Capital Budgeting: A Practical Guide for Applying the Zero-Based Budgeting Methodology to Expenditure Forecasting in Capital Budget Simulations

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Abstract

This article explores the application of Zero-Based Budgeting (ZBB) as an effective methodology for preparing capital budgets, removing reliance on historical data and fostering greater financial transparency and control. The research proposes a practical guide for ZBB implementation, highlighting its benefits in expenditure forecasting and resource allocation optimization. Key findings suggest that ZBB improves the accuracy of financial projections and reduces biases; however, its implementation faces challenges such as organizational resistance, managerial training needs, and the time required to reassess costs. Additionally, the study underscores ZBB's limitations for large organizations due to operational complexity. The article also compares ZBB with other budgeting approaches and demonstrates its applicability through examples of companies that have adopted the methodology. The research concludes that adopting ZBB may lead to more strategic financial decisions, but it demands a structured approach to mitigate implementation obstacles. A gradual rollout, supported by automation tools, is recommended to streamline the process.

Keywords: Capital Budgeting; Zero-Based Budgeting; ZBB.

Contextualização do cenário atual

Today's market presents a scenario shaped by uncertainties, diversification, limited information, time constraints, and financial restrictions. These dynamics compel executives to ground their decisions in data-driven insights, supported by financial impact predictability (Rauwerda & De Graaf, 2021). Within this environment, decision-makers must prioritize long-term corporate sustainability, rather than pursuing short-term survival strategies that disregard their consequences on future scenarios (Rauwerda & De Graaf, 2021).

In this regard, the use of financial predictability analyses proves crucial, as such tools convert strategies and decisions into quantifiable forecasts that capture their long-term implications. Capital budgeting fulfills this strategic role by offering short-, medium-, and long-term financial projections to decision-makers. This enables organizations to allocate resources more effectively, identify and mitigate risks, and position themselves for market challenges (Hartmann & Weibenberger, 2024).

Financial forecasting relies on financial planning, a discipline rooted in managerial accounting that enhances budgetary predictability by addressing firm-specific considerations. Zero-Based Budgeting (ZBB) emerges from this planning process and constructs budgets from a baseline, excluding historically biased data and requiring justification for each new expenditure (Ekholm & Wallin, 2019).

This study addresses the following central question: How can one design a practical guide to apply ZBB in expenditure forecasts within capital budgeting simulations? The relevance stems from ZBB's capacity to minimize historical bias and support a strategic approach aimed at financial efficiency and waste reduction—a critical need in uncertain economic and budgetary environments (Hartmann & Weibenberger, 2024).

Given the current market conditions and the growing importance of capital budgeting, this article seeks to present a practical guide for applying the ZBB methodology in expenditure forecasting for capital budgeting simulations. The guide primarily targets smaller and younger enterprises, as their lower organizational complexity facilitates ZBB adoption (Coyte, Messner & Zhou, 2022). The study aims to analyze and propose a step-by-step implementation framework for ZBB, emphasizing its applicability to expenditure forecasting. Additionally, it compares ZBB with traditional budgeting approaches, evaluates its challenges and limitations, presents an empirical simulation, and illustrates its adoption through real-world business cases where both ZBB and capital budgeting techniques have been applied.

Capital Budgeting

Capital budgeting functions as a financial feasibility analysis tool designed to support investment project selection over a defined time horizon. This process involves applying techniques such as Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period. NPV adjusts future cash flows to their present value using a discount rate equivalent to the cost of capital. The Payback Period indicates the time needed to recover the invested capital. IRR, in turn, reflects the rate at which the present value of inflows equals the initial investment (Almazan, Chen & Titman, 2017).

All these techniques rely on Discounted Cash Flow (DCF) projections, which reflect the project's ability to generate future cash. DCF depends entirely on projected inflows (sales and receivables) and outflows (costs, expenses, investments, and payments). Therefore, the quality and structure of financial planning for revenues and expenditures directly influence the outcome of capital budgeting analysis.

To illustrate the practical application of these capital budgeting techniques, consider the following hypothetical scenario: An investment of R$ 1,000 in a project expected to generate annual cash flows of R$ 550 over five years, discounted at a 10% annual rate.

