International Journal of Education, Vocational and Social Science
https://e-journal.citakonsulindo.or.id/index.php/IJEVSS
E-ISSN : 2963 4954
IJEVSS

The Impact Of Budget Efficiency, Work Patterns, And Work Facilities On Performance Through Budget Management

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Abstract

Through budget management at the National Research and Innovation Agency's Energy and Manufacturing Research Organization (BRIN), this research examines the impact of work patterns, work facilities, and budget efficiency on employee performance. A quantitative survey design is used in the investigation. 300 public servants make up the population, and 172 respondents were obtained via probability sampling using the Slovin formula with a 5% margin of error. PLS-SEM, or partial least squares structural equation modeling, is used to analyze data using SmartPLS 4.0. With path coefficients of 0.272, 0.356, and 0.340, respectively, the findings demonstrate that budget efficiency, work patterns, and work facilities have a positive and substantial impact on budget management. With values of 0.270, 0.215, and 0.157, budget efficiency, work patterns, and work facilities all significantly improve performance directly. Performance is positively impacted by budget management, with a value of 0.366. A satisfactory model fit is shown by an SRMR of 0.068, and the model accounts for 59.2% of the variation in budget management and 68.1% of the variance in performance. Budget efficiency (0.100), work patterns (0.130), and work facilities (0.124) are all significantly impacted indirectly by budget management. Budget management acts as a partial mediator in all three connections since the direct and indirect channels are still important. These results emphasize how crucial it is to combine resource efficiency, flexible work schedules, sufficient facilities, and responsible budget management in order to maintain public-sector research success.

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Keywords: Budget efficiency; Work patterns; Work facilities; Budget management; Employee performance; PLS-SEM; BRIN.

INTRODUCTION

It is required of public research institutions to continue producing high-quality research while adjusting changes in technology, financial limitations, and increasingly complicated accountability obligations. The Energy and Manufacturing Research Organization under BRIN supports national goals in manufacturing, transportation, energy, and technology development. The Budget Implementation Performance Indicator (IKPA) decreased from 94 in 2023 to 92 in 2024 and 90 in 2025, among other organizational indicators, while material and significant audit findings remained above the target of zero, according to the source thesis, which highlights a practical performance challenge. The link between resource utilization, work organization, facilities, budget governance, and performance is especially crucial under these circumstances. The quality of budget management is closely linked to efficiency, accountability, and the accomplishment of organizational objectives, according to recent public-sector research (Cahyani et al., 2024; Hasoloan et al., 2024; Retnosari et al., 2022).

Budget efficiency in this study is not interpreted simply as expenditure reduction. It refers to the ability to allocate funds accurately, save costs, minimize waste, optimize available resources, and still achieve program outputs. This distinction is essential because an overly narrow austerity approach may reduce operational capacity even when spending appears efficient. Evidence from government organizations shows that efficiency and effectiveness must be evaluated together with the quality of outputs and public services. Stevani and Saifuddin (2025) document relatively efficient budget management in a central-government context, whereas Yuliati (2025) shows that aggressive efficiency policies can constrain operational resources and public-service performance. Budiharto and Herawati (2026) further demonstrate that budget efficiency can improve organizational performance directly and through a mediating management mechanism. These findings support examining whether efficiency strengthens performance at BRIN through better budget management rather than through expenditure reduction alone.

The second problem relates to work habits. With the use of task-based coordination and digital communication, BRIN offers flexible solutions such as work from anywhere (WFA), work from home (WFH), and work from office (WFO). Research from throughout the world demonstrates that when job design, coordination, and employee autonomy are handled properly, hybrid and geographically flexible employment can maintain or even increase performance.

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(Bloom et al., 2024; Choudhury et al., 2021; Wang et al., 2021). However, working from home also creates challenges related to communication, isolation, boundaries, and self-management (Ipsen et al., 2021). Indonesian studies likewise report that WFH and flexible working arrangements can affect productivity and employee performance, but the strength of the effect depends on organizational support, work engagement, motivation, and work environment (Darwati, 2023; Narpati et al., 2021; Rahmawati & Pusparini, 2023; Sormin et al., 2021).

