

Abstract:

Budgeting methods for non-valued areas of an organization do not use lean concepts found in Zero-base Budgeting. Data from 53 manufacturing organizations suggest that all budgeting practices are subject to learning curve theory where preparation time is reduced to an acceptable level dispelling the misconception that ZBB is too time-consuming.

Introduction:

Lean is a management philosophy derived from various principles in the Toyota Production System (TPS) along with other industrial best practices focusing on the continual elimination of waste (Wang, J., 2011), specifically in the manufacturing process. Extensive research has been published on different methods of accomplishing this philosophy within the confines of the manufacturing process and its closely associated support areas such as supply chain management. For example, using lean concepts to lower costs and improve performance in logistics, (Saxena, R., 2009), lean thinking as a means of providing responsive logistics support (Patnode, 1999), purchasing for lean manufacturing (Hines, 1996) and the use of lean in Supply Chain Management (Taylor & Brunt, 2001) are but a few of the areas researched in regard to lean manufacturing and its immediate support components.

Budgeting in the manufacturing arm of the organization has been explored through the use of various principles. Marginal costing and total absorption costing can be used in the construction of a manufacturing budget (Thompson & White, 2008). The ability to spread out indirect costs over the range of production allows for the manufacturing budget to be based on the planned production for that manufacturing facility. Budgeting has also been explored for more

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specialized types of manufacturing. For example, Fleming (1995) writes about budgeting in a small manufacturing firm, and Dhavale and Sounderpandian (1993) develop budgetary processes for cellular manufacturing, and Modarress, Ansari, and Lockwood (2005) propose a kaizen method of budgeting to reduce costs, heighten flexibility, and increase quality. Again, the extant literature addresses the budgetary process for the operations section of the organization and its closely associated indirect costs.

Organizations practicing lean techniques in only their operations areas have not completed the circle of lean thinking. There is a major area of organizations not considered for lean practices. This void lies in budgeting practices used for corporate services, which includes the non-value added areas such as accounting, finance, marketing, and other like areas. The extant literature does not refer to the extension of lean practices into the budgeting methods of these service departments.

Although there are a variety of budgeting techniques used by organizations such as Continuous (Rolling) Budget, Performance Based Budgeting and Activity Based Budgeting, none force the budget makers to examine budgeted items as closely as Zero Base Budgeting (ZBB). The purpose of this paper is to introduce the marriage of Zero-Base Budgeting (ZBB) to the corporate offices of organizations embracing the lean philosophy. Successful adoption of the ZBB method into lean minded organizations' service areas should produce lower costs and/or more accurate and targeted spending. We begin by briefly reviewing the origins of ZBB and Lean Philosophy. Next, we introduce the importance of training and its positive effects when properly planned, developed, and administered. We develop a likely scenario of learning curves and the efficiencies gained through multiple repetitions of a process. Finally, we introduce a series of propositions

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that detail how lean philosophy firms are prime candidates for adoption or re-adoption of ZBB as a budgetary tool in their capital expenditure planning and in non-value added services.

Literature Review

Current Budgeting Practices:

Traditional, cost based budgeting is a method where a previous period's budget is adjusted for inflation or revenue growth (Investopedia, 2012). This method has drawn some criticism (Narong, 2009) but is still used today. The disadvantage of this budgeting method is that each line item in the previous budget is kept and their value normally increased each time using some prescribed multiplier such as inflation rate. The major negative issue with this method is that it does not address the most fundamental question needed in budgeting, is this item still a valid piece of the company's strategy? Two of the more current budgeting methods replacing the traditional cost based method are Performance Based Budgeting (PBB) and Activity Based Budgeting (ABB).

Performance Based Budgeting is budgeting for some expected results. "It is a process that relies heavily on strategic and operational planning, and performance accountability to build budgets" (Rainwater, 2012). PBB serves as an integrator of performance indicators and the expenditures' estimation in order to reach predetermined performance levels. With these criteria, estimated expenditures are determined to fund these attempts. As an example, the original line item budgeting for copier paper would be determined by the amount of paper needed for 800 students in a class (Wikieducator). PBB is not a budgeting framework but a tool to help budget makers understand what the budget represents.

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Activity Based Budgeting addresses the importance of budgeting by examining activities and features rather than cost elements. ABB is designed to link strategy to these activities.

