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Optimizing Cost Efficiency through Cost Control in Construction Projects: A Review

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Abstract - This study explores various methodologies and factors influencing budget performance across different sectors, particularly in construction and public budgeting. Construction projects are inherently complex and prone to cost overruns, making cost control a critical aspect of project management. This study investigates the impact of cost control on cost efficiency in construction projects. A neural network model was utilized to identify key management factors affecting project budget performance, focusing on critical aspects such as project manager experience, team turnover, and budget updates. Several monitoring techniques for cost and performance deviations, including Activity-Based Ratios, were also analyzed, revealing their varying effectiveness. In the public sector, performance-based budgeting systems were discussed, with an emphasis on integrating planning and performance metrics for more informed decision-making. Challenges in implementing such systems were highlighted, particularly regarding political and organizational barriers. In construction, various approaches were examined, including cost estimation frameworks and performance-based budgeting tools. The research underlined the importance of accurate budgeting and cost control measures in both construction projects and public administration, suggesting that strategic adjustments, better forecasting, and active stakeholder participation could improve overall budget performance. This research paper presents a comparative analysis of various process-based cost control models utilized in construction projects. The objective is to evaluate each model's effectiveness, advantages, and limitations to provide insights for project managers in selecting the most suitable approach for their specific project needs.

Key Words: Cost Efficiency, Cost Control, Construction, Projects

1.INTRODUCTION

Cost control is a critical aspect of construction project management, influencing project success and profitability. Traditional budgeting methods often fall short in addressing the complexities of modern construction projects. This paper explores process-based cost control models, which focus on the activities and processes involved in project execution.

Process-based budgeting is a financial management approach that focuses on the costs associated with specific processes or activities within an organization or project. This method contrasts with traditional budgeting, which often emphasizes overall departmental budgets without delving into the details of individual processes.

Optimizing cost efficiency in construction projects enhances profitability and ensures project success. Effective cost control practices can significantly mitigate the risk of budget overruns, which are prevalent in the industry.

Process-based cost control model meaning:

A process-based cost model estimates the costs associated with a program by connecting specific cost drivers (factors that influence costs) to the various stages of the program's lifecycle, including design, development, testing, and production. This model helps compare costs across different materials, processes, or product designs.

A "process-based cost control model" in construction is a method of managing project expenses by monitoring costs at each stage of the construction process. This approach allows for early detection and prevention of potential budget overruns by focusing on specific phases of work, rather than only reviewing the total budget.

The following are some steps for using a process-based cost model:

1. Describe the intended product
2. Model the processes required for production
3. Consider factors like cycle time, resources, and materials.

Process-based costing combines an operational and strategic view and can be used to identify areas where costs can be reduced. This can help manufacturers make better decisions about pricing, production volumes, and product mix.

Cost control is a fundamental component of any financial strategy, essential for maintaining a company's budget. Effective budget management involves several practices, such as categorizing expenditures, identifying key areas of significant spending, and implementing targeted measures to reduce costs within these areas. By executing these strategies successfully, organizations can maintain budget discipline and enhance profitability.

The principles underlying cost control in corporate finance align closely with those in personal budgeting. This article examines the concept of cost control, exploring its role within the broader framework of cost management systems.

1.1 Cost Control

Cost control encompasses the identification and reduction of expenses to enhance a company's profitability. This process can be implemented at both the project level and across the organization as a whole. This discussion will specifically address the application of cost control strategies within the context of individual projects or groups of projects [1].

As a project manager, cost control serves as a critical tool for monitoring the resource management plan and initiating corrective actions when overspending is detected. Utilizing a reporting tool can further facilitate the identification of budgetary excesses. For example, if a freelance designer hired for a project required more time than anticipated to complete image editing, this cost overrun may prompt a decision to employ an in-house designer for future projects, thereby optimizing cost-efficiency and improving operational effectiveness.

1.2 Importance of Cost Control

Achieving scope and budgetary goals can be challenging for any team; however, effective cost control provides a strategic solution. Even when a team operates within its budget, cost control techniques can further optimize expenditures, contributing to enhanced profitability. By offering insights into organizational spending patterns, cost control identifies high-cost areas and associated expenses, enabling more targeted financial management. Often, cost control is first implemented at the project level, reducing costs within individual projects to support overall profit growth for the company.