Table 1: Hypothetical Capital Budgeting Simulation

Project Cash Flow	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Cash flow (generated)	-	550.0	550.0	550.0	550.0	550.0
Investment	-1,000.0	-	-	-	-	-
Annual net cash flow	-1,000.0	550.0	550.0	550.0	550.0	550.0
Discounted cash flow	-1,000.0	500.0	454.5	413.2	375.7	341.5
Accumulated discounted CF	-1,000.0	-500.0	-45.5	367.8	743.4	1,084.9

Source: Developed by the authors, 2024.

Based on the figures above, the sum of cash flows from years one and two amounts to R$ 1,100—surpassing the initial R$ 1,000 investment. This suggests that, in a simplified view, the project achieves a Payback in the second year. However, after applying a 10% discount rate, the Payback occurs in the third year, as the accumulated discounted cash flow becomes positive at that point, ending year five with an NPV of R$ 1,084.9 and an IRR of 46.98%.

Managerial Accounting: Financial Planning

Managerial accounting plays a pivotal role in gathering, analyzing, and delivering accurate information to support decision-making and ensure operational effectiveness. It encompasses planning and control functions, including budgeting, capital budgeting, and organizational control. Budgeting—also referred to as financial planning—covers processes for budget forecasting, development, and control (Delgado & Otero, 2021).

Derived from managerial accounting, financial planning becomes fundamental in crafting and implementing corporate strategy. This process converts strategic intentions into short-, medium-, and long-term financial targets, promoting data predictability and clarifying each strategy's long-term effects. Given that strategies shift according to organizational contexts, adopting a budgeting approach to quantify and control these strategies financially becomes essential (Souza & Lunkes, 2016).

Various budgeting approaches exist, including Incremental Budgeting, Activity-Based Budgeting (ABB), Participatory Budgeting, and Beyond Budgeting, among others. Research indicates that budgeting approach selection hinges on managers' perceived organizational needs, expected outcomes, and a cost-benefit assessment (Coyte, Messner & Zhou, 2022).

Incremental Budgeting adjusts previous budget values based on inflation or operational needs. While simple and widely adopted, this method tends to perpetuate inefficiencies (Ibrahim, 2019). Activity-Based Budgeting (ABB) identifies cost-driving activities and allocates resources accordingly, aiming to improve cost transparency (Tandung et al., 2013). Participatory Budgeting involves employees and stakeholders in budgeting decisions, ensuring more democratic and aligned resource allocation (Ibrahim et al., 2018). Beyond Budgeting focuses on adaptability and continuous expenditure adjustment, removing the need for annual budget revisions and fostering innovation (Soares et al., 2019).

Each approach introduces a distinct lens for projecting financial resources. As this study prioritizes reducing bias in revenue and expenditure projections, Zero-Based Budgeting (ZBB) offers the most suitable approach for capital budgeting projects.

ZBB counters the traditional incremental method, which simply increases previous figures. Instead, it requires budgeting all expenses from a zero base, evaluating each item as if being justified for the first time. Expenses fall into budget packages, categorized based on defined assumptions. This method disregards legacy assumptions and targets expenditures critical to current strategic objectives, thereby eliminating potential waste (Coyte, Messner & Zhou, 2022).

Companies such as Tesco, Huntington Bancshares, Ford, Baxter International, and Mondelez International have adopted ZBB to cut costs, enhance financial transparency, and optimize resource allocation (Setting Consultoria, 2020). This broad adoption demonstrates its feasibility across diverse industries and organizational scales.

Despite its benefits, ZBB poses practical challenges, including high implementation costs, intensive training demands, and limited adaptability for large corporations. Its rigidity may reduce responsiveness to unforeseen market changes (Almazan et al., 2017). Organizational culture, managerial resistance, and strategic alignment also influence ZBB adoption. Firms with rigid hierarchical structures may struggle more due to the need for decentralized financial decision-making (Coyte et al., 2022).

Regarding abrupt transitions and organizational challenges, Vadapalli (2021) observed that shifting from traditional budgeting to ZBB often disrupts internal routines—particularly during crises. For instance, during the COVID-19 pandemic, small businesses in India's food and natural resources sector implemented ZBB without adequate preparation, encountering significant adaptation issues.

