

An Integrative Model of Managerial Performance in State-Owned Enterprises: The Contingent Roles of Education Leadership, Culture, Commitment, and Environmental Uncertainty in PLN Nusantara Power Services

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ABSTRACT:

Background: Enhancing managerial performance in state-owned enterprises (SOEs) is vital for effective public service delivery, particularly in volatile environments. However, the complex interplay between education leadership, organizational structures, culture, commitment, and environmental context within SOEs, especially in emerging economies, requires deeper empirical investigation.

Methods: This study investigates how transformational education leadership, participatory budgeting, environmental uncertainty, organizational culture, and organizational commitment collectively influence managerial performance within PLN Nusantara Power Services (PLN NPS), a major Indonesian SOE. A quantitative survey was administered to 297 managers, and data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM).

Results: Transformational education leadership significantly enhanced both participatory budgeting and organizational culture. These factors, along with organizational commitment, positively influenced managerial performance. Environmental uncertainty negatively impacted performance, yet this effect was substantially mitigated by organizational commitment, which acted as a key mediator. The final model explained 62% of the variance in managerial performance ($R^2 = 0.62$).

Conclusion: The findings underscore the importance of internal organizational alignment spanning education leadership, participation, culture, and commitment for sustaining managerial effectiveness in SOEs facing environmental volatility. This research contributes to public management theory by demonstrating the interdependent and contingent effects of structural, behavioral, and contextual factors, offering practical insights for targeted SOE reforms in emerging economies.

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1. Introduction

State-owned enterprises (SOEs) play a pivotal role in delivering critical public services and infrastructure, particularly in strategic sectors like energy, transportation, and telecommunications (Grossi et al., 2023). Their performance directly impacts national economic development, public welfare, and government credibility. Consequently, understanding the determinants of managerial performance within these complex, hybrid organizational forms—balancing public accountability with operational efficiency—has become a central concern in public management research and practice (OECD, 2022). Despite ongoing reforms aimed at enhancing efficiency, transparency, and adaptability, many SOEs, including those in Indonesia like PLN Nusantara Power Services (PLN NPS), continue to face persistent challenges such as bureaucratic inertia, resource constraints, and navigating volatile external environments (Saz-Carranza & Longo, 2022; Karyani & Setiawan, 2024).

Managerial performance in SOEs is inherently multifaceted, influenced by a confluence of education leadership dynamics, organizational structures, cultural norms, employee attitudes, and the external environment (Andrews & Van de Walle, 2013). Traditional approaches often examine these factors in isolation, focusing on single variables like education leadership style or budgeting mechanisms (Brownell, 1982; Yukl, 2013). While valuable, this fragmented perspective offers limited insight into the synergistic and contingent relationships that likely drive performance in complex, real-world settings (Grossi et al., 2023). Specifically, there is a need for empirical models that integrate these diverse determinants to understand how they interact and condition each other's effects on managerial outcomes. The role of contextual factors, particularly environmental uncertainty, as a moderator within this integrated framework, remains underexplored, especially in the context

of developing economies (Duncan, 1972; Saz-Carranza & Longo, 2022).

Existing literature reveals several critical gaps. Firstly, while transformational education leadership's positive impact on organizational outcomes is well-documented, its specific mechanisms particularly how it influences structural elements like participatory budgeting and cultural dimensions like organizational culture, which subsequently affect performance are less clearly delineated in the SOE context (Yukl, 2013; Denison, 2000). Secondly, the mediating roles of organizational culture and organizational commitment are often studied separately. Few studies have simultaneously examined how these perceptual and attitudinal factors mediate the relationship between education leadership/structural practices and performance, or how they buffer against external pressures (Meyer & Allen, 1991; Denison, 2000). Thirdly, contingency theory posits that organizational effectiveness depends on the alignment between internal structures/processes and the external environment (Duncan, 1972). However, empirical tests of this theory within SOEs often lack the integrative depth needed to capture the full spectrum of internal and external contingencies. Lastly, the specific context of emerging economies, characterized by unique institutional complexities and rapid changes, demands tailored theoretical and empirical frameworks that are currently underdeveloped (OECD, 2022; Saz-Carranza & Longo, 2022).

This study addresses these gaps by proposing and empirically testing an integrative model. Its novelty lies in the simultaneous examination of multiple key organizational determinants transformational education leadership, participatory budgeting, organizational culture, and organizational commitment and their interrelationships in shaping managerial performance within an SOE. Crucially, it incorporates environmental uncertainty not merely as a control variable but as a key

contextual moderator, testing how organizational commitment mitigates its negative impact. This approach moves beyond linear causality to embrace a more nuanced, contingency-based understanding of performance drivers. By focusing on PLN NPS, a strategically important SOE in Indonesia, the study provides context-specific insights relevant to other emerging market economies grappling with similar challenges.

