Spreadsheet Use in Budgeting: A Dialectic Process Theory Perspective

Completed Research Paper

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ABSTRACT

In this paper we describe and explain how and why spreadsheets are used in budgeting from a dialectic process theory perspective. It starts with the assumption that there is a tension between local and organizational requirements in a budgeting process. To deal with the tension, business controllers resort to spreadsheets because they give a flexibility to coordinate the organizational and local requirements. However as spreadsheets are primarily developed to support local decision-making, business controllers invent disciplining actions such as template and folder management to accompany spreadsheet use. The research contributes to academia and practitioners in three ways. First, it shows an extensive spreadsheet use in budgeting. Second, it demonstrates how spreadsheets are used to coordinate local and organizational requirements. Third, it warns practitioners and academia about the risks that extensive usage of spreadsheets entails.

Keywords

Budgeting, decision-making, spreadsheets, dialectic.

INTRODUCTION

“The business enterprise of today is no longer an organization in which there are a handful of bosses at the top who make all the decisions while the workers carry out the orders. It is primarily an organization of highly specialized knowledge workers exercising autonomous, responsible judgments. And every one of them [...] constantly makes truly entrepreneurial decisions, that is, decisions which affect the economic characteristics of the entire enterprise” (Peter Drucker in Keen 1997, p.5-6).

The changing landscape in decision-making structure among modern organizations to local units found in the quotation inspired an investigation of the information system (IS) technology use practice in respond to the aforementioned changing landscape. In the context of decision-making, budgeting is one of the classic decision-making processes in organizations (Anthony 1965). Throughout its long standing history, budgeting has always been the prevalent cornerstone process among modern organizations (Hansen Otley and Van der Stede 2003; Libby and Lindsay 2010).

A review of recent practitioner reports (Deloitte 2011; KPMG 2012; PricewaterhouseCoopers 2007) shows that spreadsheets are the prevalent IS technology to support budgeting in leading organizations, despite the availability and proliferation of sophisticated non-spreadsheet IS technologies like enterprise resource planning (ERP) systems and business intelligence (BI). This indication is consistent with academic publications (Granlund 2011; Granlund and Malmi 2002; Panko 2006; Rom and Rohde 2006). Reviews of the Accounting Information System literature over the last thirty years (Berry Coad Harris Otley and Stringer 2009; Granlund 2011; Hackathorn and Keen 1981) indicate a consistent suggestion that research contributions on spreadsheet use to support budgeting is warranted. There is a limited understanding in areas such as spreadsheet use practices, organizational policies and interconnection with the ERP systems and BI. Therefore this paper sets out to describe and explain how and why spreadsheets are used in a budgeting context.

Corresponding to our attempt to unveil spreadsheet use in budgeting, in this paper we determine budgeting as an accounting-based decision-making process (Anthony 1965) to accomplish a quantified statement for a selected time period (Covaleski Evans Luft and Shields 2006). After a slight modification of Rockness and Shields (1988)’ work, we deem that a budgeting process is comprised of four main activities:

- Budget construction – an activity which local departmental units make forecasts about future business operations.
- Budget consolidation – an activity which all departmental budgets are consolidated into an organizational budget.
• Budget monitoring – a continuous monitoring and controlling activity of local department units to ensure that budget plan is achieved, i.e., in term of expenditure and income.
• Budget reporting – an activity which standard and ad-hoc reports are prepared to detect/investigate budget deviations.

A further review of budgeting literature (Abernethy and Brownell 1999), which receives influence from the levers of control framework (Simons 1994), suggests that budgeting possesses a double role of interactive local level control to ensure that management involvement in decision activities at local level and diagnostic organizational level control for outcome monitoring and control at organizational level. Both roles are required in a budgeting process. It is a direct management responsibility to formulate an optimal balance between them depending on organizational circumstances (Simons 1994). In consideration of the nature of the four budgeting activities suggested, we argue that budget construction and budget reporting serve the interactive control purpose at the local level while budget consolidation and budget monitoring serve the diagnostic control purpose at the organizational level respectively. Figure 1 represents the overall argument presented here in the context of the four main budgeting activities.