In the public sector, Ibrahim (2019) identified implementation difficulties linked to bureaucratic complexity and managerial resistance, even though ZBB was introduced to curb government spending.

Lastly, Coyte, Messner, and Zhou (2021) analyzed ZBB's real-world results in U.S. firms and found that although implementation often stemmed from cost-saving motivations, actual outcomes did not always meet those expectations (Coyte, Messner & Zhou, 2021).

Proposal: A Practical Guide for Applying the Zero-Based Budgeting Methodology to Expenditure Forecasting in Capital Budget Simulations

This article emphasizes the importance of implementing Zero-Based Budgeting (ZBB) for improving expenditure predictability, especially within smaller and younger firms where reduced operational complexity facilitates adoption (Coyte, Messner & Zhou, 2022). Since capital budgeting aims to assess new investment projects using techniques like NPV, IRR, and Payback—all of which rely on Discounted Cash Flow (DCF) projections—selecting a budgeting approach untainted by historical bias becomes essential. Hence, this study advocates the use of ZBB.

ZBB originated from a 1970 article by Peter Pyhrr, later published in the Harvard Business Review in 1980, where it gained immediate recognition. Interest in the methodology declined after 1985, but recently resurged due to its active promotion by 3G Capital as part of shareholder activism initiatives (Coyte, Messner & Zhou, 2022).

According to Pyhrr (1981), ZBB relies on two key variables. The first, Zero-Based Variable (ZBV), refers to a group of accounting accounts that comprise a budget package. The second, Zero-Based Level (ZBL), defines the lowest level of grouping—either by cost center or expenditure driver. Initial steps involve establishing budget packages by clustering similar accounting accounts. These packages typically fall into two categories: operational expenses and fixed asset investments. Proper alignment with the company's chart of accounts remains essential to ensure all expenditures receive adequate coverage. Despite ZBB's "zero base," managers must still review historical data to prevent the omission of relevant expenses. Beyond optimizing current expenditures, package managers should continuously seek improvement opportunities.

This study adopts a qualitative methodology based on literature review and analysis of organizations that have implemented either ZBB or capital budgeting practices. The research identifies implementation challenges, contrasts ZBB with other budget approaches, and proposes a practical guide grounded in observed best practices.

To operationalize ZBB in capital budget simulations, Table 2 outlines a practical guide. The proposed steps rest on sound theoretical principles and market practices. They follow a logical sequence—from strategic prioritization to detailed modeling—anchored in ZBB fundamentals as developed by Peter Pyhrr and subsequent literature. Each stage facilitates effective ZBB deployment, ensuring compatibility with the firm's accounting structure and expected outcomes.

This guide maintains flexibility to adapt across different business contexts while preserving a clear and specific orientation. Its emphasis on transparency, expenditure justification, and efficient resource allocation aligns directly with ZBB's core objectives. As a result, the proposed guide offers dynamic, interactive steps that help firms implement ZBB effectively.

Table 2: Practical Guide for Applying the ZBB Methodology to Expenditure Forecasting in Capital Budget Simulations

Etapas	Atividade
1. Resource Allocation Prioritization	Evaluate, together with the management team, which expenses are most crucial to the business operation during the Capital Budget assessment. The importance of each expense should be determined based on the company's business model. For example, if the company provides outsourced labor services, employee-related expenses tend to be the most relevant and significant.
2. Budget Base Preparation	Check with the company's accountants what the company's chart of accounts is and the level of detail of the accounts. At this stage, it is important to review each account individually and identify whether any accounts are missing or if there are duplicate accounts. If there are missing accounts, they need to be created; if there are duplicates, it is necessary to decide which account will be used for budgeting purposes. For the OBZ (Zero-Based Budgeting), it is important that the accounts are directly related to expenses, as marketing expenses should not be mixed with expenses of other natures and vice versa.
3. Definition of Budget Packages (ZBB)	List all of the organization's accounting accounts and cluster them based on similarities. For instance, grouping salary, benefits, payroll taxes, and commissions may result in a package titled "Personnel." These packages must align with the company's chart of accounts to ensure coverage of all necessary expenditures. Each package should fall into one of two categories: operational expenses or investments in fixed assets. Although the zero-based budgeting approach requires a justification of all expenses from scratch, reviewing the historical data of each account remains essential to avoid overlooking any critical expenditure.
4. Definition of Budget Assumptions (ZBB)	Identify all key variables capable of influencing the accounting accounts included in each budget package, and formulate assumptions regarding the potential fluctuation of these variables. For example, in the hypothetical "Personnel" package previously mentioned, commission payments may vary depending on sales volume—meaning that sales act as an assumption directly impacting the total commission amount. All assumptions must receive explicit justification from the organization's managers, as the final budget outcome derives directly from the foundational premises established during this stage.
5. Expenditure Projection Modeling	Develop spreadsheets for each budget package, ensuring the inclusion of separate tabs for assumptions and for the resulting budget projections corresponding to each accounting account. These spreadsheets must generate expenditure forecasts through the use of mathematical formulas. For instance, in a practical example involving the "Personnel" package, if the company's sales representatives receive commission-based compensation, the correlation becomes evident: higher sales volumes tend to generate higher commission payments. Mathematically, this relationship can be expressed as: *Commission = Total Sales Value × Commission Rate.*

