

We get income statements and balance sheet statements from our affiliated companies at the “load” level. We call it a load because we only get them in the form of Excel [spreadsheets] which do not contain assumptions on how they constructed the entire budgets. We provide them with a [spreadsheets-based] template on key items like revenues, incomes and intercompany transactions because we need this information for budget consolidation. [...] As of now, there are about thirty to forty companies that we are still getting the spreadsheets from.

The empirical data from the remaining companies shows that it is common for an accounting/finance department to send out an Excel spreadsheets template to related departments to collect departmental budgets and consolidate a company-wide budget. However, this practice is not without problems, and business controllers in many case companies acknowledge the problem with it. For example, the Head of Accounting in company A remarks:

The Excel [spreadsheets] for budget consolidation are very large. No one is allowed to touch these Excel [spreadsheets]. The file is separated into many business units. They keep cutting and pasting on this file until they get the final budget picture. [...] I admit that there are problems [with this practice]. Usually it is like the budgeted balance sheet is not balanced, or something like that. We solve them as they come along.

This quotation addresses at least three spreadsheet security concerns. First, it addresses the point that spreadsheets provide neither audit trails nor information tracking (Panko 2006). Therefore business controllers usually adopt an easy way out by limiting the number of users who have access to spreadsheets. However, research has shown that this practice is not always an effective prevention method (Panko and Halverson 1997). Second, it suggests that business controllers acknowledge the pitfalls of spreadsheets for consolidation purposes, as the Head of Accounting suggests the problem of an unbalanced balance sheet (Kyd 2007). Third, it shows that companies usually have no plans and policies to manage the spreadsheet risks, as the Head of Accounting suggests that they solve the problems as they appear (Panko and Aurigemma 2010). Since this study was not primarily set up to detect spreadsheet errors in budget consolidation, there is no information to indicate how, how much and how often these spreadsheets contain errors. However, given an earlier research (Panko 1998) which concludes that eighty-eight percent of spreadsheets contain errors and the rate of errors tends to accelerate as the spreadsheets grow larger and become more complicated, there is a great tendency for spreadsheet usage for budget consolidation also contains a high rate of errors.

In the second activity of budget monitoring, eight out of the eleven case companies reported the use of spreadsheets for budget monitoring purposes. The three exceptions (Companies A, B and E) are reported to be using ERP systems for this function. The common problem found is that most organisations still have not integrated their management accounting and financial accounting together, despite the fact that the ERP systems that all organisations have access to offer this possibility (Kallunki, Laitinen, and Silvola 2011). Therefore, the common practice for budget monitoring is to download actual financial accounting information into spreadsheets which contain the initial budget information to monitor budget achievements. Even though the ERP system is used for budget monitoring, variance analysis is conducted in spreadsheets, as the Management Accounting Manager in company E, which is reported to use the ERP system for budget monitoring, explains the routine variance analysis process at her organisation:

We get the actual [financial information] from the SAP [ERP system]. Then we compare this data from the system to conduct variance analysis in Excel [spreadsheets].

A lack of complete integration between financial and management accounting is observed as a hindrance for the management control function (Chapman and Kihn 2009). The Customer Intelligence Manager in company K confirms Chapman and Kihn's conclusion by mentioning that:

It is not always easy to verify the actual information that each property has sent to the headquarters [in comparison with the initial budgets on spreadsheets]. It takes a lot of time. Let's say I have ten properties under my control, it might take me an entire month. By that time I will have to prepare for the next month's work.

Apart from the concern for spreadsheets errors that have been addressed in the first activity, the statement made by the Customer Intelligence Manager offers a conflicting proposition to the previous research, which indicates that IS technologies have transformed the role of business controllers from bean counters to business partners (Scapens and Jazayeri 2003). Use of spreadsheets for integration purposes requires an extensive amount of manual work, which does not promote a fruitful exploitation of a business controller's capacities to detect and solve business problems.

Although it is evidential and undeniable that spreadsheets are popular IS technologies employed for management control purposes, the analysis in this section sends a strong warning message to practitioners, as well as academia, about the inappropriateness of spreadsheets usage for integration functions in budgeting. The practice is not only astonishingly error-prone but also extremely inefficient for business controllers, as the empirical data has suggested. Other advanced IS technologies such as ERP systems or BI, as well as a proper management and financial accounting integration strategy, should be given a serious consideration in order to replace spreadsheets. The next section examines the contradiction between spreadsheets and budgeting at the structural level.

### **9.4.3 Contradiction: spreadsheets and budgeting**

Built upon the analysis presented in the last two sections, this section aims to present a discussion as to how and why spreadsheets are used or not used in budgeting practice. The concept of contradiction is ST shapes the discussion presented here.

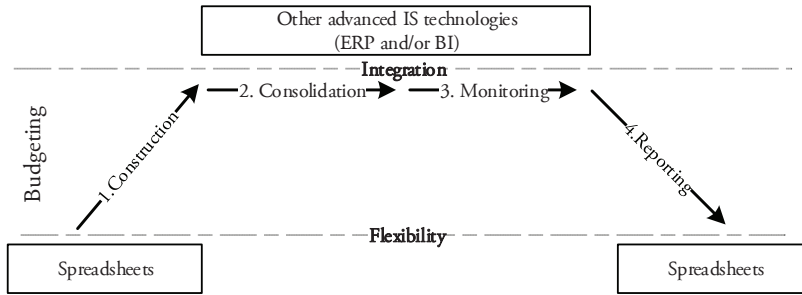
Budgeting, which is an established management accounting practice in modern organisations, is portrayed in this study as a social practice which requires continuous flexibility for decision-making. Spreadsheets are shown in the two prior sections to be widely used for the four budget activities (budget construction, budget consolidation, budget monitoring, budget reporting). They equally belong to the flexibility and integration domains. This study has identified a serious awareness that spreadsheets use for data integration in the management control function is problematic. This is because such use tends to generate a high rate of errors. In addition, other advanced IS technologies, especially the ERP system and BI, are better designed, developed and tested for the integration purpose than spreadsheets.