Work facilities form the third resource dimension. Research employees require suitable equipment, information technology, communication networks, workspaces, research facilities, and reliable maintenance. Inadequate facilities can create delays and reduce the ability of employees to convert competence and time into measurable output. Hazmi and Nugraha (2021) find a significant relationship between work facilities and employee performance, while Sjahruddin et al. (2022) show that facilities can affect both satisfaction and performance. More recent studies also support the importance of adequate facilities in public and organizational contexts (Astria et al., 2024; Az'zahra et al., 2024; Devi & Rizky, 2025). Accordingly, facilities should be treated not as a passive background condition but as an organizational resource that can influence both the quality of budget utilization and employee performance.

Budget management provides the mechanism that can connect these three resource dimensions to organizational outcomes. It covers planning, implementation, administration, reporting, and accountability. Performance-based budgeting research indicates that clearer budget targets, participation, and systematic control can strengthen managerial or institutional performance (Gasperz et al., 2024; Miharto et al., 2025; Wardani & Silvia, 2021). Miharto et al. (2025) further show that planning and budget execution influence budget-management performance, with control operating as an important linking mechanism. The source thesis therefore positions budget management as a mediator between budget efficiency, work patterns, work facilities, and performance. This integrated model is particularly relevant in a research organization because work flexibility and facilities themselves have resource implications that must be planned and controlled through the budget system.

Prior studies commonly examine budget efficiency, flexible work, facilities, or performance separately. Research on budget efficiency frequently focuses on expenditure ratios or fiscal effectiveness, while studies of flexible work concentrate on productivity, engagement, or work-life outcomes. Likewise, facilities are often tested as a direct determinant of performance. As a result, there is limited empirical evidence that simultaneously evaluates these three dimensions within one public research organization and places budget management between organizational

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inputs and employee performance. This gap is important because the same resource may generate different performance outcomes depending on how it is planned, administered, monitored, and accounted for. The mediation evidence reported by Budiharto and Herawati, (2026) and the budget-control mechanism identified by Miharto et al. (2025) indicate that indirect pathways can be substantively important.

A second gap concerns the institutional setting. Much of the flexible-work literature is based on private firms or broad employee samples, although evidence from public financial organizations and government employees is growing (Az'zahra et al., 2024; Darwati, 2023; Rahmawati & Pusparini, 2023). BRIN's Energy and Manufacturing Research Organization combines public-sector accountability with research work that can require laboratories, specialized facilities, digital collaboration, and geographically flexible coordination. This combination makes the relationship among work patterns, facilities, and budget management different from a conventional administrative office. It also creates a setting in which employee performance cannot be interpreted only as attendance or short-term output.

Methodologically, the thesis uses PLS-SEM to evaluate a multi-construct model with simultaneous direct and indirect effects. This approach permits the measurement model and structural model to be evaluated together and is appropriate for estimating mediation in a model containing multiple latent constructs.

PUBLIC-SECTOR PERFORMANCE AND BUDGET MANAGEMENT

The amount and quality of work completed in fulfilling organizational duties is reflected in employee performance. According to the original thesis, cooperation, responsibility, punctuality, work quantity, and quality all demonstrate performance. These factors must be considered in conjunction with accountability and the accomplishment of research program goals in a public research institution. This process is aided by budget management, which converts strategic goals into planned actions and financial resources, manages their execution, reports on their realization, and establishes responsibility for the use of public monies. Hasoloan et al. (2024) emphasize that compliant and well-organized budget processes support efficiency and effectiveness, while Retnosari et al. (2022) show that budget effectiveness and efficiency are closely related to organizational financial performance.

Performance-based approaches further suggest that budgeting is most useful when financial inputs are linked to explicit outputs and responsibilities. Wardani and Silvia (2021) report that performance-based budgeting and budget-target clarity strengthen accountability

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performance. Gasperz et al. (2024) find that budget participation has a positive relationship with managerial performance, and Miharto et al. (2025) identify significant links among performance-based planning, budget implementation, control, and budget-management performance. These studies provide the theoretical basis for expecting stronger budget management to support employee performance in the BRIN research context.