1.3 Key Determinants of Cost Control

A comprehensive understanding of the primary factors influencing project costs is crucial for effective cost management. By establishing a robust cost management framework and employing appropriate cost control techniques, project expenditures can be optimized, and processes streamlined. The following are some of the most pivotal cost determinants:

Labour Costs: Labour expenditures constitute a substantial portion of project costs. This encompasses wages, benefits, and other associated personnel-related expenses. Effective management of labour costs entails ensuring the deployment of appropriately skilled personnel in optimal quantities and utilizing their time productively.

Material Costs: The expenses associated with materials also represent a significant component of project budgets. This includes costs for raw materials, components, and other necessary physical items. To control material costs effectively, careful planning and ongoing oversight of procurement and material consumption are essential to avoid waste and prevent overspending. The adoption of a procurement management system, along with strategic supplier negotiations, can yield considerable savings.

Actual Costs: Actual costs refer to the real expenditures incurred during a project, in contrast to the initially estimated or budgeted figures. Continuously tracking actual costs is vital for identifying deviations from the budget and making timely adjustments to ensure financial control. Implementing cost accounting metrics and an integrated cost control system can help monitor actual spending and mitigate the risk of budget overruns.

Cost Variance: Cost variance is the discrepancy between actual expenditures and budgeted amounts. Analyzing cost variances enables project managers to pinpoint areas where costs are exceeding or falling short of expectations. This analysis provides valuable insights for investigating underlying causes and taking corrective actions. Regular reviews of cost performance indicators and comparisons with the baseline budget help to maintain financial discipline throughout the project's duration.

1.4 Return on Investment (ROI)

Return on Investment (ROI) serves as an indicator of a project's or investment's financial profitability, providing a comparison between the returns generated and the initial capital invested. In the context of cost control, evaluating ROI is crucial for making informed decisions about resource allocation, enabling the prioritization of expenditures that contribute to a

favorable financial outcome. By implementing efficient cost control strategies, the financial viability of the project can be enhanced, ultimately improving its overall profitability and long-term performance.

1.5 Effective Cost Control Techniques

While cost control initiatives often begin at the higher echelons of an organization, their implementation typically progresses to the project level. It is at this level that the actual costs associated with a project can be assessed, monitored, and effectively managed. By focusing on project-specific financial data, organizations can more accurately track expenditures, identify cost variances, and apply corrective measures to ensure financial performance aligns with established budgets and objectives.

Budget control parameters are metrics and guidelines that organizations use to manage and monitor their financial resources effectively. The following are some key budget control parameters:

1. Budget Variance: The difference between budgeted amounts and actual spending. It helps identify areas where spending is over or under the planned budget.
2. Expenditure Limitations: Predefined limits on spending for specific departments, projects, or activities to prevent overspending.
3. Revenue Projections: Estimates of income that guide budget creation and help assess financial performance against goals.
4. Cost Centers: Specific departments or units within an organization for which costs are tracked separately to facilitate accountability.
5. Financial Ratios: Metrics such as profit margin, return on investment (ROI), and debt-to-equity ratio that provide insights into financial health.
6. Cash Flow Management: Monitoring incoming and outgoing cash to ensure sufficient liquidity and avoid cash shortages.
7. Accountability Measures: Procedures that assign responsibility for budget performance to specific managers or teams.
8. Forecasting: Regularly updated predictions of future revenues and expenses to adjust budgets proactively.
9. Control Periods: Defined time frames (monthly, quarterly, yearly) for reviewing budgets and making necessary adjustments.
10. Contingency Funds: Allocated reserves for unexpected expenses or emergencies to maintain financial stability.

Using these parameters effectively can help organizations maintain financial discipline, make informed decisions, and achieve their strategic goals.

2. Comparative Analysis of Cost Control Models

A comparative analysis of cost control models (Refer Table 1) allows organizations to evaluate various approaches to managing and reducing expenses, ultimately informing the selection of the most effective strategy. Comparative analysis of these models reveals that each approach varies in complexity, implementation cost, and suitability for different organizational structures and project types, allowing managers to choose a model that aligns with the company's financial objectives and operational scale.

Table 1: Comparative analysis of cost control models

Model	**Description**	**Advantages**	**Disadvantages**
Traditional Cost Control Model	This model relies on line-item budgets and variance analysis.	Simplicity and familiarity among project managers.	Inflexibility and limited insight into process efficiencies.
Activity-Based Costing (ABC)	Allocates costs based on activities that drive costs.	Provides detailed insights into cost drivers.	Complexity in implementation and data collection.
Earned Value Management (EVM)	Integrates scope, schedule, and cost to assess project performance.	Comprehensive view of project health and early detection of issues.	Complexity in setup and data consistency requirements.
Lean Construction	Focuses on minimizing waste and maximizing value.	Enhances efficiency and promotes collaboration.	Requires cultural change and may face resistance.
Integrated Project Delivery (IPD)	A collaborative approach involving all stakeholders.	Shared risk and improved communication.	Complexity in contracts and trust requirements.