Source: Prepared by the authors, 2024.

To illustrate the development of Expenditure Projection Modeling more practically, the following table presents two hypothetical scenarios for a budget package titled "Commercial Personnel," which includes accounts related to payroll expenses for employees in the commercial sector. This example aims to demonstrate the structure of a financial model based on distinct assumptions in two separate scenarios, highlighting how the definition of budget

assumptions (ZBB) can alter expenditure projections and, by extension, the capital budgeting outcomes. Therefore, all assumptions must receive thorough justification from the organization's managers and reflect the company's operational reality as accurately as possible.

Table 3: Example of Expenditure Projection Modeling for the "Commercial Personnel" Budget Package

Modeling Step	Assumptions and Accounting Items in the Package	Scenario 1	Scenario 2
a	Assumption 1: Sales Volume	R$ 1,000	R$ 1,000
b	Assumption 2: Sales per Salesperson	R$ 200	R$ 333
c = (a / b)	Number of Salespersons	5	3
d	Assumption 3: Salary and Payroll Charges per Salesperson	R$ 3.0	R$ 3.5
e = (c × d)	Accounting Item: Salaries and Payroll Charges	R$ 15.0	R$ 10.5
f	Assumption 4: Other Benefits per Salesperson	R$ 0.5	R$ 0.5
g = (c × f)	Accounting Item: Benefits	R$ 2.5	R$ 1.5
h	Assumption 5: Commission Rate incl. Charges (2% of sales)	2%	2%
i = (h × a)	Accounting Item: Commissions	R$ 20.0	R$ 20.0
j = (e + g + i)	Total Sales Force Expenses	R$ 37.5	R$ 32.0
k = (j / a)	Share of "Commercial Personnel" Expenses in Sales	3.8%	3.2%

Based on the table above, assuming that managers identify the possibility of adjusting the assumption "sales per salesperson" from R$ 200 to R$ 333, this change would lead to a projected reduction of two salespersons and an overall decrease in expenditures by approximately 0.6 percentage points. While the variation may appear minor in this example, applying such adjustments in real-world capital budgeting projects could yield significant financial savings. These savings, in turn, may positively affect the Free Cash Flow (FCF) and, consequently, enhance key economic-financial viability indicators such as Net Present Value (NPV) and Payback Period, both of which derive directly from these financial models.

This expenditure projection modeling process must extend to every budget package established by the company, with recommendations made at the level of individual accounting accounts to ensure comprehensive coverage of all organizational expenditures.

Conclusion

To mitigate potential biases in the interpretation of Capital Budgeting projects—particularly those arising from distorted projections—we propose the implementation of this practical guide for applying the Zero-Based Budgeting (ZBB) methodology to expenditure forecasting in capital budgeting simulations. Our main contribution lies in highlighting the relevance of expenditure predictability approaches within capital budgeting analyses, given that the outcome of such tools depends directly on the budgeting method employed.

The study reveals that, in terms of strategic decision-making, ZBB supports more grounded decisions by requiring detailed justifications for each expenditure, thereby fostering greater alignment among financial managers.