BUDGET EFFICIENCY, BUDGET MANAGEMENT, AND PERFORMANCE

Budget efficiency concerns the relationship between resources used and outputs achieved. The thesis operationalizes this construct through accurate budget allocation, cost savings, minimal waste, optimization of budget use, and achievement of program outputs. This operationalization follows a value-for-money logic: resources should be conserved without undermining the intended results. Cahyani et al. (2024) demonstrate that the efficacy and efficiency of public spending may be evaluated, and Stevani and Saifuddin (2025) indicate that central government budget management is very efficient. However, Yuliati (2025) warns that when efficiency initiatives are implemented with an overwhelming focus on budget limitations rather than service delivery, they may impair operational capacity.

Therefore, when efficiency is combined with proper allocation and management, a good link with performance is anticipated. Budiharto and Herawati (2026) offer pertinent evidence that budget efficiency functions through an intermediate risk-based planning mechanism and has a favorable impact on performance. According to the current paradigm, budget management is supposed to carry out a similar organizational function: effective resource usage should enhance the quality of planning and execution, which may subsequently promote worker production. Both the direct and indirect routes from budget efficiency to budget management and performance are supported by this logic.

WORK PATTERNS, BUDGET MANAGEMENT, AND PERFORMANCE

Work patterns describe how employees organize time, location, task execution, discipline, and productivity. The thesis measures work patterns through flexibility of working time, flexibility of work location (WFO, WFH, and WFA), effectiveness of task implementation, work discipline, and work productivity. Flexible work may improve autonomy and reduce commuting costs, but it can also increase coordination demands. Choudhury et al. (2021) find productivity benefits from geographic flexibility, while Bloom et al. (2024) show that hybrid work can improve retention without damaging performance. Wang et al. (2021) demonstrate that effective remote work

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depends on work design and social support, and Ipsen et al. (2021) document both advantages and disadvantages of home-based work.

Indonesian evidence is broadly consistent but context dependent. Narpati et al. (2021) report that WFH and the work environment affect public-employee productivity. Rahmawati and Pusparini (2023) find that flexible working arrangements contribute to work engagement and employee performance in a government financial organization. Darwati (2023) also identifies a positive relationship between WFH and employee performance, whereas Sormin et al. (2021) show that the performance consequences of WFH coexist with other factors such as stress and competence. Because flexible arrangements require technology, coordination, and administrative support, they can also affect how resources are planned and controlled through the budget process.

WORK FACILITIES, BUDGET MANAGEMENT, AND PERFORMANCE

Work facilities include the equipment, physical conditions, technology, and supporting infrastructure required to perform tasks. The thesis measures facilities through completeness of work equipment, equipment quality, workplace comfort, ease of facility use, and facility maintenance. Adequate facilities reduce operational friction and allow employees to complete tasks with greater accuracy and continuity. Hazmi and Nugraha (2021) report significant effects of work facilities on employee performance. Sjahruddin et al. (2022) likewise find that facilities influence both satisfaction and performance, although the mediated relationships depend on the tested variable.

Recent evidence reinforces the importance of this resource dimension. Astria et al. (2024) find a positive relationship between facilities and employee performance with job satisfaction as an intervening variable, Az-Zahra et al (2025) report a significant effect of work facilities on employee performance, and Devi and Rizky (2025) show that facilities contribute to employee job satisfaction in a public financial-management agency. Facilities also have direct budget implications because procurement, maintenance, access, and renewal must be planned and administered. Consequently, facilities may affect performance both directly and indirectly through better budget management.

BUDGET MANAGEMENT AS A MEDIATING MECHANISM

A mediator explains how or through what organizational process an antecedent contributes to an outcome. In this study, budget management is expected to translate budget

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efficiency, work arrangements, and facilities into coordinated program implementation and employee performance. The mechanism is plausible because resource efficiency affects the amount and allocation of funds; work patterns affect operational needs and coordination costs; and facilities create procurement and maintenance requirements. When these inputs are reflected in sound planning, implementation, administration, reporting, and accountability, the organization can convert them into more reliable work outputs.

Empirical research supports the importance of intermediate organizational processes. Budiharto and Herawati (2026) show a significant indirect effect of budget efficiency on internal-audit performance through risk-based planning. Miharto et al. (2025) demonstrate that budget control mediates relationships among planning, implementation, and budget-management performance. In a different human-resource context, Astria et al. (2024) show that facilities can influence performance through an intervening satisfaction mechanism. Together these studies suggest that direct effects alone may understate how organizational resources are converted into performance.

