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# The relationship between ERP systems and budgeting: Uncovering the limited ERP system impact on budgeting

## ABSTRACT

This paper investigates the relationship between enterprise resource planning (ERP) systems and budgeting to address the limited impact of ERP systems on management accounting. Budgeting is considered as a social phenomenon which requires *flexibility* for decision-making and *integration* for management controls. The analysis at the activity level, 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 in management controls. The analysis at the structural level, guided by the concept of 'contradiction' in ST, concludes that there is a contradiction between them because ERP systems operate in terms of integration alone while budgeting assumes both roles. This research offers three new insights. First it offers a theoretical contribution by employing new theory. Second it offers empirical insights on the limited impact of ERP systems on budgeting. Third it shows how other IS technologies supplement them.

## Keywords

structuration theory, budgeting, ERP system, contradiction.

## INTRODUCTION

A number of researchers have stated that there is a limited amount of research on the impact of enterprise resource planning (ERP) systems on business controllers (or management accountants) and management accounting (Granlund, 2011; Scapens and Jazayeri, 2003). Research on business controllers suggests that the ERP systems transform business controllers from *bean counters* to *business partners* due to improved information processing capacity (Granlund and Malmi, 2002; Scapens et al., 2003). On the contrary, research on the impact of ERP systems on management accounting determines that the ERP systems have a *limited* impact on management accounting practices (Grabski, Leech and Schmidt 2011; Granlund et al., 2002). For example, Jack and Kholeif (2008) conduct a study of ERP implementation in an Egyptian organisation. They conclude that the ERP system does not change management accounting practice ex-post. This is consistent with results from Australia (Booth, Matolcsy and Wieder, 2000), Finland (Chapman and Kihn, 2009; Granlund et al., 2002; Hyvönen, 2003; Kallunki, Laitinen and Silvola, 2011) and Denmark (Rom and Rohde, 2006).

Several researchers have in particular called for more research contributions on the impact of ERP systems on management accounting, and especially on how the system might have an impact on decision-making and management control functions (Granlund, 2011; Rom and Rohde, 2007). This paper responds to that call by focusing on the impact of ERP systems on budgeting. It is considered to be the most suitable social phenomenon under investigation in response to the aforementioned research call because it is a longstanding control procedure (Davila and Foster, 2007) which continues to soar in popularity among modern organisations (Libby and Lindsay, 2010). Besides, it assumes the dual roles of management control and decision-making (Abernethy and Brownell, 1999).

Budgeting is considered as a *process* undertaken to achieve a quantitative statement for a defined time period (Covaleski, Evans, Luft and Shields, 2006). A budget cycle can be said to cover activities such as budget construction, consolidation, monitoring and reporting. The levers of control (LOC) framework<sup>1</sup> (Simons, 1994), a popular management control system framework, suggests that budgeting can be used *interactively* for decision-making and *diagnostically* for management control purposes. This is in line with modern budgeting literature (Abernethy et al., 1999; Frow, Marginson and Ogden, 2010) whose

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<sup>1</sup> The LOC framework is used in this research according to the previous interpretation in budgeting research, namely Abernethy, M.A., and Brownell, P. "The role of budgets in organizations facing strategic change: an exploratory study," *Accounting, Organizations and Society* (24:3) 1999, pp. 189-204. Therefore the author omits the two remaining control systems mentioned in the original LOC; *the boundary system* and *the belief system*, since it is deemed that they are not directly related to budgeting.

interpretation is that budgeting assumes the dual roles. However, the degree of combination between these two roles varies according to management's judgements in specific situations (Simons, 1994).

This dual role requires budgeting to be more *flexible* for decision-making yet *integrative* for management control. Flexibility is defined, in the context of this study, as business controllers' discretion to use IS technologies for budget-related decision-making (Ahrens and Chapman, 2004). This is a direct response to contingency factors (Chenhall, 2003) and intense competition (Frow et al., 2010) which characterise today's decision-making. Integration, on the contrary, is defined as an adoption of IS technologies to standardise data definitions and structures across data sources (Goodhue, Wybo and Kirsch, 1992). This is directly aimed to support efficient management control functions (Chapman et al., 2009).