Figure 9.1 portrays the overall discussions about the contradiction between spreadsheets and budgeting at the structural level. It depicts the shifts in the role of budget activities from the role of flexibility in the first budget construction activity to the role of integration in the second budget consolidation activity. It also shows that spreadsheets can support budget construction, but that it is inefficient to employ spreadsheets for budget consolidation since other advanced IS technologies (whether the ERP system or BI) have a greater potential to support this work function. This is



similar to the third monitoring activity in which an automatic integration between financial and management accounting functions, assisted by these advanced IS technologies can properly assist business controllers to constantly observe business operations in relation to the budgets. In the last activity of reporting, budgeting once again changes its role from integration to flexibility in support of business decision-making. Once again, spreadsheets are needed to support this activity because the advanced IS technologies put certain restrictions on the decision-making process.

**Figure 9.1 The contradiction between spreadsheets and budgeting at the structural level**



So why do spreadsheets support the flexibility but not the integration in budgeting? To answer this question, it is best to begin the discussion with the following excerpt from Hedberg and Jönsson (1978) who mention that:

Formalised information systems and information technologies are not good or bad, per se. But, there are information systems which offer less discretion to decision makers than others and which lead to organisational rigidity; and there are information systems which stimulate organisations to experiment and innovate, and which foster organisational flexibility.

From a similar line of argumentation, advanced IS technologies like the ERP systems or the BI are designed to support certain purposes. The ERP systems, for example, are a basic reference model which enforces underlying data, business processes and organisational structure (Kallinikos 2004) through a single database repository (Davenport 1998). This is well supported not only by the empirical data shown in this study but also by the research results from many other publications (Kallinikos 2004; Quattrone and Hopper 2005; Soh, Kien, and Tay-Yap 2000). It has been empirically demonstrated that the ERP systems are too rigid for decision-making, especially at the local level of organisations. The BI system may prove to be more useful than the ERP system for decision-making (Rom and Rohde 2006), but the empirical data has shown a similar system limitation to the ERP system. In short, it might be less beneficial for businesses to rely strictly on the ERP system or the BI to support decision-making because these systems tend to put a limit to the decision-making processes.

Spreadsheets, on the contrary, are opened IS technology that allows business controllers to model data and information according to their own interpretations of the problems as well as the environments around them. Spreadsheets are regarded as the IS technology that allows business controllers to break free from standardised data and information stored in advanced IS technologies (March 1988, p.6) which is not primarily collected and stored to aid decision-making (March 1988, p.395). In comparison to advanced IS technologies, some academia have argued for spreadsheets advantages over advanced IS technologies especially for problem-solving and learning purposes. Baker and Sugden (2003), for example, posit three following advantages of using spreadsheets over advanced IS technologies. First, spreadsheets require abstract reasoning. Second, spreadsheets are rule-using tools therefore they force users to become rule-makers. Third and last, spreadsheets promote more open-ended investigations, problem oriented activities and active learning. Everything considered, IS technologies use in budgeting is more about the suitability of IS technology in question to the nature of tasks undertaken. When tasks require flexibility to make decisions into the future like it has been shown in the budgeting construction and budget reporting activities, it is deemed that spreadsheets are more appropriate in comparison to other advanced IS technologies. Spreadsheets allow a full flexibility for business controllers to collect, model and analyse data in a more critical manners.

So how can we readdress the limitations of spreadsheets especially on information accuracy? It is undeniable that information accuracy which results from spreadsheets errors and frauds is one of the pitfalls in spreadsheets use. It is well documented that most errors in complicated spreadsheets exceed the accounting materiality level<sup>9</sup>, therefore they might impact the quality of decisions made (Panko 2006). The European spreadsheets interest group (EuSpRIG 2012) has provided a webpage which summarises horror stories from spreadsheets use in the global arena. The best actions we can do to readdress spreadsheets limitations are to promote spreadsheets testing, inspection and auditing. Panko (2006) differentiate between these three main activities and insist that each activity is complementary to one another. In testing, different input variables are entered to spreadsheets in order to observe similarity or difference among results. In inspection, inspectors are assigned to look at spreadsheets line by line to identify errors. Testing and inspection are activities which are purposefully designed to reduce errors. The purpose of auditing, on the contrary to the previous two activities, shifts to ensure that good spreadsheet practices are followed throughout. Having suggested these three procedures, Panko acknowledges

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<sup>9</sup> There is no universal indication of the level of accounting materiality. Anyhow, Panko (2006) holds that a five percentage error in a significant bottom line value is considered as a critical value in determining an accounting materiality. This is because it might severely affect a decision quality.

that organisations as well as regulators hardly reinforce these practices despite the widely-accepted fact that spreadsheets use for accounting and financial activities is dominant. All things considered, it is important to note that error and detection rates in spreadsheets development are neither different from error and detection rates found in packaged software development (Panko 2006, 1998) nor dissimilar to human errors in comparable complex cognitive activities (Panko 2006). The main difference is that professional software developers tend to spend more a significant amount of time on testing, which is not the case for novice business controllers who develop spreadsheets for budgeting purpose. In conclusion, we should be concerned about the possibility of spreadsheets errors and implement spreadsheets testing, inspection and auditing procedures in organisations. However we should not be excessively concerned about it by blindly believing that advanced technologies always produce error-free results.