“Budgeting through this process allows managers to implement plans for continuous improvement, emphasize cost and activity management, and foster improvement in the efficiency” (Coulmas & Law, 2010, 44).

of necessary activities. (Hansen and Mowen, 2008). ABB is not a control budget and is not designed to replace the department or line-item budget. It provides only supplemental information. It does not eliminate or take the place of any process, but adds additional duties to the administrative functions of the company (Nayab, 2010).

Current Budgeting Practices in a Volatile Economy:

Budgeting methods for a volatile economy have been recognized as scenario planning, quarterly budgeting, continuous rolling budgets, and zero-based budgeting (Akten, Giordano & Scheiffle, 2009). Each has their own merits and drawbacks. Scenario planning is based on an environmental analysis relying on historical data and employing traditional forecasting techniques. The separation of this method from methods of old is that a second area is opened, scenarios. The future forecasts are linked with different scenarios using soft data and intuition to assign changes when/if certain turns in events take place where the main budget is no longer as viable. The problem with this method is determining if the right scenarios have been formulated and what are the provisions to go from scenario to decisions (Fahey & Randall, 1998).

Rolling forecasts are different from the traditional budget that provides for a twelve-month fiscal budget, beginning with period one and ending with period twelve (if months are used as the increment). At the end of the year, an entire new twelve-month budget is constructed. A rolling forecast looks at a twelve-month rolling forecast where the first month, once finished, drops out

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of the rolling average and the thirteenth month (next year's first month) is added. The advantage to this method is that forecasts and budget amendments can be made as condition changes dictate present or future revisions. The rolling period can be adjusted as actual sales are reported allowing the organization to change more quickly than waiting until the end of the fiscal year and then redirecting the budget. The drawbacks of a rolling budget, however, present formidable arguments. It requires large amounts of time in both formulation and subsequent manipulation. This performing the updates may be dissatisfied with the continual budget revisions debilitating their time needed to spend addressing other immediate issues. Lastly, unless environmental changes are continuous, continual updating may be futile.

(Northern Ireland Assembly, 2010).

Quarterly budgets are prescribed as a method typically used in times of extreme uncertainty. This method may even take the place of longer range forecasts in order for the company to concentrate on three months at a time rather the distraction of a longer term twelve-month budget. During this type of budgeting process, companies may well be under extreme duress and should use the quarterly budgets to focus on cost cutting, assuring short term financial needs are available. This option is used as a stop-gap method and longer term budgeting methods should be re-established once the volatility subsides to an acceptable level. If not, quarterly budgeting can stymie growth by over emphasizing the short term. (Akten, Giordano, and Scheiffele, 2009).

What is Zero-Base Budgeting?

The origins of Zero-Base Budgeting can be traced back as far as 1892 where Charles F. Bastable, chair in Political Economy at Dublin University and a detractor of the then current practice of incremental budgeting, authored one of the earlier finance texts written (Burrows and Syme, 2000). Lord Kennet, a United Kingdom Treasury official along with a prominent economic

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group, were charged with identifying and recommending for exclusion, budget items to reduce public expenditure (Tarscheys, 2007).

Zero Base Budgeting has been credited with cost savings and redirecting funds to projects and areas in the private and public sector that have greater need thereby creating greater effectiveness in spending. Although others wrote about the practice of ZBB throughout the following years, Peter A. Pyhrr first popularized it in his article “Zero-Base Budgeting” (1970) after initiating the practice as Control Administrator at Texas Instruments in 1969. Texas Instruments non-manufacturing expense accounted for 25% of the total company annual budget. In 1970, Texas Instruments allowed Pyhrr to use ZBB to budget the staff and research budgets. The apparent successes lead to full implementation the following budgeting year, 1971. This success led then Governor Jimmy Carter of Georgia to use ZBB to compose the state’s budget. Later, as President of the United States, Jimmy Carter brought ZBB to the national budgeting process. ZBB gained popularity and by 1977, 40% of U.S. firms using ZBB, budgets were reduced by five percent. Different versions emerged from the original construction of ZBB. In 1982, Schick and Hatry introduced the idea of decremental budgeting where managers are directed to propose their ZBB packets using a total capped value somewhat less than the previous year, for example, 90% of the previous year’s budget. The reasoning was that managers should target areas that can be reduced rather than on incremental practices where budgets are expected to grow. Schick and Harry went on to write that over 50% of those surveyed reported they were able to allocate resources more rationally.