Given the research gaps addressed and the flexible yet integrative roles of budgeting, this paper seeks to uncover the complex relationship between ERP systems and budgeting so as to discover why the ERP systems have only a limited impact on budgeting.

The flexible yet integrative roles of budgeting fit into the contradiction discussion in social sciences research. For example, Robey and Boudreau (1999) elaborate how modern theories such as institutional theory and organisational learning theory employ a *logic of opposition*. From a similar logical frame, this paper looks into the concept of *contradiction* in structuration theory (ST) in which Giddens, the founder of ST, explicitly suggests: "don't look for the functions social practices fulfil, look for the *contradiction* they embody!" (1979, p.131). The theoretical background section provides further discussion on the contradiction concept in ST.

This paper proceeds as follows. The next section discusses the concepts of conflict and contradiction in ST. Then it constructs propositions guiding this research. After that, it deliberates on the research method and case companies contained in this study. Subsequently, it proceeds to data analysis based on the concepts described earlier. It ends with conclusions and research implications.

## THEORETICAL BACKGROUND

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 for uncovering the interplay of people with technology (Poole and DeSanctis, 2004, p.208; Walsham and Han, 1993).

This paper 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 contradiction which 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 used in budgeting. It is deemed that the flexibility (in decision-making) and integration (in management control) 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. Based on these conceptualisations, the next section constructs propositions which guide the research investigation.

## PROPOSITIONS

Guided by the flexible yet integrative roles of budgeting in connection to the ERP system and the concept of 'conflict' in ST, this section formulates propositions from previous literature. A review of literature suggests that studies on ERP systems' impact on flexibility provide an opposing explanation. One research stream concludes that the transactional processing characteristic of ERP hinders unanticipated informational needs. Therefore it reduces user discretion over how the system can be used (Grabski et al., 2011; Hyvönen, 2003; Rom et al., 2006). Another research stream (Cadili and Whitley, 2005; Holsapple and Sena 2003) concludes that the ERP system offers some flexibilities especially at the early installation stages. However, they tend to decrease as the system grows in size and interconnectivities. Based on these opposing conclusions in the literature, the following propositions are proposed.

Proposition 1A: the ERP system *facilitates* flexibility in budgeting

Proposition 1B: the ERP system *impedes* flexibility in budgeting

The key premise of the ERP system is a reference model, which enforces a data definition (Kallinikos, 2004) across organisational units. This view leads to a belief (Quattrone and Hopper, 2005) and a conclusion that the ERP system enables integration and control (Chapman et al., 2009). However, some research opposes this view. For example, Dechow and Mouritsen (2005, p.725) explicitly suggest: “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. In many cases, any other means of integration but IS is more fruitful for organisational control, such as a lunch room observation. Quattrone and Hopper (2006) support this view by suggesting that the ERP system is at best a belief that activities can be integrated by making transactions visible and homogenous. Based on these opposing conclusions in literature, the following propositions are proposed.

Proposition 2A: the ERP system *facilitates* integration in budgeting

Proposition 2B: the ERP system *impedes* integration in budgeting

These propositions will be used to guide the analysis. The next section discusses the research method and the case organisations involved in this study.

**RESEARCH METHOD AND CASE DESCRIPTION**

This study employs a critical research described by Walsham (2005). The primary research design is a multiple case study in which the researcher investigates a single phenomenon (Gerring, 2004), namely the use of IS technologies in budgeting. Eleven for-profit organisations from Thailand are included in this study. To be eligible for the study, these organisations meet the following three criteria. First they have installed and used an ERP system for finance and accounting functions for at least two years to ensure system maturity. Second, they employ budgeting as the main management accounting control. Third they are listed on a stock exchange to ensure size and internal control consistency due to stock market regulations.