## 9.5 Conclusions and implications

This research investigates the use of spreadsheets in budgeting from the concepts of conflict and contradiction in ST in order to explain how and why spreadsheets are used or not used in budgeting practice. Budgeting is deemed as a social practice which entails flexibility and integration for decision-making. Spreadsheets, on the contrary, are an IS technology used to support budgeting. The analysis at the activity level guided by the concept of *conflict* reveals that spreadsheets are heavily used in all the four main budgeting activities (budget construction, budget consolidation, budget monitoring and budget reporting) in relation to the flexibility and integration domains discussed earlier. The analysis shows that spreadsheets can support flexibility in decision-making because other advanced IS technologies tend to put a limit on what business controllers can do in their decision-making processes. However, the analysis highlights a serious problem with the use of spreadsheets for the integration domain. This is because spreadsheets are extremely error-prone and inefficient for business controllers. Other advanced IS technologies have a much better capacity to assist the integration function than spreadsheets. The analysis at the structural level concludes that there is a contradiction between spreadsheets and budgeting. This is because spreadsheets only have the potential to support the flexibility domain, but budgeting constantly requires both flexibility and integration domains. This study posits that spreadsheets are extremely popular among business controllers for budgeting purpose because of the flexibility that they provide. However in most companies, such flexibility is over utilised to support inappropriate activities in budgeting such as budget consolidation and budget monitoring. In these two activities, organisations are better off applying advanced IS technologies like the ERP system and/or the BI which provide state-of-the-art integration capabilities. With

regards to the criticisms on information inaccuracy that are typically found in spreadsheets literature, this chapter purposes organisations to implement three necessary steps to reduce errors and reinforce best spreadsheets practices which are testing, inspection and auditing.

This research offers a key message to the AIS community that IS technology application in organisations is more about the suitability of the IS technology in question to the specific organisational task aimed for. No single IS technology is good or bad in itself. Against the contemporary idea that spreadsheets are not suitable for organisational task executions, this research has shown that spreadsheets are actually more appropriated than other advanced IS technologies to support the budgeting activities that require flexibility, i.e., budget construction and budget reporting, but careful considerations and policies must be paid to spreadsheet testing, inspection and auditing. However when it comes to the integration activities, advanced IS technologies are much more appropriate.

What practitioners can learn from this key message are: first, they should reduce their reliance on spreadsheets especially in the budgeting process. Even though it is probably not possible to totally eliminate spreadsheets, other advanced IS technologies can be implemented to reduce the role of spreadsheets especially in relation to the integration function. Second, companies should set out to test, inspect and audit their spreadsheets in order to reduce the problem of information inaccuracy presented from spreadsheets, which is the major concern in many new regulations governing the twenty-first century organisations, such as the Sarbanes-Oxley Act.



# Part IV: Conclusions and implications



# 10. Concluding discussions

This final chapter is arranged into four sections in order to provide essential concluding discussions to end this dissertation. Section 10.1 provides conclusions of the research results according to the two main research questions. Section 10.2 endeavours to demonstrate the contributions that this research has made in relation to the overall research purpose introduced. Section 10.3 concludes with how the insights generated in this dissertation can be applied to real life practice in support of the flexibility and integration needs in budgeting. The chapter ends with section 10.4 on limitations and suggestions for future research.

## 10.1 Revisit the research questions

This section presents discussion on the research results according to the two main research questions posed in section 1.4.

*RQ1: How do business controllers perceive IS technologies in relation to the need for both flexibility and integration in budgeting?*

Chapters 4 and 5 answer the research question through a sequential yet mutual investigation of the flexibility and integration concepts in budgeting. First, chapter 4 opens the scene with a discussion of these two concepts using a secondary data analysis. The chapter suggests the idea that business controllers acknowledge that different types of IS technologies enable and constrain them in relation to their quests to achieve flexibility and integration in budgeting. Chapter 5 further analyses that the needs for flexibility and integration in budgeting can be examined under four domains; organisation-in-focus, personal requirement, business requirement and reporting requirement. It further confirms that both flexibility and integration are needed in budgeting but for very different reasons. As a result, these four main domains in budgeting between flexibility and integration poles are in constant conflict with each other.



In answer to RQ1, it can be concluded that business controllers perceive IS technologies to enable and constrain their flexibility and integration needs in budgeting. These two needs are constantly represented in the form of a contradictory relationship between them in four domains: organisation-in-focus, personal requirement, business requirement and reporting requirement. The concept of “contradiction” between flexibility and integration is further analysed in the next research question to determine IS technology use practice.

*RQ2: Why do business controllers use IS technologies to support the need for both flexibility and integration in budgeting?*

Chapters 6, 7, 8 and 9 mutually provide an answer to this research question. Chapter 6 confirms the assumption that no single IS technology is enough to support an entire budgeting process. The problem of accounting solution non-use in budgeting is persistent regardless of a company choice to adopt the ERP system, the hybrid ERP or BoB. The remaining chapters build upon this insight to further investigate the three main IS technologies commonly known to be used in budgeting -ERP system, BI and spreadsheets respectively. The use of ERP in budgeting (chapter 7) is not significant because the system cannot support the need for flexibility in budgeting. BI use (chapter 8) in budgeting is rather disappointing. Generally the system is mainly employed to support routine reporting. There is limited use of the system to support either the flexibility or the integration domains. This is because of BI's poor capability to respond to the flexibility in budgeting as well as BI's poor enterprise architecture design which does not support the integration in budgeting. Spreadsheets (chapter 9), the last IS technology investigated, are the most significant IS technology employed to support budgeting for both the integration and flexibility domains. Spreadsheets are popular because they offer a full flexibility to business controllers. Spreadsheet use is against a commonly cited best practice that spreadsheets should not be applied to support the integration function due to the potential for errors and frauds. It is deemed that spreadsheets should only be used to support the flexibility needed in decision-making related activities. This is because they allow business controllers to insert and model data according to their interpretations of business problems.