The spreadsheet literature shows that an idea to use electronic spreadsheets to support budgeting arises since the 1970s before an actual spreadsheet is invented (Mattessich 1961). With progress in IS technology, many new functionalities are added into electronic spreadsheets which add on to their popularity among business and home users. Today, they are often claimed to be the indispensable IS technology among many users (Baker and Sugden 2003). The literature reports that spreadsheets are employed to support both local and organizational activities. Individual users depend on spreadsheets to perform many local decision-making activities such as reporting and analysis, simply because of the flexibility that they offer (Panko 2006; Scapens and Jazayeri 2003). At the same time, users commonly use spreadsheets to support organizational level activities such as budget consolidation and budget monitoring (Parkinson Coron and Sodarelli 2006). Concerns with spreadsheet use are present throughout academic and practitioner publications especially in connection to errors, frauds as well as regulation and law infringements such as Sarbanes-Oxley and Basel II/III (Deloitte 2011; Panko 2006).

This paper is arranged accordingly. After the introduction presented in this section, the second section discusses the dialectic process theory selected to investigate spreadsheet use in budgeting. The third section delineates research methods adopted and company descriptions included in this study. Afterwards, an empirical analysis following the dialectic process theory is presented in the fourth section. The paper ends with conclusions and contributions presented.

DIALECTIC PROCESS THEORY

The dialectic process theory originates from the Hegelian assumption that organizations comprise of at least two conflicting systems, forces or values which compete with each other for domination and control (Mason and Mitroff 1973). It holds that a social world is always in a state of becoming due to the constant competition for domination and control. Therefore, the theory is committed to the process concept. The theory explains how certain fundamental principles can account for occurrence and dissolution of specific social patterns (Benson 1977). According to Van de Ven and Poole (1995), three
fundamental concepts found in the dialectic process theory are: thesis, antithesis and synthesis. A thesis (A) identifies a state of being which is challenged by an opposing force or an antithesis (Not-A). The resolution to overcome the conflict between a thesis and an antithesis leads to a synthesis (which is Not Not-A). The synthesis could become the new thesis over times as the dialectic process continues endlessly because the social world is always in the state of becoming. Nevertheless there is no guarantee that an emergence of a new status quo, either through a replacement of the old thesis with the antithesis or a production of synthesis, is always desirable. Status quo maintenance represents stability which is neutral result-wise, but status quo adaptation leads to change, for better or for worse.

In the context of this study, we apply the concepts of thesis and antithesis to represent the contradicting forces between organizational and local levels respectively (Simons 1994), as illustrated in Figure 1. Meanwhile spreadsheet use in budgeting is a result of synthesis which occurs from the struggle to maintain a balance between local (antithesis) and organizational (thesis) requirements. The next section describes the method and the companies included in this study.

**RESEARCH METHODS AND COMPANY DESCRIPTIONS**

The primary research strategy adopted is a multiple case study without any explicit temporal component (Eisenhardt and Graebner 2007). It focuses on a single phenomenon, i.e., spreadsheet use in budgeting (Gerring 2004). The multiple case study is claimed to be superior than a single case study because its rich empirical data tends to generate a better explanation and a greater possibility for robust theoretical constructs (Eisenhardt et al. 2007).

The empirical data was collected from multiple sources including face-to-face interviews with 26 business controllers, on-site observations as well as internal and external documentations from eleven for-profit organizations in Thailand in 2011. These eleven organizations were selected (Yin 2009) because (1) they use spreadsheets for budgeting despite an access to advanced IS technologies like ERP systems and BI systems and (2) they are listed on a stock exchange to ensure size consistency. Interviews and observations were targeted at business controllers who are directly responsible for the budgeting process in their respective organizations such as chief financial controller (CFO), accounting vice president, business analyst, planning vice president and vice president for information technology. On average, each interview lasted for one hour. Every interview was recorded, transcribed and analyzed using Nvivo8 qualitative analysis software. An inductive coding technique was adopted (Miles and Huberman 1994). Coding was performed in two iterative steps; a general etic coding followed with a more specific emic coding which emerges in a close connection to interviewees’ categories but next to the etic coding (Miles et al. 1994).