The present study therefore evaluates three mediated paths: budget efficiency → budget management → performance; work patterns → budget management → performance; and work facilities → budget management → performance. Under the interpretation rule specified in the source thesis, a significant indirect effect combined with a remaining significant direct effect indicates partial mediation. This classification is applied consistently to the SmartPLS bootstrapping results reported in the thesis.

RESEARCH METHOD

RESEARCH DESIGN AND DATA

A quantitative survey design is used in the study. In addition to organizational papers and literature utilized in the source thesis, primary data is gathered via questionnaire responses of civil servants at BRIN's Energy and Manufacturing Research Organization. A five-point Likert scale, spanning from strongly disagree to strongly agree, was used in the questionnaire. The individual employee serves as the analytical unit. Five latent characteristics are present in the structural model: employee performance (Y), work patterns (X_2), work facilities (X_3), budget management (Z), and budget efficiency (X_1). Using SmartPLS 4.0, partial least squares structural equation modeling (PLS-SEM) is used to analyze data.

There are two interconnected structural elements in the model. The first assesses if budget management can be explained by work patterns, work facilities, and budget efficiency. The second

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assesses how budget management and the three external factors directly affect performance. The importance of both direct and indirect channels is then tested via bootstrapping. The following is a representation of the structural relationships:

$$Budget\ Management\ (Z) = \beta_1 Budget\ Efficiency + \beta_2 Work\ Patterns + \beta_3 Work\ Facilities + \varepsilon_1$$

$$Performance\ (Y) = \beta_4 Budget\ Efficiency + \beta_5 Work\ Patterns + \beta_6 Work\ Facilities + \beta_7 Budget\ Management + \varepsilon_2$$

POPULATION AND SAMPLING

300 federal personnel employed by the Energy and Manufacturing Research Organization make up the study population. To give every employee a chance to be chosen, probability sampling is employed. Using a 5% margin of error, the sample size is determined using the Slovin formula: $n = 300/[1 + 300(0.05^2)] = 171.43$, rounded to 172 respondents. The dataset utilized in the PLS-SEM analysis consists of these 172 replies. Therefore, instead of using deliberate selection, the source thesis blends a probability-based sample with an organization-wide population frame.

Table 1. Population, Sampling, and Analytical Design

No.	Sampling / analytical item	Parameter	Value
1	Population: civil servants, OR Energy & Manufacturing – BRIN	PNS	300
2	Sampling method: probability sampling	Random	-
3	Sample-size calculation: Slovin formula	e = 5%	171.43
4	Final rounded sample	n	172
5	Primary instrument: questionnaire	Likert 1–5	172
6	Data collection	2026	n = 172
7	Analysis: PLS-SEM	PLS4	-
8	Significance	Bootstrap	$p < 0.05$

Source: Source thesis, research-data processing, 2026.

VARIABLE MEASUREMENT

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Table 2. Research Constructs and Operational Indicators

Variable	Code	Operational indicators
Budget efficiency	X_1	Accurate budget allocation; cost savings; minimal waste; optimization of budget use; achievement of program outputs.
Work patterns	X_2	Flexible working time; flexible work location (WFO/WFH/WFA); task effectiveness; work discipline; work productivity.
Work facilities	X_3	Completeness of equipment; equipment quality; workplace comfort; ease of facility use; facility maintenance.
Budget management	Z	Budget planning; implementation; administration; reporting; accountability.
Employee performance	Y	Work quality; work quantity; timeliness; responsibility; cooperation.

Source: Operational definitions and indicators reported in the source thesis.

PLS-SEM ESTIMATION AND MEDIATION ANALYSIS

Indicator loadings, convergent validity, discriminant validity, and internal-consistency reliability are used to assess the measurement model. The thesis reports Cronbach's alpha and composite reliability scores over 0.70 for each of the five constructs, using loading and average variance extracted criteria. Collinearity diagnostics, R-squared, effect size (f2), model fit, path coefficients, t statistics, and bootstrapped p-values are used to assess the structural model. When $t > 1.96$ and $p < 0.05$ at the 5% level, a route is considered statistically significant.