Face-to-face interviews with twenty participants in these eleven organisations are conducted in autumn 2011. Each interview lasts for approximately one hour. The participants are business controllers who are directly responsible for budgeting, such as the CFO, business analyst and planning vice president. All those interviewed are recorded, transcribed and analysed in Nvivo8 data analysis software. Coding is performed using a simple two-level theme; epic coding followed with emic coding (Miles and Huberman, 1994). Additional secondary data from annual reports, internal documents and companies’ websites are used to supplement the analysis.

Case	Main Activities	Owner	ERP	Spreadsheets	BI	Web tool
A	Power plant	Thai	SAP	Yes	Magnitude	-
B	Oil and Petrochemical	Thai	SAP	Yes	Cognos	-
C	Oil refinery	Thai	SAP	Yes	-	-
D	Frozen food processor	Thai	SAP	Yes	-	-
E	Drinks and dairy products	Foreign	SAP	Yes	Magnitude	-
F	Drinks	Foreign	SAP	Yes	-	Yes
G	Agricultural products	Thai	BPCS	Yes	-	-
H	Truck	Foreign	SAP	Yes	-	-
I	Automobile parts	Thai	SAP	Yes	-	Yes
J	Electronic appliances	Foreign	JDE	Yes	-	Yes
K	Hotels and apartments	Thai	Oracle	Yes	IDeaS	-

**Table 1. Case Description**

With regard to the case companies, the organisations selected represent core industries of Thailand such as the energy industry (Cases A-C), the food industry (Cases D-G) and the automobile industry (Cases 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 cases, Case J is a Thai business unit of a global household electronic appliance company. Case K is a Thai hospitality conglomerate which operates numerous five-star hotels and luxury serviced apartments through the Asia Pacific region. In terms of IS technologies, all of these companies employ both ERP and

spreadsheets for budgeting functions. However, some have access to additional IS technologies such as BI and web tool. Table 1 provides a clear description of each case organisation. The next section presents data analysis obtained from these organisations.

## ANALYSIS

The analysis is presented based on the theoretical and proposition sections presented earlier. It starts with the 'conflict' between (1) the ERP system and flexibility and (2) the ERP system and integration at the activity level. Later it proceeds to discuss the 'contradiction' between the ERP system and budgeting at a structural level.

### Conflict at the activity level: ERP system and flexibility

*Flexibility*, defined as business controllers' discretion to use IS technologies for budget-related decision-making (Ahrens et al., 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 et al., 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 case company 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 Case I mentions: "I think 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 Case 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 Case G suggests that the ERP system limits what business controllers can do with their budgeting procedures in connection with volatile environments, as 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 cases 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 Cases 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 Case 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 Business Intelligence Manager in Case K comments on why she sees that the ERP system is 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*".

The empirical data suggests that there is a clear conflict between the ERP system and the flexibility required in budgeting activities. All points suggest that the ERP system puts a limitation on what business controllers can or cannot do with regard to flexibility in budgeting. This conflict is clearly addressed by the Financial Planning Manager in Case F who states: "I think SAP [ERP] functions are not flexible enough [for budgeting] but it is quite good for [financial] accounting".

Based on these empirical findings, there is no support for proposition 1A, since the data suggests a support for proposition 1B.

### Conflict at the activity level: ERP system and integration

*Integration*, defined as the adoption of IS technologies to standardise data definitions and structures across data sources (Goodhue et al., 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. The Vice President Information Technology in Case I

elaborates on the importance of integration: “I think integration is significant because before the ERP system we did not have any data to support decision-making. Well I should say that the data was not accurate. The standard terms among factories are not the same. Like when we talked about the term ‘defect’. It meant one thing to one factory and another thing to another factory. Someone said the term ‘defect’ includes everything but someone else argued that it includes this and excludes that. There was no standard definition. When we have the ERP system, it frames a discipline on them so that when they talk about a defect it must include these points A, B and C so they must record these points A, B and C. It frames a category, it frames a definition”.