To sum up the response to RQ2, spreadsheets are the main IS technology that organisations rely on to support both flexibility and integration needs in their budgeting process despite the availability of advanced IS technologies like ERP system and BI. These IS technologies are mainly employed to support the integration function as they do not allow enough flexibility to business controllers like spreadsheets. It can be concluded that the three types of IS technology are commonly found to support budgeting processes. However it is essential for business controllers to rethink how they should apply a particular IS technology to support a particular activity in budgeting. This is because the current use practice, which is overly dependent on spreadsheets and under-dependent on the ERP system and BI, is problematic and far from being ideal. This point will be further discussed in section 10.3 on implications as to how business controllers should insightfully apply these IS

technologies in a complementary manner. The next section describes the contributions of this dissertation.

## 10.2 Contributions

The contributions that this dissertation makes may be delineated into three broad streams: the theoretical contributions, the methodological contributions and the practical contributions.

As discussed earlier, in chapter 2, this dissertation posits three new theoretical contributions as it applies ST concepts in a new context. First, it demonstrates how the concept of human agency in ST can be applied to study business controllers' interpretations of IS technologies in relation to the flexibility and integration domains in budgeting (RQ1). Second, this dissertation posits how the concept of "human and machine agency in ERP use" can be applied to study the use and non-use of various types of accounting solutions (ERP, hybrid ERP and BoB) beyond its original scope which was the ERP system alone (RQ2). Third, this dissertation posits how the concept of contradiction in ST can be applied to study business controllers' use and non-use of IS technologies in relation to the flexibility and integration domains in budgeting (RQ2).

On the methodological contributions which are connected to chapter 3, this dissertation makes three new methodological contributions as it applies the following research design choices to the study. First, this dissertation demonstrates that the interpretivism paradigm is appropriate given the research aim and questions to describe and explain how IS technologies can be complementarily used to support the flexibility and integration needs in budgeting processes (RQ1 and RQ2). Second, this dissertation demonstrates that the qualitative method is appropriate in the context of the research aim and questions to describe and explain how business controllers perceive and use IS technologies in relation to the flexibility and integration needs in budgeting (RQ1 and RQ2). Third, this dissertation demonstrates that the multiple case study research design is appropriate in the context of the research aim and questions to construct a theory to describe and explain how IS technologies can be used complementarily to support the flexibility and integration needs in budgeting processes (RQ1 and RQ2).

Lastly the following practical contributions are made in this dissertation. First, chapter 4 in this dissertation describes, according to RQ1, through the concept of human agency in ST that business controllers interpret IS technologies to enable and constrain their needs for flexibility and integration in budgeting. Second, chapter 5 in this dissertation explains, according to RQ1, through the concept of human agency in ST that the needs for flexibility and integration in budgeting IS technologies are in

constant conflict with each other. These conflicts can be explained from four domains: organisation-in-focus, personal requirement, business requirement and reporting requirement. Third, chapter 6 in this dissertation describes, according to RQ2, through the concept of “human and machine agency in ERP use” that business controllers do not use the main accounting solutions, whether in the form of the ERP system, the hybrid ERP or BoB, to support budgeting process. Fourth, chapter 6 in this dissertation explains, according to RQ2, through the concept of “human and machine agency in ERP use” that non-use of the main accounting solution is due to a misfit between business controllers’ intentions and accounting solutions’ functionality. Fifth, chapters 7, 8 and 9 of this dissertation, in line with RQ2, describe through the concept of contradiction in ST that the three IS technologies – ERP system, BI and spreadsheets – should be used in complement to support the needs for flexibility and integration in budgeting processes. Sixth and last, chapters 7, 8 and 9 of this dissertation, in line with RQ2, explain through the concept of contradiction in ST that no single IS technology – whether it is the ERP system, BI or spreadsheets – is sufficient in its own right to support the needs for flexibility and integration in the budgeting process. Chapter 7 demonstrates and explains that the ERP system is strong in supporting the integration domain but not the flexibility domain. Chapter 8 demonstrates that BI should have the capability to support both the flexibility and integration domains but no significant use of BI to support these domains can be confirmed. Chapter 9 demonstrates that spreadsheets can support the flexibility domain but not the integration domain.

These contributions serve as the ground for the recommendations which will be presented in the next section as to how business controllers can apply these findings to further enhance their practice regarding IS technology in budgeting.

### 10.3 Implications

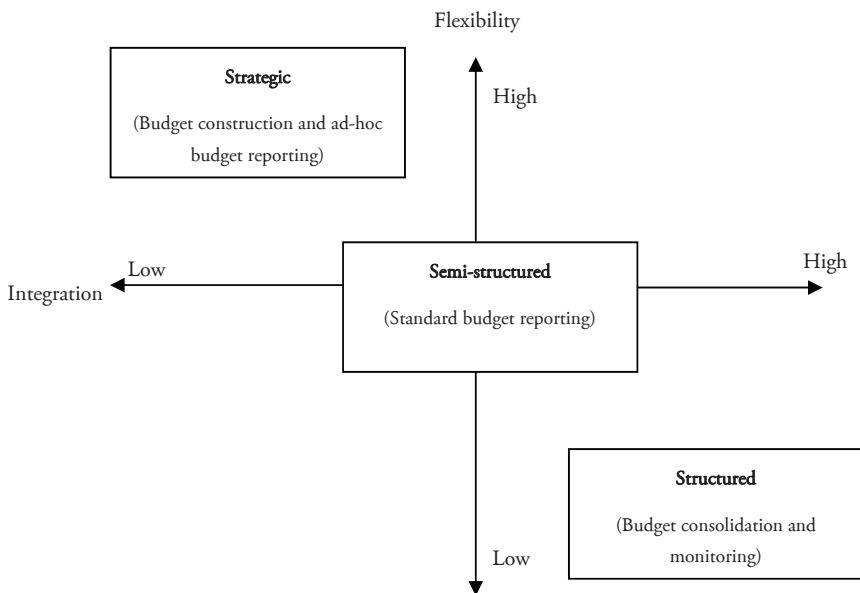
The six contributions posited in the previous section can be used to construct a theory to describe and explain how IS technologies can be used complementarily to support the needs for flexibility and integration in budgeting processes according to the overall research purpose, as follows.