The choice of a cost control model significantly impacts the success of construction projects. While

traditional models offer simplicity, process-based models like ABC, EVM, Lean Construction, and IPD provide enhanced insights and flexibility. A hybrid approach that combines elements from multiple models may yield the best results in managing costs effectively.

Process-based budgeting is a valuable approach for organizations seeking to enhance their financial management and cost control practices. By concentrating on the activities that contribute to overall costs, this method provides organizations with deeper insights, fosters greater accountability, and helps align budgets with strategic goals. However, successful implementation requires careful planning and continuous oversight to fully realize its advantages.

Process costing, on the other hand, is an accounting technique commonly employed by firms engaged in mass production of homogeneous or nearly identical products. This method is prevalent in industries such as manufacturing, where the cost of producing each unit is relatively consistent, making it impractical to track costs for individual items during the production process. For instance, oil companies producing vast quantities of fuel or food manufacturers producing large volumes of uniform snack packages typically utilize process costing to manage and allocate production costs efficiently.

3. Past Research Studies

The following are past research studies on optimizing cost efficiency through cost control in construction projects.

Chua et al. (1997) employed a neural network model to identify key management factors influencing project budget performance, particularly in construction. Utilizing field data, the study developed a predictive budget performance model capable of generating accurate outcomes even with ambiguous input factors. Eight critical factors were highlighted, including organizational levels, project manager experience, design detail, constructability programs, team turnover, control meetings, budget updates, and control system budgets. This model provides project teams with strategic insights into the essential management factors that promote effective budget performance, offering a valuable tool for enhancing budget control in complex project environments [2].

Al-Jibouri et al. (2003) investigated the effectiveness of several monitoring systems in detecting deviations from planned cost and performance, examining the Leading Parameter technique, Variances method, and Activity-Based Ratios technique. The study evaluated these systems through theoretical analysis and simulation, developing a project model to mimic project progress and produce relevant cost and performance data. Key factors influencing cost and performance were represented by adjustments to the project plan and inflation rates. Results indicated that the Activity-Based Ratios technique provided a clearer overview of overall project progress, although generalizability was limited due to the study's restricted dataset [3].

Young et al. (2003) examined the shift in government focus toward public budgeting to adapt to global changes and provide policymakers with reliable information. They highlighted that governments were increasingly evaluating public service quality, value, and societal impact. To address these goals, many governments had adopted performance-based budgeting systems, integrating planning and performance metrics with budget decisions. This approach enabled more informed, strategic decision-making that considered long-term effects and measurable progress. The study discussed key aspects of performance measurement and budgeting, including definitions, applications, criteria, strategic elements, and insights gained from previous implementation efforts, underscoring the value of a results-driven budgeting model [4].

Van Landingham et al. (2005) reviewed Florida's performance-based program budgeting (PB2) reform, introduced in 1995, which provided valuable accountability information to legislators for policy and budget decisions. While the reform improved consensus on government programs, it did not significantly alter the way budgets were developed or decisions were made. Key implementation challenges included Florida's organizational structures, technical content, and budgetary processes, which limited the reform's progress. The study suggested that making unit cost information more accessible could facilitate continued reform, but emphasized that organizational dynamics, such as leadership and integration issues, were more critical than technical factors in driving meaningful change [5].

Fortune et al. (2006) emphasized the importance of accurate building project price forecasting for client decision-making, noting that poor forecasts could negatively affect value-for-money business decisions. The practice of budget price forecasting faced challenges, particularly with the rejection of calls for more stochastic models. The authors proposed a research agenda focused on process standardization, practitioner judgment, and information engineering approaches to improve forecasting practices. They highlighted the need for emerging tools, such as neural networks, neuro-fuzzy networks, sustainability models, and whole-life cost models, and called for the development of a project-based simulator or decision aid to promote a more probabilistic approach [6].

Günhan et al. (2007) developed a methodology to reduce an owner's construction contingency budget by

analyzing historical project data, identifying problematic line items, and taking corrective actions during the preconstruction phase. A case study demonstrated that a systematic approach could significantly minimize contingency fund requirements, with a 10% allocation in most projects. This approach promoted early decision-making and helped reduce the need for large contingency funds, thus improving budget efficiency in construction projects [7].