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 Case B, which uses a mixture of spreadsheets and BI). The CFO in Case 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 a company’s 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 (Cases 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 Cases 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 cases, as it is mentioned in the previous section that budget construction is entirely achieved outside the main ERP system.

In conclusion, the empirical data suggests that the ERP system facilitates data integration from a financial accounting perspective as the data shows that all companies can prepare consolidated financial statements from the ERP systems. At the same time, it also shows that the ERP system has the potential to support information integration between budgets and financial accounting. However, companies have yet to realise this hidden potential of the ERP system. These conclusions are consistent with the result addressed in Kallunki et al. (2011) that the majority of organisations still have separate financial/management accounting controls despite all the potential offered by the ERP systems.

Based on these empirical findings, proposition 2A is accepted while proposition 2B is rejected.

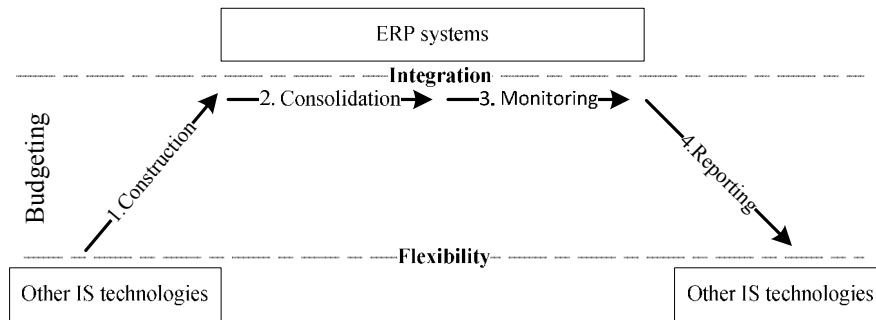
### **Contradiction at the structural level**

Based on the discussions at the two activity levels presented in earlier sections, this section builds on the concept of contradiction in ST and explains how the ERP system is in contradiction with 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. The ERP systems, on the contrary, are shown in earlier discussions to operate in terms of integration but not the flexibility which is also needed in the budgeting process. Indeed, they have the potential to support budget consolidation and budget monitoring activities. However, the data obtained from the eleven case companies as well as the earlier research suggest that companies still have to realise the hidden potential of ERP systems. Figure 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.

So why do the ERP systems support the integration but not the flexibility in budgeting? Despite all the endlessly 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 the systems to

change in response to new business requirements or circumstances because such change is contradictory to the most basic principle of the systems.



**Figure 1. Contradiction between budgeting and ERP system at a structuration level**

So how can we readdress the limitations of ERP systems to support the flexibility needs in budgeting? As Figure 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 the indication from Simons (1994).

## CONCLUSIONS AND IMPLICATIONS

This paper investigates the relationship between the ERP systems and budgeting from the concepts of conflict and contradiction in ST using empirical data from eleven case companies in Thailand. Budgeting is treated as a social practice which portrays the two consecutive but contradictory roles of flexibility and integration. The analysis at the activity level reveals that the ERP systems impede the flexibility domain, but they have the potential to facilitate the integration domain in budgeting. The analysis at the structuration level concludes 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.

The research offers three new insights into the accounting information system (AIS) research community. First, it demonstrates that the use of an existing but largely-ignored theoretical framework can provide a new insight into empirical research. Second, it explains that ERP systems have a limited impact on budgeting because the systems have the potential to support only half of the budgeting activities. The activities supported are related to the integration domain but not to the flexibility domain which is also needed. Third, it explains that business controllers recognise such limitations imposed by the ERP systems and that they choose to rely on other IS technologies to accomplish their budgeting tasks.

For practitioners, this research warns them 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 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.

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