Zero-base budgeting is a method that begins the annual budgeting process with a clean slate. All previously budgeted items are wiped clean and every investment and expenditure must be “proposed, justified, weighed and compared with competing claims” (Tarschys, 2007, 1). In

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other words, budget items that have remained over the years but are no longer productive or are not in the strategic alignment are eliminated resulting in the release of previously allocated funds.

Each year, every budget begins at zero dollars and a budget is built through a hierarchical process where managers develop decision packages for their areas. These decision packages are the foundation of the zero base concept. Each package identifies and describes the budgeted item(s) so that the next higher layer of management can evaluate its need, then ranks it against other decision packages all competing for funding. As the decision packages move through to the higher layers of management, the final decision-makers are left with the packages scrutinized and culled by the ascending levels of management leaving those packages with the greatest importance. By forcing the upward movement of all budget proposals (packages), each level of management becomes aware of the planned expenditures and their purpose contributing to a more informed decision making team. It also forces each level of management in the process to assume responsibility and have a greater stake in the process. (zerobasedbudgeting.net, 2011). The final decision-makers are able to view the specific requests for budget and make better-informed decisions resulting in a strategy driven allocation of scarce resources leading to more effective spending furthering the organization's strategy. The greatest downfall of ZBB was not in its lack of benefits but in the large amount of time and resources needed to develop and finalize it.

Scholars and practitioners alike have been at odds over the merits and downfalls of Zero-Base Budgeting (ZBB). In its early years, ZBB appeared as a panacea for businesses that would eliminate fiscal practices based on incremental budgeting and create a need based practice focusing on the firm's strategic plans. Over time, the luster of ZBB wore off as companies rushed

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to adopt but later found the inordinate amount of time it took to prepare ZBB was too distasteful to continue. Supporters of ZBB argued that it took no longer to prepare than any other current budgeting technique when those involved are properly trained (Pyhrr, 1977). In spite of this advice, many practitioners abandoned ZBB for other budgeting techniques or just simply fell back into an incremental style of fiscal budgeting.

In lieu of its drawbacks, ZBB is the only budgeting method that addresses the long-term strategy of the organization most effectively. In the continuing volatility in world economics, a budgeting method dealing with forward integration of strategy and implementation is needed. ZBB is the method most capable of helping companies direct, redirect and focus financial resources in order to gain competitive advantage.

Where is ZBB Today?

The academic literature falls off considerably after 1985 where approximately one article per year is averaged from 1986 to date (Ebsco Data Base) as fewer researchers explored new avenues for ZBB. Meanwhile, the quest for lowering costs went on as manufacturing organizations began looking at ways to keep or gain competitive advantage through cost savings techniques and philosophies such as Total Quality Management, Just-in-Time (JIT), and Lean Manufacturing.

How Does ZBB fit with Lean Philosophy?

Lean Philosophy's Origins:

Lean Manufacturing was born out of necessity. Taiichi Ohno developed the system in early 1959 for Toyota Manufacturing. The name was coined by Womack, Jones, and Roos (1990) in their book "The Machine That Changed the World." Adoption of lean techniques in manufacturing facilities provided the education and awareness required to help manufacturing workers and their

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plant management adopt lean thinking. The system of Lean techniques consists of many elements but can be summed in a simple statement, lean is the constant address of waste reduction in order to create higher profits.

Those successfully adopting TQM and/or JIT found their cost of inventories shrinking, service levels rising and overall higher organizational performance. As TQM and JIT gained a foothold, Lean Manufacturing emerged as a manufacturing philosophy to further the cost savings cause. Practicing Lean techniques has been confined mainly to shop floor activities. This practice has left two other areas of concern to budgeting techniques that may not be as effective as ZBB, specifically capital expenditures and non-value added/service activities usually located outside of the manufacturing facility.

Where in the organization should ZBB be used?

Manufacturing facilities:

In factories, each product has a labor and raw materials standard attached. Adherence to these standards means no cost overruns. Cost per unit should not vary and lead to a stable product costing. Using the lean philosophy, factories can educate workers and monitor the elimination of scrap and other wastes in order to eliminate lost costs thereby diminishing cost per unit.

In order to account for the non-value added costs of salaried employees, office personnel, office and cleaning supplies and so on, their annual costs are prorated into the cost of each unit produced. With exception of the non-value added components, no value added operations should use ZBB. The lean advantage comes from people looking for and eliminating waste. The result is a lower cost to produce each unit. Attempting to budget this area using ZBB makes no sense.