Liu et al. (2007) explored the critical factors influencing effective cost estimation in construction projects, drawing from organizational control theory and cost estimating literature. They developed a theoretical framework identifying key factors during each project phase. As the cost estimating process advanced, task programmability and output measurability improved, shifting the control effort from input-oriented to a combination of output and behavior control. While the framework requires further empirical validation, it offers construction companies valuable insights into resource allocation, helping them manage critical factors to enhance estimating effectiveness and improve competitiveness [8].

Lai et al. (2007) addressed the issue of unreliable construction project budgeting in Taiwan, where regulations only provided qualitative descriptions of the process. They proposed a novel procedure integrating an analytical hierarchy process (AHP)-based multi-criteria evaluation model with a simulation-based cost model. This procedure used AHP to reflect officer evaluations and generated a cumulative cost distribution for setting project budget boundaries. Its merits were demonstrated through application to a Taiwanese project. The study contributed to the budgeting process by establishing evaluation criteria and associated weights, proposing a user-friendly computerized system for automating the procedure in future projects [9].

Robinson et al. (2009) presented a basic model of performance-based budgeting suitable for low-income countries (LICs) with limited resources and capacity. They emphasized that such budgeting should not be introduced in countries with dysfunctional public financial management (PFM) and governance systems. The study discussed more complex models that may not be suitable for many countries, suggesting that performance-based budgeting should be part of broader reforms, including civil service and institutional changes. They recommended a scaled-down model for LICs with sound fiscal policy, reliable PFM systems, and improved capacities to enhance public expenditure efficiency and effectiveness [10].

Olawale et al. (2010) conducted a survey of 250 UK construction project organizations to identify factors that hinder time and cost control during construction projects. The study found that design changes, risks, inaccurate time evaluations, complexities, and subcontractor non-performance were the main inhibitors. They developed 90 mitigating measures, categorized as preventive, predictive, corrective, and organizational. These measures provided a checklist for project managers to improve control effectiveness. The study also highlighted the correlation between cost and time control issues and suggested that further research was needed to address additional factors and evaluate the effectiveness of these measures during project execution [11].

Bahaudin et al. (2012) examined the cost control methods and procedures used by construction practitioners in Malaysia, focusing on corrective project control. The research involved interviews with G7 contractors, including some Bursa-listed companies. The study found a lack of effective cost control procedures, with contractors relying on conservative strategies and conventional methods. Despite the availability of cost control tools like S-curves and earned value, many contractors did not use any computer software for cost control. The study concluded that improvements were essential for better early detection of potential project problems and more efficient cost control [12].

Azevedo et al. (2013) The Brazilian apartment building sector developed the MCDA-C methodology to improve budget performance evaluation. This approach helped decision-makers understand current situations, plan improvements, ensure quality, and prioritize actions. The methodology included identifying relevant criteria, measuring them, and applying the constructivist paradigm. While it proved effective, it required adaptation due to its focus on context and decision-maker's values. The study suggested that future research should test the model's applicability in other civil engineering contexts to assess its generality [13].

Yang et al. (2014) analyzed budget changes in Taiwanese construction projects, identifying client changes, inaccurately estimated quantities, and unclear drawings as the main causes. The study provided insights that could help project managers correct budget allocation errors. It highlighted the need for innovative cost management methods, particularly in a low-profit environment. However, the research had limitations, including a small sample size and limited questionnaire responses, which suggested the need for broader data collection to strengthen the findings [14].

Cheng et al. (2014) used the Modified Delphi Method and Kawakita Jiro method to identify key cost-influencing factors in construction projects. Ninety factors were identified, consolidated into four categories, and analyzed. The study revealed that a clearly defined project scope and effective cost control

were crucial in preventing cost overruns. It emphasized the need for better communication with clients, understanding contract scope, and implementing cost-control measures during project execution to ensure successful cost management [15].

Hwang et al. (2015) focused on the importance of accurate budget cost estimation in construction projects, which often suffered from significant errors. It identified limitations in current forecasting practices and suggested that the Bayesian approach was more effective. The study demonstrated the practical application of Bayesian analysis using historical cost data, highlighting its ease of use with large datasets. The paper called for further tests on non-homogeneous data sets to validate the approach's effectiveness in different contexts [16].