The bootstrapped specific indirect effects are used to evaluate mediation. The product of the pertinent path from an exogenous construct to budget management and the path from budget management to performance is known as the indirect coefficient. According to the source thesis, the mediator is regarded as partial mediation when both direct and indirect effects are substantial; complete mediation may be recommended when only the indirect impact is important. This article presents the original coefficients, t statistics, and p-values from the thesis while keeping that choice rule.

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RESULT

RESPONDENT PROFILE

The analysis is based on 172 respondents. Men account for 59.3% and women for 40.7%. The largest age group is 30–40 years (43.6%), followed by 41–50 years (32.0%), above 50 years (19.8%), and below 30 years (4.6%). The sample is also experienced: 47.7% of respondents have worked for more than 15 years, 23.8% for 11–15 years, 23.3% for 5–10 years, and 5.2% for less than five years. The distribution indicates that the dataset predominantly reflects employees with substantial organizational experience while still representing younger and shorter-tenure groups.

Table 3. Respondent Characteristics, n = 172

Dimension	Category A	%	Category B	%	Total
Gender	Male	59.3	Female	40.7	100%
Age	< 30 years	4.6	30–40 years	43.6	
Age	41–50 years	32.0	> 50 years	19.8	100%
Tenure	< 5 years	5.2	5–10 years	23.3	
Tenure	11–15 years	23.8	> 15 years	47.7	100%
Sample	Valid respondents	172	Population	300	
Method	Probability sampling	-	Margin of error	5%	
Instrument	Likert scale	1–5	Data type	Primary	
Organization	BRIN	-	Unit	OR Energy & Manufacturing	
Analysis	PLS-SEM	-	Software	SmartPLS 4.0	
Year	Research data	2026	Respondent base	Civil servants	

Source: Questionnaire and respondent profile reported in the source thesis, 2026.

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Strong internal consistency is shown by the measurement model. Composite dependability (rho_c) runs from 0.940 to 0.954, whereas Cronbach's alpha goes from 0.929 to 0.946 These values are above the 0.70 threshold used in the source analysis. The thesis also reports that the retained indicators satisfy the required loading and validity criteria. The reliability results therefore support proceeding to interpretation of the structural relationships.

Table 4. Construct Reliability

Variable	Cronbach's alpha	rho_A	rho_C	Inference
Budget efficiency	0.933	0.939	0.944	Reliable
Work patterns	0.929	0.934	0.940	Reliable
Work facilities	0.939	0.941	0.948	Reliable
Performance	0.940	0.941	0.949	Reliable
Budget management	0.946	0.947	0.954	Reliable

Source: SmartPLS 4.0 output reported in the source thesis, 2026.

Structural Model Quality and Fit

The structural model explains a substantial share of the two endogenous constructs. R-squared for performance is 0.681, indicating that budget efficiency, work patterns, work facilities, and budget management jointly explain 68.1% of the variance in employee performance. R-squared for budget management is 0.592, indicating that the three exogenous constructs explain 59.2% of its variance. The reported SRMR is 0.068, below the 0.08 criterion applied in the thesis, indicating a good overall fit. The NFI is 0.701 and is retained as a supplementary fit statistic. Effect-size results show particularly strong contributions for budget efficiency → performance (f^2 = 0.370), work patterns → budget management (0.356), and budget management → performance (0.366).

Table 5. Structural Model Quality and Model Fit

Metric	Value	Criterion / meaning	Inference
R^2 Performance	0.681	68.1% variance explained	Strong explanatory contribution

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R^2 Budget management	0.592	59.2% variance explained	Moderate-to-strong explanatory contribution
SRMR	0.068	≤ 0.08	Good fit
NFI	0.701	Supplementary reported index	Reported model-fit statistic

Source: SmartPLS 4.0 structural-model output reported in the source thesis, 2026.

DETERMINANTS OF BUDGET MANAGEMENT

All three antecedents positively and significantly affect budget management. Budget efficiency has a coefficient of 0.272 (t = 3.961; p < 0.001), work patterns have a coefficient of 0.356 (t = 5.227; p < 0.001), and work facilities have a coefficient of 0.340 (t = 4.727; p < 0.001). Work patterns produce the largest coefficient among these three paths, followed closely by work facilities. The result indicates that budget management at the organization is associated not only with formal financial efficiency but also with how work is organized and whether employees have adequate operational facilities.