The needs for flexibility and integration in budgeting can be used to form three characteristics of budgeting activities that business controllers experience in the budgeting processes. Gorry and Scott Morton (1971) propose an idea which can be further built on in connection to the budgeting context and the research results found that there are three types of activities in organisations: structured, semi-structured and strategic. Applied in the context of this dissertation, three characteristics of budgeting activities can be set up based on an interplay of the needs for flexibility and

integration in budgeting: structured (High: Integration, Low: Flexibility), strategic (Low: Integration, High: Flexibility) and semi-structured (Medium: Integration, Medium: Flexibility). Figure 10.1 illustrates these ideas.

In the first type, the structured activities in budgeting are characterised by precision and known principles. Discussed in relation to the four main budgeting activities suggested throughout the dissertation (section 1.1.2), budget consolidation and budget monitoring belong to this category. This is because the generally accepted accounting principle (GAAP) thoroughly prescribes how departmental budgets should be consolidated. Apart from that, budget monitoring is pretty much straightforward as business controllers continuously compare actual results in comparison with the predetermined budget numbers. For these activities, advanced IS technologies such as ERP systems and BI should be deliberately applied to assist the work processes since they offer a high degree of integration between budget numbers according to what the activities need.

**Figure 10.1 The complementary use of IS technologies to support budgeting**



In the second type, strategic activity, the budgeting activities are characterized with ambiguity and unknown principles. Discussed in relation to the four budgeting activities posited, budget construction and ad-hoc budget reporting<sup>10</sup> belong to this category. The budget construction process is always at best an informative guess into the future business operation. Therefore they are many known and unknown external factors to be accounted for in order to forecast business results purposefully. Therefore BI is recommended to support the budget construction activity because it allows business controllers to model data and information according to their interpretations of the business situations. In addition to that, BI also provides a constructive and verifiable information set to be included in the budgeting construction activity. For the second activity, ad-hoc reporting, BI should be deliberately applied to support this activity. The nature of ad-hoc reporting is similar to the budget construction activity in the sense that external information is often taken into account in order to make a unique, one-off business decision. Therefore the same argument to use BI applies. Please note that standard reporting like a variance analysis is not included in this category but it will be discussed next.

The last type of semi-structured activity requires a degree of both flexibility and integration. In connection to the four main types of budgeting activities, standard reporting like variance analysis falls into this category. Variance reporting needs a capacity for both integration and flexibility at the same time. Lack of access to either capacity will result in inefficiency and/or inaccuracy. Variance analysis needs the integration capacity to compare predetermined budget numbers with actual operating results. Variance analysis also needs the flexibility capacity in order to investigate why a variance happens based on many informational clues available online and offline. To tackle variance analysis, BI is recommended. This is because BI (based on a proper enterprise architecture design) possesses a strong capability to retrieve data and information from various sources. The strong integration capability coupled with the moderate flexibility capability is most suitable for variance analysis.

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<sup>10</sup> The literature has suggested there are two main types of reporting activities, ad-hoc and standard reporting. In consideration of the three types of activities suggested in Gorry and Scott Morton (1971), I deem it more appropriate to split the reporting activities into ad-hoc reporting and standard reporting accordingly. This is because the nature of information and the way business controllers work with these two types of reporting are dissimilar to one another.

## 10.4 Limitations and future research

This dissertation represents limitations in three main areas that future research endeavours can pursue. First, this dissertation is geographically limited to only Thailand. Unfortunately, the result may not be relevant to other countries or settings. Therefore, there is a good research opportunity to conduct a comparable study in either a similar setting to that of Thailand, i.e., in other Asian countries, or in a dissimilar setting, i.e., in Western countries. The purpose to conduct a comparable study is to verify whether similar business controllers' interpretation and use of IS technology in budgeting are present in other settings. Second, case study which is the main research method pursued in this dissertation represents another limitation. Case study, by definition, makes no claims to be typical as the nature of a case study is based on studies of small, idiosyncratic and predominantly qualitatively data. Therefore, the result produced from a case study method should not be popularised to any larger population. As a result, the results presented in this study should be interpreted with a very careful attention. A future research opportunity arises from this limitation is that future research can approach a similar topic from a different method in particularly a quantitative questionnaire on business controllers' interpretation and use of IS technologies. Third, ST, as the main theory employed in this dissertation, also represents a limitation. The focus of ST is on the human agencies and how they make sense of the world around them. By focusing on ST, this dissertation ignores many other views which might also be useful to describe and explain the phenomenon intended to investigate. Other theories such as ANT and the dialectic process theory might be as well considered the guide a future research. ANT gives an equal important to humans and artifacts since the theory does not consider any difference between them. The dialectic process theory moves away from the traditional human and/or artifact debate. The theory is based on an assumption that organisations comprise of at least two conflicting systems, forces or values which compete with each other for domination and control. The theory offers a promising potential in this research topic because the theory assumption fits very well with the contradictory forces presented in a budgeting process, i.e., the flexibility and integration needs in budgeting.



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# Appendix A: Company descriptions

The purpose of this appendix is to provide thorough contextual descriptions of all of the sixteen case companies studied in this dissertation.