Thailand was the target country for empirical data collection because the country is considered to be the world’s leader in many niche industries including foods, automobiles and hospitality (Manasserian 2005). Table 1 provides a summary of company descriptions as well as the IS technologies that they use.

<table>
<thead>
<tr>
<th>Company</th>
<th>Descriptions</th>
<th>Owner</th>
<th>Spreadsheets</th>
<th>ERP systems</th>
<th>BI</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Power plant</td>
<td>Thai</td>
<td>MS Excel</td>
<td>SAP</td>
<td>Magnitude</td>
</tr>
<tr>
<td>B</td>
<td>Oil and Petrochemical</td>
<td>Thai</td>
<td>MS Excel</td>
<td>SAP</td>
<td>Cognos</td>
</tr>
<tr>
<td>C</td>
<td>Oil refinery</td>
<td>Thai</td>
<td>MS Excel</td>
<td>SAP</td>
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<tr>
<td>D</td>
<td>Frozen food processor</td>
<td>Thai</td>
<td>MS Excel</td>
<td>SAP</td>
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</tr>
<tr>
<td>E</td>
<td>Drinks and dairy products</td>
<td>Foreign</td>
<td>MS Excel</td>
<td>SAP</td>
<td>Magnitude</td>
</tr>
<tr>
<td>F</td>
<td>Drinks</td>
<td>Foreign</td>
<td>MS Excel</td>
<td>SAP</td>
<td>Own BI</td>
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<tr>
<td>G</td>
<td>Agricultural products</td>
<td>Thai</td>
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<td>Truck</td>
<td>Foreign</td>
<td>MS Excel</td>
<td>SAP</td>
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<tr>
<td>I</td>
<td>Automobile parts</td>
<td>Thai</td>
<td>MS Excel</td>
<td>SAP</td>
<td>Own BI</td>
</tr>
<tr>
<td>J</td>
<td>Electronic appliances</td>
<td>Foreign</td>
<td>MS Excel</td>
<td>JDE</td>
<td>Own BI</td>
</tr>
<tr>
<td>K</td>
<td>Hotels and apartments</td>
<td>Thai</td>
<td>MS Excel</td>
<td>Oracle</td>
<td>IDEaS</td>
</tr>
</tbody>
</table>

Table 1. Descriptions of companies and IS technologies available for budgeting process
The first group (company A, B and C) represents the energy industry. Even though the industry is not significant globally, these companies are strategic participants in the Thai energy chain. One of them is listed on the Fortune global five-hundred top companies. Business activities performed in this company group are offshore drilling, pipeline transport, refineries, electricity generation, and service stations. The second group (company D-G) denotes the food industry. The foreign-owned companies (company E and F) are Thai business units of the world’s leading food conglomerates. The remaining companies are leading Thai food companies which produce, distribute and export food products nationally and internationally. The third group (company H and I) is from the automobile industry. Company H is a Thai business unit of the world’s leading automobile brand. It markets, sells and services trucks in Thailand. Company I is an original equipment manufacturer (OEM) which produces made-to-order car parts to numerous Japanese personal car manufacturers. The remaining companies represent diverse industries. Company J is a Thai business unit of an international household electronic appliance company. It specializes in home electronic appliances. Company K is a division of a Thailand-based hospitality conglomerate which operates and owns many five-star hotels and top-class service apartments throughout the Asia Pacific region.

In terms of IS technologies, all companies have access to spreadsheets and ERP systems. However, some companies also have additional access to BI applications for budgeting. Some employ off-the-shelf BI solutions but some have developed their own BI solutions in cooperation with IS/IT consultants according to their own specific budgeting requirements. These companies are labeled as having an “own BI”.