DETERMINANTS OF EMPLOYEE PERFORMANCE

All four routes to performance are also supported by the direct-effect model. Performance is positively impacted by budget efficiency (β = 0.270; t = 4.087; p < 0.001). While work facilities have a lower but substantial beneficial impact (β = 0.157; t = 2.680; p = 0.007), work patterns have a favorable effect (β = 0.215; t = 2.914; p = 0.004). Of the four performance indicators, budget management has the highest direct coefficient (β = 0.366; t = 4.536; p < 0.001). These findings suggest that a key organizational channel linked to worker performance is the caliber of the budget-management procedure.

Table 6. Direct-Effect Hypothesis Testing

Dependent variable	Predictor	Coefficient	t-statistic	p-value	Inference
Budget management	Budget efficiency	0.272	3.961	0.000	Significant (+)
Budget	Work patterns	0.356	5.227	0.000	Significant (+)

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management					
Budget management	Work facilities	0.340	4.727	0.000	Significant (+)
Performance	Budget efficiency	0.270	4.087	0.000	Significant (+)
Performance	Work patterns	0.215	2.914	0.004	Significant (+)
Performance	Work facilities	0.157	2.680	0.007	Significant (+)
Performance	Budget management	0.366	4.536	0.000	Significant (+)

Source: SmartPLS 4.0 bootstrapping output reported in the source thesis, 2026.

INDIRECT EFFECTS THROUGH BUDGET MANAGEMENT

The three specific indirect effects are statistically significant. The indirect effect of budget efficiency on performance through budget management is 0.100 (t = 2.955; p = 0.003). The indirect effect of work patterns is 0.130 (t = 3.290; p = 0.001), and the indirect effect of work facilities is 0.124 (t = 3.243; p = 0.001). Because the corresponding direct effects on performance also remain significant, the thesis's stated mediation rule leads to a partial-mediation interpretation for all three paths. Budget management therefore transmits a meaningful portion of the effects without replacing the direct contributions of efficiency, work patterns, or facilities.

Table 7. Specific Indirect Effects and Mediation

Indirect path	Indirect effect	t-statistic	p-value	Mediation
Budget efficiency → Budget management → Performance	0.100	2.955	0.003	Partial mediation
Work patterns → Budget management → Performance	0.130	3.290	0.001	Partial mediation
Work facilities → Budget management → Performance	0.124	3.243	0.001	Partial mediation

Source: SmartPLS 4.0 bootstrapping and mediation results reported in the source thesis, 2026.

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DISCUSSION

BUDGET EFFICIENCY AND BUDGET MANAGEMENT

The positive budget-efficiency effect on budget management indicates that efficient use of public resources is associated with stronger planning, implementation, administration, reporting, and accountability. The result supports the view that efficiency should be embedded in the management process rather than applied as a stand-alone spending cut. Hasoloan et al. (2024) similarly emphasize the importance of regulatory compliance and orderly management for achieving budget efficiency and effectiveness. Cahyani et al. (2024) show that public-budget performance must consider both efficiency and effectiveness, while Stevani and Saifuddin (2025) document how controlled expenditure can coexist with effective program achievement. In the BRIN setting, the result suggests that accurate allocation and reduced waste create better conditions for managing research resources.

The finding is also consistent with the thesis's descriptive result that budget efficiency is generally rated very highly, although achievement of program outputs receives the lowest indicator score within the construct. This distinction is practically important. Savings become valuable only when research activities and output targets remain achievable. Yuliati (2025) documents the potential service consequences of restrictive efficiency policies, reinforcing the need for output-sensitive implementation. BRIN managers should therefore monitor budget savings together with milestones, research outputs, procurement timing, and operational constraints so that efficiency improves management quality rather than merely lowering expenditure.

WORK PATTERNS AND BUDGET MANAGEMENT

Work patterns have the largest coefficient among the three determinants of budget management. This result indicates that flexibility of time and location, effectiveness of task execution, discipline, and productivity are closely connected with the way budgets are implemented and controlled. Flexible arrangements change operational needs: digital collaboration, travel, facility access, meeting formats, and task coordination may require different resource allocations. Rahmawati and Pusparini (2023) show that flexible working arrangements influence engagement and performance in a public financial organization, while Choudhury et al. (2021) and Bloom et al. (2024) demonstrate that flexibility can support productivity when appropriately designed.