The first group of companies discussed is companies in the BoB category. These first five companies are presented in Table 3.2 as ConsumerGood, RealEstate, HotelChain, HotelBeach, and FrozenFood respectively (numbers 1–5 in Table 3.2). These companies also represent an initial data collection which took place in autumn 2010 during which an explorative study was conducted (see: chapter 6). In order to approach these companies, I first looked at the companies' profiles available on the Internet, then I directly contacted these companies, especially the accounting managers, in order to find out if it would be possible to conduct a study with them. The following paragraph describes the companies.

The first company, ConsumerGood, is a global consumer packaged goods manufacturer specialising in soap and shampoo products. The branch approached in this study is located in Bangkok, Thailand. The company is experiencing a high level of market competition and a slow yet stable growth rate. SAP ERP management software, which also includes an accounting module, is implemented company-wide. Budgeting data is communicated to the global headquarters through the assistance of Hyperion BI. RealEstate, the second company, is an independent housing development company in the south of Thailand. It builds and sells detached houses and commercial buildings for the medium to low end of the market. Due to its small operation and stable market conditions, the company only employs the packaged Express accounting software for management purposes. The third company, HotelChain, is a worldwide hotel management company which has a regional head office in Thailand. It manages a wide range of hotel brands from budget to luxury brands. The company offers hotel franchises and provides human resources, marketing, management, and consulting services to franchisees in return for a fee based upon gross operating incomes (GOI). HotelChain adopts and encourages its franchisees to employ a standard Micros Fedilio property management system and SunSystems accounting software. The fourth company, HotelBeach, manages two three-star hotel properties at a popular resort destination in Thailand. One hotel is operated under its own brand; the other is under HotelChain's brand. Altogether it

operates five hundred hotel rooms, with restaurants, bars, shops, and spas. The company uses the Micros Fedilio system for hotel management purposes but adopts the packaged Carmen system for accounting. The fifth company, FrozenFood, is a leading frozen seafood processor and exporter in Thailand. It implements an integrated supply-chain strategy from fishing and processing to sales and marketing. Most sales are from contracted manufacturing for US and European markets. It employs a mix of in-house and packaged software for various purposes and integrates them all in order to create a system which best fits its unique requirements. For accounting, it adopts the Alpha<sup>11</sup> packaged accounting software.

The organisations presented in the initial study differ significantly in size. RealEstate falls into the definition of small and medium-sized enterprises (SMEs). The remaining companies are major business operations in Thailand. The size difference is presented due to the fact that the main objective of the initial data collection round was to compare the difference between BoB and ERP organisations. Although some major organisations such as HotelChain, HotelBeach and FrozenFood have not yet developed a full ERP application, as is the case with ConsumerGood, they have integrated their BoB applications with other business solutions to create their own approach to the ERP system. They are referred to as the hybrid ERP companies in Chapter 6 (Uppatumwichian, Johansson, and Carlsson 2011).

The second group of companies discussed is companies in the ERP system, BI and spreadsheet categories which are presented in chapter 5, 7, 8 and 9. This group of companies also represents the second data collection which was conducted with eleven companies in summer-autumn 2011. The eleven case companies presented (companies A–K in Table 3.2) are listed on the stock exchange. To access these companies, I received help from many organisations such as the Thai-Swedish Chamber of Commerce, the Association of Thai Securities Companies and other key contact persons. An initial telephone inquiry was made with every potential organisation. In total I contacted about fifteen organisations, however only eleven of them agreed to participate. The succeeding paragraphs describe the nature of these case organisations.

The first group (companies A, B and C) belongs to the energy industry. They are the backbone of the Thai energy production chain. Company A is one of Thailand's leading power plant companies. It supplies nearly a quarter of the nation's energy demands. The main power plants are located in Thailand but some of the plants are located in neighbouring countries to serve both foreign and domestic energy demands. The company also invests in a number of power plant operations in the

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<sup>11</sup> This is a fictional software name. The real software name is removed and replaced with this fictional name to protect the identity of the case organisation.

Pacific region to diversify operational risks. Regarding IS policy, the company has been using SAP ERP to serve the main accounting function for more than ten years. It also encourages holding companies as well as newly acquired companies to do the same. For budgeting, it relies on spreadsheets and employs Magnitude BI to collect actual financial data from holding companies. At the time of data collection, there is no future plan to test or install any other software for budgeting purposes. Company B is Thailand's biggest energy conglomerate and conducts many energy-related activities such as offshore exploration and production of oil and gas. It also specialises in the distribution and transportation of oil, gas and petrochemicals and owns petrol stations. Though the company's main operations are in Thailand, a substantial number of business transactions are conducted internationally. Company B can be said to be one of the biggest SAP ERP users in the Southeast Asia region. The company installed and has used SAP ERP as the main accounting software for more than eight years, whilst also using other operational software. Due to a massive number of business transactions as well as complicated business structure and operations, the company has introduced Cognos BI for budgeting over the last two years. The installation process is not yet complete but the majority of budgeting transactions have already begun in the Cognos BI software. Company C operates several oil refinery plants in Thailand. The business model is sensitive to the fluctuation of crude oil prices because the business revenue relies on a dollar-per-barrel margin between product revenues (such as oils and petrochemicals) and the cost of crude oil. This company has long been using SAP ERP for accounting and other operational functions. At the time of data collection, the company had recently upgraded to SAP ERP ECC 6.0 and was in the process of configuring SAP ERP for cash-flow budgeting. Other budgeting activities still rely on simple spreadsheets.