Tang et al. (2015) introduced activity-based costing (ABC) for better cost accounting and forecasting in construction projects. ABC helped calculate actual and budget costs, analyze cost deviations, and predict material supply-demand relationships. The study demonstrated how adjusting activities and resource supply based on budget discrepancies improved cost management and competitiveness. By eliminating non-value-added activities, ABC refined cost control processes, supporting organizational strategy and enhancing contractors' competitiveness in construction projects.

Timo et al. (2015) explored the managed care system's contract-based budgeting model and its impact on resource flow control in municipal and hospital budgets. It found that despite the introduction of the CBB, budgetary biases persisted due to conservative revenue estimations and strict balance requirements. The research revealed that changes in budgeting practices were incremental rather than revolutionary, suggesting that understanding institutional forces was key to evaluating the persistence of budgetary bias and its limited impact on budget accuracy.

Al-Reshaid et al. (2015) introduced a Project Control System (PCS) methodology for the pre-construction phases of construction projects. The proactive approach aimed to identify problems and bottlenecks early, helping to control time and budget effectively. By focusing on risk review, budget preparation, and innovative contractor ideas, the methodology promised positive results. The authors emphasized that the PCS could significantly improve the competitive performance of construction projects by preventing time and cost overruns [17].

Falcón et al. (2016) explored the Process-based Budget (POP) model to improve efficiency in Spain's construction sector. The model helped with transparent cost estimation and identified potential cost omissions. It proved versatile and reliable for use in different stages of building projects. The study suggested further research into an integral model for managing construction works and transferring the process-based budgeting approach to production networks, aiming to enhance the economic management of construction projects.

Roestel et al. (2016) examined the benefits of a collaborative approach to corporate budgeting, emphasizing the inclusion of operational employees. It found that operational insights contributed to more meaningful budget processes. The study recommended that organizations fostering collaboration could create budgets that positively influence business stability and investor confidence. It proposed that a cooperative decision-making approach could lead to more effective financial models that reflect shared goals and enhance resource utilization.

Shahtaheri et al. (2016) proposed a method to incorporate uncertainty and risk in the estimation phase of megaprojects. A stochastic event simulation model, using Monte Carlo simulation and Microsoft ProjectTM, was developed to account for risks and uncertainties in the project schedule. The model was validated using a nuclear plant project, allowing estimators to consider specific risks for each activity type. The study demonstrated that the method reduced runtime and improved risk management, making it a valuable tool for project estimation [18].

Jayaraman et al. (2016) discussed how Tata Steel re-engineered its project management methods for the Cold Rolling Mill Project (CRMP). The study revealed key factors contributing to project failures and highlighted how Tata Steel benchmarked with industry leaders to improve project costs. The implementation of the PCCS methodology over five years led to significant improvements in cost management. The paper encouraged project management communities to adopt holistic approaches to reduce cost escalations in future projects.

Sheth et al. (2017) outlined the process for preparing functional and master budgets within organizations. It emphasized cooperation among functional heads to develop a feasible master budget through a systematic, participative approach. The success of the budget depended on balancing challenges with attainability, ensuring that the budget aligned with long-term organizational goals. The study highlighted the importance of participative budgeting in dynamic environments, where flexibility and collaboration are key to maintaining realistic and actionable budgets [19].

Kurakova et al. (2017) explored process-based budgeting in the management of development projects, specifically for nuclear power plant units. The paper presented a business model that linked development project processes to construction tasks, facilitating efficient cost control. It discussed the advantages of modern software tools for automating cost tracking

and ensuring accurate financial and operational data. The research suggested that switching to process-based budgeting could solve issues related to conventional budgeting, improving project efficiency and resource management [20].

Nikitina et al. (2017) emphasized the importance of budget planning in cost management within the market economy. Construction companies, facing long production cycles and low working capital turnover, required constant resource mobilization for development and profit maximization. The authors focused on the implementation of a budgeting system at LLC "Stroytekhnologiya," particularly on income and expenses budgeting. They developed a dynamic budget structure to address challenges encountered by construction organizations, contributing valuable insights to improving cost management strategies within the construction industry [21].

Hijal-Moghrabi et al. (2017) explored the adoption of Performance-Based Budgeting (PBB) in major U.S. cities, particularly Texas. Despite the widespread use of performance measures, the study found that no budgets fully qualified as performance-based. PBB, while similar to classical normative theory, faced practical and political challenges. The research emphasized the need for performance measurement systems, skilled staff, and political support for successful PBB implementation. It concluded that PBB serves as an accountability tool but faces significant barriers that hinder its broader application in government budgeting [22].