The positive result does not imply that any flexible arrangement will automatically improve

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management. Wang et al. (2021) show that remote-work effectiveness depends on work design and social support, and Ipsen et al. (2021) identify communication and boundary challenges alongside the advantages of home-based work. Indonesian evidence also indicates that WFH performance is influenced by organizational and individual conditions (Narpati et al., 2021; Sormin et al., 2021). The BRIN result therefore supports a managed form of flexibility in which schedules, task targets, attendance mechanisms, digital systems, and budgeted operational support remain aligned.

Work Facilities and Budget Management

Work facilities significantly improve budget management, indicating that the availability and usability of equipment are linked to how effectively financial resources are translated into operational activities. Facilities require procurement planning, asset administration, maintenance budgets, and accountability; inadequate facilities can therefore create both operational and financial-management problems. Hazmi and Nugraha (2021) find that facilities significantly affect performance, and Sjahruddin et al. (2022) also identify significant facility-related effects. In the present study, the relationship with budget management shows that facilities are not merely a human-resource issue but also part of the public-resource management system.

The source thesis notes that facility maintenance is a comparatively weak area despite the generally good overall facility assessment. This issue deserves attention because maintenance delays can reduce equipment availability and increase replacement costs. Astria et al. (2024) and Az-Zahra et al. (2025) both support the performance relevance of adequate facilities, while Devi and Rizky (2025) link facilities with employee satisfaction. A practical implication is that maintenance schedules, condition monitoring, repair response times, and lifecycle budgeting should be integrated into annual planning rather than treated as reactive expenditures.

DIRECT DETERMINANTS OF PERFORMANCE

Budget efficiency has a significant positive direct effect on performance. This is consistent with the argument that employees perform more effectively when available resources are allocated to priorities and unnecessary expenditure is controlled without sacrificing output. Budiharto and Herawati (2026) similarly find a positive direct relationship between budget efficiency and internal-audit performance. The BRIN result extends this logic to a research organization and implies that value-for-money practices can support employee output when savings are accompanied by appropriate resource availability.

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Work patterns also positively affect performance. The result aligns with evidence that flexibility can be compatible with high performance when work is designed around clear tasks and appropriate support (Bloom et al., 2024; Choudhury et al., 2021). Rahmawati and Pusparini (2023) and Darwati (2023) provide Indonesian evidence of positive performance relationships involving flexible work. The comparatively moderate coefficient in the BRIN model suggests that flexibility is beneficial but should not be viewed as a substitute for discipline, coordination, and work quality. The thesis itself identifies productivity as an area requiring continued attention even when flexibility and discipline are generally rated positively.

Work facilities have the smallest direct coefficient among the three resource variables, but the effect remains statistically significant. This finding is consistent with Hazmi and Nugraha (2021), Astria et al. (2024), and Az-Zahra et al. (2025), all of whom report positive facility-performance relationships. Setiadi et al. (2024) also show that the work environment contributes to government-employee performance. For BRIN, a smaller coefficient should not be interpreted as low managerial importance because research activities can be highly dependent on specialized equipment; disruptions in a critical facility may have consequences larger than the average coefficient suggests.

BUDGET MANAGEMENT AND ITS MEDIATING ROLE

Budget management has the strongest direct coefficient on performance (0.366). This indicates that employees benefit when organizational resources are supported by sound planning, implementation, administration, reporting, and accountability. The result is consistent with Gasperz et al. (2024), who find a positive relationship between budget participation and managerial performance, and with Miharto et al. (2025), who identify significant relationships among performance-based planning, implementation, control, and budget-management performance. The finding also supports a stewardship-oriented interpretation in which managers use public resources responsibly to support collective organizational objectives.

All three indirect paths through budget management are significant. The largest indirect coefficient belongs to work patterns (0.130), followed by work facilities (0.124) and budget efficiency (0.100). This ordering suggests that budget management is particularly important for translating the operational consequences of how and where people work, and of the facilities they use, into performance. Because the direct effects of all three variables remain significant, the mechanism is partial rather than full mediation under the thesis's stated classification. In practical terms, efficient resources, flexible work, and facilities each matter on their own, but their

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performance contribution becomes stronger when supported by an effective budget process.