The second group (companies E, F, D and G) is categorised under the food industry. Company E is a Thai business unit of a global food company. It owns many well-known beverage and dairy products and operates many production facilities in Thailand. The majority of food products produced is for both domestic and international markets. However due to high transportation costs, the export markets are mainly within the Southeast Asia region. In terms of IS technologies, the company has installed and used SAP ERP as the main operational and accounting/finance software since 2000. Budgeting processes are supported by spreadsheets. The actual financial information is communicated to the respective foreign headquarters through Magnitude BI. In addition to the existing IS technologies, the foreign headquarters is conducting the pilot phase of its own budgeting BI which was launch in Thailand by the end of 2012. Company F is a Southeast Asia business unit of the world's leading soft-drink company. Located in Thailand, the company oversees business operations in the Southeast Asia region and communicates the operational results back to the global headquarters. The company has been an active user of SAP ERP for accounting/finance and other operation functions for more than ten years. Recently the company installed a new BI solution of its own for budgeting processes on a



global scale. The in-house BI solution is primarily for use by regional business units (e.g. the Southeast Asia business unit located in Thailand) to report budgeting information back to the global headquarters. However, the majority of budgeting processes are still performed through spreadsheets, especially at the country level that the business unit oversees. Company D is a Thai-based food manufacturer which supplies frozen food products worldwide and is the leader in the US, the UK and European markets. The company operates an entire frozen food supply chain, from fishing and processing to marketing. Though the business description is similar to that of the FrozenFood company presented in the initial data collection, it is not the same organisation. Company D has used SAP ERP for accounting and manufacturing functions for eleven years. The budgeting functions are carried out in spreadsheets, however the company is constantly looking for opportunities to implement BI application in order to support the budgeting process. Company G, the last company in the food industry, engages in a production supply chain of agricultural products. It includes activities such as livestock and poultry farming, compound feeds, veterinary medical supplies, slaughterhouses, food processing facilities and sales and marketing. Finished products are labelled under its own brand and are marketed domestically and internationally. Company G has been a BCPS ERP user for more than twenty years.

The remaining four companies (companies H, I, J and K) represent diverse industries. Company H is the Thai business unit of a worldwide automobile brand. The company markets, sells and services trucks in Thailand. This company has implemented and used SAP ERP for accounting functions since the turn of the millennium. There is no specific system other than spreadsheets which can support the budgeting function. However the company has a positive attitude toward an adoption of BI applications. Company I is a Thai original equipment manufacturer (OEM) of automobile parts for many known private vehicle manufacturers. It owns a number of manufacturing facilities throughout the country. It produces automobile parts according to specific customer requests and does a great deal of business with Japanese car manufacturers. The company has operated SAP ERP for two years in order to support all business functions including accounting and finance. At the time of data collection, the company had just rolled out an in-house developed budgeting BI to support budget submissions from related entities. Company J is an international electronics organisation which specialises in household appliances. It markets, sells and services household appliances to final users. A sister company is responsible for the production of these appliances, however it also subcontracts and imports certain specialised appliances from abroad depending on the specific nature of particular products. This company has used a JD Edwards ERP system for more than ten years and also utilises the ERP system used in all Southeast Asian companies. Over the next few years the company plans to upgrade from JD Edwards ERP to SAP ERP, which is the platform adopted at the global headquarters. There is no specific software to support budgeting except for spreadsheets, however budgets and actual operational

results are submitted to the regional headquarters through a web based application called Web Brase.

The last company, company K, is a division of a Thailand-based hospitality conglomerate. It operates many five-star hotels, resorts and serviced apartments both domestically and internationally. It manages a number of five-star facilities through franchise and joint-venture agreements depending on the specific agreements set up for each property. Although the company descriptions are similar to that of the HotelChain company, please note that they are not the same organisation. With regard to the IS technology structure, each hotel property which company K manages must install a Micros Fedilio property management system and an Oracle ERP system for accounting and financial modules. Information from these systems is connected through a central database system. Budgeting is performed mainly in spreadsheets, however IDEaS BI application is used to support certain data analysis especially for the variance analysis.



# Appendix B: Interview guide

The interview guide is developed according to an amended management control framework (MCS) developed by Uppatumwichian and Johansson (2011). The framework is adapted from a viable system model (VSM) invented by Stafford Beer. The adapted MCS is used in union with ST especially for empirical data collection. The paper concludes that the VSM application in MCS overcomes the limitations in existing MCS frameworks such as the levers of control framework (Simons 1994) and the performance management system (Ferreira and Otley 2009). The MCS addresses the relationships between formal and informal sub-control components across all of the organisation's levels. It also shows that IS technologies can be regarded as tools ("ERP as a database") and social systems ("ERP as a system"). A business controller's choice to bypass an ERP system in budgeting reduces the role of the ERP system from a social system to a simple database.

These questions are structured based on the five systems suggested in the adapted MCS. The first system concerns the nature of business operations that organisations are undertaking in order to understand how the organisations might need to operate and adapt to external environments. These include information such as production units for services and products, market segments, and target markets etc. in order to ensure its independence and survival. The second system articulates any coordination activities in organizations. It focuses on the IS technologies used in organisations. It adopts a limited IS technology definition in organisations (Dechow and Mouritsen 2005) that IS technologies are fundamentally acting as databases in organisations because their main function is to work as a big coordinating calculation machine. The first and the second systems correspond to Anthony's (1965) category of operational control which concerns the lower operational management.

The third system pays specific attention to the budgeting process. Budgeting is where the executive functions take place and important resource-allocation decisions are made. Therefore budgeting is often the mechanism introduced in this system to assist the resource-allocation processes. The third system on budgeting is formulated according to Anthony's category of operational control which is the direct responsibility of middle management.

The fourth system focuses on the strategic management of organisations which aims to sculpt the future organization according to its environment (Leonard 2009). The

fifth system directs attention toward normative management in order to promote organisational identity through norm, value and rule managements. The fourth and fifth systems comply with Anthony's category of strategic planning activities which are the direct responsibility of top management.