Regarding barriers and challenges, the most critical issues involve organizational resistance, the considerable time required for implementation, and the difficulty of adaptation in companies with multiple business units (Coyte et al., 2022). For this reason, we recommend: (1) gradual implementation in specific departments; (2) training programs to prepare managers for the methodology; and (3) the use of automation tools to streamline financial modeling.

Future research may explore the effectiveness of ZBB in large enterprises, its integration with artificial intelligence tools for budget process optimization, and its comparative applicability across various economic sectors. In addition, studies may investigate the strategic impact of ZBB, including its interaction with other financial management frameworks such as the Balanced Scorecard and Value-Based Management, to enhance strategic analysis and support more efficient capital allocation.

References

Almazan, A., Chen, Z., & Titman, S. (2017). Firm Investment and Stakeholder Choices: A Top-Down Theory of Capital Budgeting. *Journal of Finance*, 72(5), 2179-2288. https://doi.org/10.1111/jofi.12526

Ekholm, B.-G., & Wallin, J. (2011). The Impact of Uncertainty and Strategy on the Perceived Usefulness of Fixed and Flexible Budgets. *Journal of Business Finance & Accounting*, 38(1-2), 145–164. https://doi.org/10.1111/j.1468-5957.2010.02228.x

Coyte, R., Messner, M., & Zhou, S. (2022). The revival of zero-based budgeting: drivers and consequences of firm-level adoptions. *Accounting and Finance*, 62(3), 3147-3188. https://doi.org/10.1111/acfi.12884

de Souza, P., & Lunkes, R. J. (2016) Práticas de orçamento de capital: um estudo em empresas hoteleiras de Florianópolis (SC). *Anais Do Congresso Brasileiro De Custos - ABC*. Recuperado de https://anaiscbc.emnuvens.com.br/anais/article/view/266

Hartmann, M., & Weibenberger, B. E. (2024). Decision-making in the capital budgeting context: effects of type of decision aid and increases in information load. *Journal of Business Economics, 94*(2), 379-411. https://doi.org/10.1007/s11573-023-01165-5

Ibrahim, M. (2019). Designing zero-based budgeting for public organizations. *Problems and Perspectives in Management*, 17(2), 323–333. https://doi.org/10.21511/ppm.17(2).2019.25

Mondragón Delgado, L. F. ., & Oblitas Otero , R. C. . (2022). Managerial accounting and decision making in the company Estación de Servicios New Mejía E.I.R.L, Cutervo 2021. Sapienza: *International Journal of Interdisciplinary Studies*, 3(2), 214–230. https://doi.org/10.51798/sijis.v3i2.320

Soares, T. C., Schneider, J., Lima, C. M., & Soares, S. V. (2019). Budget and strategy: beyond budgeting as a tool for planning and budgetary control in a graduation course. *Revista Ibero-Americana De Estratégia*, 18(1), 126–138. https://doi.org/10.5585/ijsm.v18i1.2646

Pyhrr, P. A. (1981). Orçamento Base Zero: Um instrumento Administrativo Prático para a Avaliação de Despesas. São Paulo: Editora Interciência.

Rauwerda, K., & De Graaf, F. J. (2021). Heuristics in financial decision-making: the selection of SME financing by advisers in an increasingly diverse market. *Management Decision, 59*(7), 1728-1749. https://doi.org/10.1108/MD-09-2019-1269

Setting Consultoria. (2020). Empresas que utilizam Orçamento Base Zero: 5 cases de sucesso para se inspirar e implementar no seu negócio. Recuperado de https://setting.com.br/gestao-empresarial/empresas-que-utilizam-orcamento-base-zero-5-cases-de-sucesso-para-se-inspirar-e-implementar-no-seu-negocio/

Tandung Huynh, Guangming Gong, Huyhanh Huynh. (2013). Integration of Activity-Based Budgeting and Activity-Based Management. *International Journal of Economics, Finance and Management Sciences*, 1(4), 181-187. https://doi.org/10.11648/j.ijefm.20130104.11

Vadapalli, R. (2021). A Study On The Cases Of Abrupt Shifting From Conventional Budgeting To Zero Based Budgeting (Zbb) Under Covid 19 Pandemic Situation In The Small Scale Packaged Food Industry And Small Scale Natural Resource Industry In India. *The Management Accountant Journal*, 56(6), 30-33.