The mediation result is consistent with broader evidence that organizational mechanisms can transmit resource effects to performance. Budiharto and Herawati (2026) identify a significant mediated path from budget efficiency to performance through risk-based planning, while Miharto et al. (2025) report a mediating role for budget control in a performance-based budgeting system. Human-resource research likewise shows that intervening mechanisms such as satisfaction can transmit facility effects (Astria et al., 2024). The BRIN evidence adds budget management as a cross-functional mediator connecting financial, work-design, and facility resources to employee performance.

The findings also clarify why isolated interventions may underperform. Budget cuts without management discipline can weaken outputs; flexible work without aligned planning can create coordination costs; and new facilities without maintenance and accountability can become underutilized assets. The structural model instead supports a coordinated approach in which each organizational resource is connected to a transparent, performance-oriented budget system. This interpretation is especially relevant to a research institution where project timing, specialized equipment, collaborative teams, and multi-year research outputs require close integration between operational and financial decisions.

CONCLUSION

This study analyzes 172 civil servants at BRIN's Energy and Manufacturing Research Organization using PLS-SEM with SmartPLS 4.0. The model integrates budget efficiency, work patterns, work facilities, budget management, and employee performance. Measurement reliability is strong across all constructs, the structural model explains 59.2% of budget management and 68.1% of performance, and the reported SRMR of 0.068 indicates a good model fit under the criterion applied in the thesis.

Budget efficiency, work patterns, and work facilities each have positive and significant effects on budget management. They also have positive and significant direct effects on performance. Budget management itself has a positive and significant effect on performance and records the largest direct coefficient among the predictors of performance. The evidence therefore supports an integrated view: efficient resource use, well-managed flexible work, adequate facilities, and sound budget governance jointly contribute to stronger employee performance.

The three specific indirect effects through budget management are significant. Budget

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management mediates the effect of budget efficiency on performance, the effect of work patterns on performance, and the effect of work facilities on performance. Because the corresponding direct effects remain significant, the mediation is classified as partial for all three paths under the rule stated in the source thesis. Budget management thus acts as an important mechanism without eliminating the independent contribution of each organizational resource.

The practical implication is that BRIN should not pursue efficiency, work flexibility, facilities, or financial administration as separate agendas. Budget savings should remain connected to program outputs; flexible work should be supported by discipline and coordination; facilities should be accessible and maintained; and budget planning, implementation, reporting, and accountability should continuously connect resources with performance targets. Such integration is likely to provide a more sustainable route to public research performance than isolated cost reduction or stand-alone workplace interventions.

FUTURE DIRECTIONS

For management, the priority is to preserve the output orientation of efficiency. The source thesis identifies achievement of program outputs as the weakest budget-efficiency indicator, so monitoring should connect spending realization with measurable research deliverables. For work patterns, flexible time and location should remain tied to task targets, service-level expectations, discipline, digital coordination, and periodic performance review. For facilities, the thesis highlights maintenance as a concern; preventive-maintenance schedules, condition inventories, adequate repair budgets, and rapid reporting mechanisms can reduce downtime and improve the value obtained from existing assets.

For budget managers, the significant mediation effects mean that financial administration should be treated as an enabling system rather than only a compliance function. Planning should reflect actual work-pattern and facility requirements; implementation should be monitored against both financial realization and research outputs; administration and reporting should remain timely; and accountability should generate feedback for the next planning cycle. This approach is consistent with performance-based public management and can help ensure that efficiency measures do not reduce the organization's capacity to generate research and innovation outcomes.

Future research can extend the model by including leadership, digital capability, employee engagement, competence, workload, organizational culture, or research-specific productivity indicators. Multi-group analysis could compare laboratory-intensive and non-laboratory units,

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different functional positions, or work-location patterns. Longitudinal data could also examine whether the relationships change as BRIN's flexible-work system and budget-efficiency policies mature. Because the present study relies on survey perceptions, future studies can integrate objective indicators such as publication output, project completion, procurement lead times, facility downtime, IKPA, and budget absorption to strengthen causal and operational interpretation.

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