ANALYSIS

The analysis presented herein starts with an overall analysis of the IS technologies use pattern found in the eleven companies. Then it discusses tensions between pair of activities in the budgeting process according to the concepts of thesis and antithesis. It ends with an analysis of how spreadsheets are used to overcome the prescribed tensions based on the synthesis concept.

**IS technologies use in budgeting: The pattern analysis**

Table 2 provided below summarizes the IS technologies use pattern found among the eleven case companies. The normal practice is that budgets are prepared and consolidated on spreadsheets. Afterwards, the consolidated budget numbers are entered into ERP systems or BI systems for a monitoring purpose. These numbers are later retrieved into spreadsheets for reporting and analysis. The ERP system use is not significant except in the reporting activity in which the ERP systems are used to download actual operating data in order to compare with the budget numbers on spreadsheets. However they are not used for data analysis which is a crucial activity in reporting. For BI (except for companies C, D, F, and G which do not have access to BI), the use of BI system to support budgeting activities are scattered but it is predominantly employed to support budget monitoring activity. The usual use practice is that local units construct and consolidate budgets on their own spreadsheets, then entering the final results into the BI so that organizational units can retrieve the data to control and monitor local operations. However when it comes to budget reporting which aims on investigating budget deviation causes, the BI is not called upon to help the analysis. This is true for every company except for Company K in which certain analysis can be achieved on their BI system, however, more specific analysis and reporting functions must be performed on spreadsheets alone. The IS technology use pattern presented here is in line with previous conclusions found in prior research (Granlund et al. 2002; Hyvönen 2003; Rom et al. 2006) that despite the existence of advanced IS technologies like ERP and BI systems, spreadsheets dominate the budgeting process.
Tensions between organizational and local levels: Thesis and antithesis

The analysis shown in this section highlights the tension between organizational and local levels of organizations through pair of activities deemed to serve each level, as denoted by the dotted line in Figure 1. The analysis starts with the first pair of activities in a typical budgeting process: the pair of budget construction and budget consolidation. Then it continues with the second pair on budget monitoring and budget reporting.

Budget construction and budget consolidation: Combining local needs with organizational needs generates tension– it is without doubt that both local and organizational views are complementary; therefore both perspectives are needed in a budgeting process. As a result, we find that organizations often combine a bottom-up and a top-down budgeting approach to represent both local and organizational perspectives as each represents its own advantages and disadvantages. This is where the fabrics of tensions between budget construction and budget consolidation originate. In the budget construction activity, business controllers focus on constructing a budget which best reflects unique local requirements so that they can use this information for subsequent reporting and analysis at the local level. On the contrary, the objective of budget consolidation is to ensure that the local operational plan aligns with a strategic decision set at the organizational level. Consider the following excerpt from the Financial Planning Manager in Company F who mentioned: “The business nature is different from country to country. The [BI] only represents the standard format that our headquarter wants to see. For example, Thailand and the Philippines do not share the same revenue structure but it is fixed in [the BI]. […] It is impossible to command every country to adhere to the same calculation standard.” This statement highlights an important fact that budgeting is a very locally driven process which will lose its relevancy if it is purely driven by an organizational mechanism implicated in for instance an ERP or a BI system. Simultaneously, budget consolidation following a certain standard budgeting format is required to ensure that local country companies operate according to the strategic plan. The same Financial Planning Manager continued: “[A consolidated budget] represents our strategic plan. It allows me to discuss with [local country companies] that this is what we expect from them according to the strategic plan. We need to negotiate whether they can meet it.” This kind of tension between local and organizational needs is present throughout companies investigated. In connection to IS