Hijal-Moghrabi et al. (2018) investigated the rationalization of government budgetary decision-making with a focus on performance-based budgeting (PBB). It emphasized the challenges in linking allocations to performance results and the difficulty of fully implementing PBB. The study acknowledged the role of incrementalism and organizational learning in shaping budgetary processes, highlighting the complexity of rationalizing decision-making in a pluralistic democracy. The paper argued that PBB reflects the government's priorities but faces challenges in fully integrating performance-based outcomes into the budgeting process [23].

Aliabadi et al. (2018) focused on identifying key cost-influencing factors in construction projects and developing methods to control expenditure. The study applied the Modified Delphi Method and Kawakita Jiro method to rank 90 factors, revealing that a clearly defined project scope and cost control measures were essential in preventing cost overruns. The authors emphasized the importance of effective communication with clients and the implementation of robust cost-control measures during project execution to ensure cost management success.

Mauro et al. (2018) examined the variation of performance-based budgeting (PBB) practices across organizations in Italy. It found that while managerial reforms existed, they were more supported by administrations rather than seen as mandatory. The research highlighted the role of technical and managerial competencies in promoting PBB and emphasized the importance of involving stakeholders at all levels in defining shared regulations. The study called for context-specific approaches to PBB and suggested that future research should explore practice variation within countries to understand the process of institutionalizing PBB [24].

Idan et al. (2019) discussed the importance of accurate cost estimate management in construction projects, focusing on the challenges posed by unexpected changes. The study explored common techniques used in cost estimation, such as document-based project details, expert opinions, and close cost estimates. However, it noted that more sophisticated methods, like organizational processes and bottom-up estimation, were less frequently used. The findings emphasized the need for more precise cost estimation practices to improve project outcomes and reduce financial discrepancies [25].

Jiang et al. (2020) explored the issue of over-budgeting in construction projects and the potential for using big data analysis to improve cost control. The research introduced a new method combining list classifiers and K-means clustering to detect anomalous data more accurately than traditional anomaly detection methods. The experimental results demonstrated the method's effectiveness in identifying discrepancies related to integrated unit prices and list descriptions. The paper concluded that big data analysis could significantly improve cost management by addressing common budgeting errors in construction projects [26].

Albtoush et al. (2020) examined factors affecting cost performance in construction projects, analyzing data from 41 reviews. The study identified key factors, such as design changes, poor site management, and material price fluctuations, that impact cost performance. It also highlighted issues like poor scope definition and inaccurate cost estimates, which contribute to budget overruns. The authors emphasized the need for proactive cost management practices and the implementation of project management tools to ensure project success, urging stakeholders to actively engage in effective cost control [27].

Khoo et al. (2024) evaluated the impact of budgeting process elements on government budget performance in Malaysia. A survey of budget officers revealed that budget participation, implementation, and evaluation significantly impacted budget performance. While budget preparation was found to have no significant relationship with performance, it had a positive effect. The study highlighted the

importance of involving employees at all levels in budgetary activities and the need for regular budget reviews. It recommended the establishment of communication channels and real-time reporting systems to enhance budgeting practices in the Malaysian public sector. Future research was encouraged to explore qualitative methods for deeper insights [28].

3.1 Major outcomes from past research studies

The following are the major outcomes based on past research studies:

1. The study created a model that accurately forecasts budget performance in construction projects, even with ambiguous input factors [2].
2. The model provided project teams with valuable guidance on the management factors essential for effective budget performance, improving budget control in complex construction projects [2].
3. The study underscored the importance of a results-oriented approach to budgeting, ensuring more effective resource allocation and better public sector outcomes [4].
4. Highlighted the crucial role of budget planning in cost management for construction companies [21].
5. Identified key cost-influencing factors in construction projects using the Modified Delphi and Kawakita Jiro methods
6. Suggested that more sophisticated methods like organizational processes and bottom-up estimation were less common but needed for accurate cost management [25].

4. CONCLUSIONS

The following are the conclusions based on past research studies:

1. The key factors influencing budget performance, including organizational levels, project manager experience, design detail, constructability programs, team turnover, control meetings, budget updates, and control system budgets.
2. Governments increasingly adopted performance-based budgeting systems to evaluate public service quality, value, and societal impact.
3. Developed a dynamic income and expenses budget structure to address construction industry challenges.
4. Stressed the need for performance measurement systems, skilled staff, and political support for Performance-Based Budgeting (PBB) implementation.
5. Emphasized the importance of technical and managerial competencies and involving all stakeholders in the Performance-Based Budgeting (PBB) process.

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