The following shows the list of interview questions used in the interviews with business controllers which are framed according to the five systems explained in the previous paragraphs.

- The first system on business organisations: How do you describe your business organisation?
- The second system on IS technologies as databases: What IS technologies are used in relation to budgeting procedure?
  - What are the histories of these IS technologies? (e.g., ERP, BI and spreadsheets)
  - What is the length of use of these IS technologies?
  - What are the modules implemented?
  - How do/did top management support IS technology implementation?
  - What is the user's attitude toward IS technologies?
- The third system on budgeting: What are the budgeting procedures in your organisation?
  - What is the length of budget preparation?
  - What are the roles and responsibilities of the accounting/financial department in the budgeting process?
  - What are the characteristics of pre-budget information gathering and analysis?
  - How does your business organisation prepare a revenue budget?
  - How does your business organisation prepare an expense budget?
  - How does your business organisation prepare a cash-flow budget?
  - How does your business organisation consolidate its budget?
  - What are advantages and limitations of IS technologies used in budgeting?
  - What are the roles and responsibilities of the accounting/finance department in reporting?
  - What are the advantages and limitations of IS technologies used in reporting?
  - What are the roles and responsibilities of the accounting/finance department in variance analysis?
  - What are the advantages and limitations of IS technologies used in variance analysis?
  - What are (if any) the budgeting innovations adopted in your organisation? These include for example rolling forecasts (outlook), profit planning, activity based costing, valued based management and zero-based budgeting.
  - What are the advantages and limitations of IS technologies used in budgeting innovation?

- The fourth system on strategic management: How does your organisation direct strategic management?
  - What are the mission and vision statements?
  - What are the general future directions for the organisation?
- The fifth system on normative management: How does your organisation control normative management?
  - What are the general norms and organisation cultures in your organisation?
  - What are the rules of thumb in budgeting



# Appendix C: Journal ranking

This appendix presents a review of academic journal ranking in accounting, accounting IS and IS separately. The journals that constantly appear in this review in their own respective disciplines are those selected for journal reviews in chapter 4. The selected journals from the accounting discipline (Table 0.1) are: *Accounting, Organizations and Society*, *Journal of Accounting Research*, and *The Accounting Review*. The journals selected from the AIS discipline (Table 0.2) are: *International Journal of Accounting Information Systems* and *Journal of Information Systems*. Finally the journals selected from the IS discipline (Table 0.3) are: *Information and Management*, *Journal of Management Information Systems*, and *MIS Quarterly*. In total eight journals were selected for the review process.



Table 0.1 Journal ranking in the accounting discipline

	Journal	Abbreviation	Selected for the review?	Accounting discipline			
				Chan et al. (2009)	Herron and Hall (2004)	Lowensohn and Samuelson (2006)	Bonner et al. (2006)
1	Accounting, Organizations and Society	AOS	Yes	X	X	X	X
2	Behavioral Research in Accounting	BRA	-	X	-	-	-
3	Journal of Accounting Research	JAR	Yes	X	X	X	X
4	Journal of Cost Management	JCM	-	X	-	-	-
5	Journal of Information Systems	JIS	-	X	-	X	-

6	Journal of Management Accounting Research	JMAR	-	X	X	X	X	-
7	MIS Quarterly	MISQ	-	X	-	X	X	-
8	The Accounting Review	TAR	Yes	X	X	X	X	X

Table 0.2 Journal ranking in the AIS discipline

	Journal	Abbreviation	Selected for the review?	Accounting information systems discipline		
				Poston and Grabski (2000)	Baldwin et al. (2000)	Hurchison and Hunton (2012)
1	Accounting Management and Information Technology	AMIT	-	X	-	-
2	Advances in Accounting information systems/ International Journal of Accounting Information Systems <sup>12</sup>	AAIS/ IJAIS	Yes	X	X	X
3	International Journal of Intelligent Systems in Accounting, Finance and Management	IJISAFM	-	X	-	-
4	Journal of Information Systems	JIS	Yes	X	X	X

<sup>12</sup> *Advances in Accounting Information Systems* and *International Journal of Accounting Information Systems* are the same journal. The journal bore the first title until 2000 when the journal title changed to *International Journal of Accounting Information Systems*.

Table 0.3 Journal ranking in the IS discipline

	Journal	Abbreviation	Selected for the review?	Information systems discipline		
				Willocks et al. (2008)	Nord and Nord (1995)	Lowry et al. (2004)
1	Communications of the AIS	CAIS	-	X	-	-
2	Database	DB	-	X	-	-
3	Decision Support Systems	DSS	-	X	-	X
4	European Journal of Information Systems	EJIS	-	X	-	-
5	IEEE Transactions on Engineering Management	-	-	X	-	-
6	IEEE Transactions on Knowledge and Data Engineering	-	-	X	-	-
7	IEEE Transactions on Software Engineering	-	-	X	-	-
8	Information and Management	IM	Yes	X	X	X
9	Information and Organization	IO	-	X	-	-

10	Information Systems Frontiers	ISF	-	X	-	-
11	Information Systems Journal	ISJ	-	X	-	-
12	Information Systems Research	ISR	-	X	-	X
13	IT and People	IT&P	-	X	-	-
14	Journal of Accounting Information Systems	J AIS	-	X	-	-
15	Journal of End User Computing	JEUC	-	X	-	-
16	Journal of Information Technology	JIT	-	X	-	-
17	Journal of Management Information Systems	JMIS	Yes	X	X	X
18	Journal of Strategic Information Systems	JMIS	-	X	-	-
19	MIS Quarterly	MISQ	Yes	X	X	X
20	Scandinavian Journal of Information Systems	SJIS	-	X	-	-
21	Social Science Computer Review	SSCR	-	X	-	-
22	The Information Society	IS	-	X	-	-

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