Table 2. IS technologies use practice in each budgeting activity by company

<table>
<thead>
<tr>
<th>Company</th>
<th>Local level - Construction</th>
<th>Org. level - Consolidation</th>
<th>Local level - Monitoring</th>
<th>Org. level - Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>X - - - - X - X - X - X - X -</td>
<td>E - - - - X - X - X - X - X -</td>
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</tr>
<tr>
<td>J</td>
<td>X - - - - X - X - X - X - X -</td>
<td>J - - - - X - X - X - X - X -</td>
<td>J - - - - X - X - X - X - X -</td>
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</tr>
<tr>
<td>K</td>
<td>X - - - - X - X - X - X - X -</td>
<td>K - - - - X - X - X - X - X -</td>
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<td>K - - - - X - X - X - X - X -</td>
</tr>
</tbody>
</table>

1 SSs stand for spreadsheets.
2 The minus (“-“) denotes the fact that these companies have access to ERP and BI systems, but does not use the systems in the specific budgeting activities.
3 The asterisk (“*“) denotes the fact that these companies (companies C, D, F and G) do not have access to the BI according to the information presented in Table 1.
technologies used for budgeting, the normal practice found throughout the eleven companies is that business controllers keep two reconcilable versions of budgets. The full detailed version from budget construction is accomplished first using spreadsheets. Then a less detailed version is reconciled on spreadsheets. Afterwards, it is either uploaded or keyed into the main ERP or BI systems depending on how a particular organization decides to store its company-wide budget. In summary, the IS technology use practice draws attentions to the tension between organizational (thesis) and local (antithesis) levels. It highlights that both organizational and local information are needed for a very different reason. The less-detailed budget found on ERP or BI systems is needed for strategic decision-making for an organizational purpose while the more-detailed budget found in spreadsheets is required for operational control at local level.

Budget monitoring and budget reporting: Bringing organizational needs with local needs generates tension – the two activities presented earlier signify an attempt to forecast business operation before it takes place; in this part we move toward the activities after the budget becomes effective. Nevertheless the focus remains on the tension between organizational and local needs. Following budget consolidation, budget monitoring takes place to ensure that the organizational strategic plan is followed. As mentioned earlier, business controllers usually keep two sets of budget; a full detailed version and a less detailed version. The less detailed version available on the ERP or BI systems is often used for organizational monitoring. The CFO in Company J gave an example that headquarters sent a guy to inquire him about an unusually high account receivable balance based on the comparison of budgeted against actual operating result found in the BI system. From the headquarters perspective, having access to a centralized IS technology like ERP or BI systems makes the monitoring task more effective because they ensure information accuracy. The Customer Intelligence Manager in Case K commented: “It is not easy to verify the actual information which each [local unit] 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 [local units] under my control, it might take me an entire month. By that time I have to do something else.” Apart from the effectiveness benefit found, the BI enables budget monitoring efficiency because it shortens the time required to accomplish the task. However, when further inquire about the BI usefulness to support budget reporting, which focuses on identifying budget deviation causes, we found that the organizational view embedded in the BI is not useful for reporting and analysis. The Management Accounting Manager in Company E stated: “Having the new [BI] makes the picture bigger at the cost of lost details. The BI represents a headquarters’ requirement which does not want us to be complicated. But our business is complicated; there are many risk factors that we have to consider. If we do not prepare a budget at the stock keeping unit (SKU) level [on spreadsheets], we will not be able to investigate what is wrong.” The lack of budgeting details on a centralized IS technology constructed according to organizational requirements hampers an ability to analyze and present a budgeting report in a way that is useful for decision-makers. This is where spreadsheets come in to fill the gap in reporting especially on the data analysis. Anew, the analysis stresses the fundamental tension between organizational (thesis) and local (antithesis) levels through the interaction between budget monitoring and budget reporting activities. The tension is not only fundamental but also complementary in the sense that without one, the other would not be possible to achieve. This is reflected in the choice of IS technology selected to support organizational and local activities especially the usefulness of centralized IS technologies (ERP and BI systems) for monitoring versus spreadsheets for reporting.