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Manufacturing organizations many times follow any one of a host of different budgeting strategies. Many use full absorption costing in the manufacturing facilities and budget each manufacturing facility using the forecast units to be produced in that facility. Although this is not a place for ZBB, the service units of the organization such as marketing, accounting and finance, etc. (also known as the home office) are areas where quantitative output measures are not available making zero based budgeting an appropriate tool (Wetherbe and Montanari, 1981).

A second area that fits well with the use of ZBB is in capital expenditures (cap ex). The portion of the budget typically set aside for cap ex is an area known to change with a rolling budget.

Using ZBB to justify these projects enables the system to delete, reduce or enlarge that budget depending on the critical nature of the cap ex projects and how they tie into the organizations overall strategy.

By fully understanding the mechanics of ZBB, it becomes readily apparent that those organizations wishing to complete the lean Philosophy in their organization must follow ZBB. By ZBB's method of starting at zero for each and every line item automatically puts the burden of necessity upon the shoulders of every layer of management involved in the budgeting process. If the organization has communicated the corporate strategy in such a way where each and every layer within the organization develops, understands and adheres to their strategy, the task of budget building should be one of a highly focused effort that act as building blocks supporting the layer above until the delineation of each layer paints one picture.

The problem with the use of ZBB has been cited repeatedly in the literature. The amount of time and resources dedicated to the building enterprise is beyond the level that managers wish to dedicate to the process (Dean & Cowen, 1979; Brown, 1981; Cowan & Burton, 1979).

According to Peter Pyhrr (1970), the need to allow for adequate training before attempting to

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implement ZBB is crucial. Development of the individual packets requires sufficient training for the preparer to feel comfortable with the processes. Without this, preparers feel overwhelmed and have difficulties developing packets that are constructive to the process.

Learning Curves and Zero-base Budgeting:

Admittedly, complex, preparation of ZBB packets and their subsequent evaluations puts an inordinate amount of strain on the participants. One of the questions not addressed in the literature is how well ZBB budget preparers could have become given not only adequate training, but also to have the opportunity to prepare their portion of the budget for several years before the organization gave up on the use of ZBB. After all, academic journals reported the successful cost savings realized for those using ZBB. Why give up a good thing?

A fundamental principle that has been over looked is that of decreasing time spent on preparing a ZBB budget when experience enters into the picture. Learning curve theory in general states that individual learning takes place when “people repeat a process and gain skill or efficiency from their own experience” (Jacobs, Chase, & Aquilano, 2009, 143). Learning curve theory rests on three assumptions:

1. The amount of time required to complete a given task or unit of a product will be less each time the task is undertaken.
2. The unit time will decrease at a decreasing rate.
3. The reduction in time will follow a predictable pattern.

(Jacobs, Chase, & Aquilano, 2009, 143)

The premise of this experiment is that people who prepare budgets at least annually will decrease their time in the process at some decreasing rate. Data are being collected from companies located in the maquiladora sector in Matamoros, Tamaulipas, Mexico. A questionnaire was

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initially sent to all managers in this industrial park as a blind mailer. The response rate has been fairly low with 53 returned to date out of 200 mailed. The purpose of this questionnaire was to find out what budget method was being used for the “home office” areas of Marketing, Finance, and other non-value added areas of their organizations’ corporate office. The mailer asked for the name of the budgeting method, a brief description of it, the length of time it took to prepare the budget for this year and a close approximation of the length of time for the previous year.

Budgeters were also asked how many years they have been preparing budgets for these same “home office” areas. The last questions asked if the budget preparer had any knowledge of Zero-Base Budgeting, had they ever used it, and their opinion, if any, of ZBB.

Once data collection has been completed, a list of budget methods will be listed and grouped.

The cumulative times spent per year per budget method will be reviewed to see if there is learning involved.

The current data set indicates that there is a learning curve for each method listed and, in general, learning curve is present for all budget methods combined. This preliminary result indicates that no matter the budgeting method, a person performing the task repeatedly will gain experience and over time reduce the total number of hours spent in budget preparation.

The managerial implications are that Zero-base Budgeting is the best budgeting method to use.

In particular, adhering to the principles of ZBB, companies already embracing lean philosophy will fulfill the circle of commitment by using ZBB as a tool to further the lean processes in the organization reducing costs, utilizing monies in the most efficient and effective manner as aligned with the overall corporate strategy.

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