The resolution to overcome the budgeting tensions: Synthesis

As a resolution to coordinate the tension between organizational and local needs in budgeting, spreadsheets are the IS technology which business controllers employ to ease the tension. Spreadsheets are considered as the synthesis according to the theory. From the outset, spreadsheets are invented to support personal decision-making at local levels (Panko 2006). But, when business controllers have to cope with the difference in information array needed for local and organizational levels, preparing both the more and less detailed budgets on spreadsheets, they invent creative ways to use spreadsheets. Spreadsheets are the most suitable IS technology to coordinate different information requirements between local and organizational levels because they are an open IS technology which allow users to do anything with it (Granlund 2011). To accommodate changes in spreadsheet use to support organizational requirements, business controllers often invent new business procedures. The Senior Accounting Manager in Company G explained how she created a “flow” of spreadsheets in budgeting: “Everyone [who is involved in the cost budgeting process] has his own spreadsheets. [...] If a cost of chicken feed has increased, the person who works on the budget must notify the change to the person who is responsible for the chicken budget cost and so on. [...] The second person in line cannot do anything with the budget spreadsheets until he gets a final calculation result from the first person in line”. The statement exemplified here emphasizes that there is an “organizational approach” going in a spreadsheet use for budgeting which is contrary to the fundamental purpose of spreadsheets to support individual decision-making. Therefore a prescribed business flow among business controllers who use spreadsheets is needed to make the budgeting process functions as it should be. The CFO in Company J pointed out that a spreadsheet folder management is necessary to prevent confusions with budgeting because they are many spreadsheets: “We have to arrange spreadsheet folders carefully. For the current year we classify it by category. Here is the white good folder and here is the...
floor care folder. Also I try to use a uniform template for every spreadsheet”. The excerpt points out that business controllers are attempting to “discipline” local spreadsheets usage to accommodate organizational requirements through actions such as folder management and template prescription. We regard the two examples as an attempt to stabilize spreadsheet use practice according to the organizational requirement which is contradictory to the nature of spreadsheets to support local requirements. This use practice of spreadsheets is considered as the synthesis to ease the tensions between local and organizational needs in budgeting.

CONCLUSIONS AND CONTRIBUTIONS

The paper describes and explains how and why spreadsheets are used to support budgeting through a dialectic process theory perspective. It departs from the standpoint that there is a constant conflict (tension) between organizational (thesis) and local (antithesis) needs in a budgeting process. The empirical data was obtained from multiple sources including interviews with twenty-six business controllers, on-site observations and documentations from eleven listed companies in Thailand. The first part of the analysis shows that spreadsheets are extensively used to support the four main budgeting activities. However ERP system and BI use is scattered. The second part analyses two pairs of budgeting activities: budget construction and budget consolidation, and budget monitoring and budget reporting. It shows that both organizational and local views are presented and required in a budgeting process but they are always in instant conflict. In the last part of the analysis, we show that business controllers resort to spreadsheets (as a synthesis) to overcome the conflict between organizational and local needs. New disciplining actions such as workflow design and folder management are invented to accommodate spreadsheet use to coordinate organizational and local needs.

Although spreadsheets are extensively employed to support budgeting, usage of spreadsheets to accommodate conflict between local and organizational requirements 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 which could affect the quality of decisions made in a budgeting process (Deloitte 2011; Panko 2006). Organizations are prompt to mitigate these risks through actions such as spreadsheet testing, inspection and auditing (Panko 2006).

This paper contributes to the academic and practitioner communities in three areas. First it demonstrates an extensive spreadsheet use in budgeting in comparison to ERP and BI systems. Second, it shows that spreadsheets are used to coordinate the tension between organizational and local views in budgeting. Both views are clearly required in budgeting but there is no other IS technology, but spreadsheets, which is capable of bridging the gap between them. Third, it warns practitioners and academia about the risks that spreadsheets entail. In short, spreadsheets could be considered as “the necessary evil”. They bridge the gap between local and organizational needs at the cost of something equally important such as information accuracy and security. It is only through a careful spreadsheet management that we learn to take the best from the evil.

REFERENCES