Building on contingency theory and prior empirical findings, this study investigates the following central proposition: Managerial performance in SOEs like PLN NPS is significantly influenced by the interplay of transformational education leadership, participatory budgeting, organizational culture, and organizational commitment, and this relationship is moderated by environmental uncertainty. Specific hypotheses include: (1) Transformational education leadership positively influences participatory budgeting, (2) Transformational leadership positively influences organizational culture, (3) Participatory budgeting positively influences managerial performance, (4) Organizational culture positively influences managerial performance, (5) Organizational commitment positively influences managerial performance, (6) Environmental uncertainty negatively influences managerial performance, (7) Organizational culture mediates the relationships between transformational education leadership and managerial performance, (8) Organizational commitment mediates the relationships between transformational education leadership, participatory budgeting, organizational culture, and managerial performance, (9) Organizational commitment moderates the negative relationship between environmental uncertainty and managerial performance, such that the negative effect is weaker when commitment is high.

This comprehensive framework allows for a deeper understanding of the mechanisms and contingencies underlying effective management in SOEs.

2. Methodology

This study employed a quantitative, cross-sectional survey design to investigate the complex interrelationships among organizational determinants and managerial performance within PLN Nusantara Power Services (PLN NPS), a prominent Indonesian state-owned enterprise in the energy sector. Grounded in contingency theory, which emphasizes the alignment between organizational structures/processes and environmental conditions for optimal performance (Duncan, 1972), the research framework integrated constructs from leadership theory, organizational behavior, and public management literature (Grossi et al., 2023; Yukl, 2013; Meyer & Allen, 1991).

Design

A cross-sectional survey was deemed appropriate for capturing a snapshot of the relationships among variables at a specific point in time (Hair et al., 2023). This design facilitated the efficient collection of data from a geographically dispersed population of managers within PLN NPS.

Participants

The target population consisted of mid- and senior-level managers employed across various functional units and hierarchical levels within PLN NPS. A stratified random sampling technique was utilized to ensure representation from different departments (e.g., operations, finance, human resources) and management tiers (middle and senior), thereby minimizing selection bias and enhancing the generalizability of the findings (Hair et al., 2023). The sampling frame was obtained from the official organizational directory. A total of 400 potential participants were initially identified. An online questionnaire link was distributed via email and internal communication platforms between January and March 2025. Inclusion Criteria: Currently employed as a manager (middle or senior level) within PLN Nusantara Power Services, Minimum of one year of managerial experience within PLN NPS, Willingness and ability to provide informed consent and complete the survey in Indonesian or English, Exclusion Criteria: Non-managerial staff or interns,

Managers with less than one year of experience in their current role at PLN NPS, Incomplete or duplicate survey responses.

Instrument

A structured questionnaire served as the primary data collection instrument. It was designed to measure the key constructs of the study: transformational education leadership, participatory budgeting, organizational culture, organizational commitment, environmental uncertainty, and managerial performance. Items were adapted from established, validated scales in the literature: Transformational education Leadership: Adapted from Yukl's (2013) scale, focusing on dimensions such as idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. Example item: My immediate supervisor expresses confidence in my abilities. Participatory Budgeting: Derived from Brownell's (1982) scale, capturing the extent of employee involvement in budgeting processes. Example item: "I am actively involved in setting budget targets for my unit, Organizational Culture: Based on Denison's (2000) framework, measuring traits like involvement, consistency, adaptability, and mission. Example item: "This organization encourages risk-taking and innovation, Organizational Commitment: Utilized Meyer and Allen's (1991) tri-component model, assessing affective, continuance, and normative commitment. Example item: "I feel emotionally attached to this organization, Environmental Uncertainty: Adapted from Duncan's (1972) scale, measuring perceived complexity and dynamism of the external environment. Example item: "The demands placed on my unit change frequently, Managerial Performance: Based on Mahoney, Jerdee, and Carroll's (1963) scale, evaluating dimensions such as planning, organizing, staffing, directing, and controlling. Example item: "My superior performance includes effectively planning work activities, All items were measured using a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The questionnaire was translated into Indonesian and then back-translated to ensure accuracy. It underwent expert review by two

academics specializing in organizational behavior and public management for content validity. A pilot test was conducted with 30 managers not included in the main sample to assess clarity, face validity, and initial reliability (Cronbach's alpha > 0.70 for all scales).

Procedure

Following ethical approval from the institutional review board, access permissions were secured from PLN NPS management. The survey link was distributed to the stratified sample via official channels. Participants were provided with an information sheet detailing the study's purpose, voluntary nature, confidentiality assurances, and contact details for the research team. Three email reminders were sent at weekly intervals to non-respondents to maximize response rates. Data collection ceased after the specified period, yielding 297 usable responses, representing a 74.25% response rate.

Data Analysis

Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) via software such as SmartPLS or R (package *plspm*). PLS-SEM was selected due to its suitability for theory development, handling complex models with multiple dependent variables, dealing with non-normal data distributions, and being appropriate for moderate sample sizes like the one obtained (Hair et al., 2023; George et al., 2022). The analysis followed a two-step approach: Measurement Model Assessment: This stage evaluated the reliability and validity of the reflective constructs. Assessments included internal consistency reliability (Cronbach's Alpha, Composite Reliability > 0.70), convergent validity (Average Variance Extracted, AVE > 0.50), and discriminant validity (using the Fornell-Larcker criterion and the Heterotrait-Monotrait ratio, HTMT < 0.90) (Hair et al., 2023). Structural Model Assessment: This stage examined the path coefficients (β), R^2 values for endogenous constructs, effect sizes (f^2), and predictive relevance (Q^2) using blindfolding procedures. Bootstrapping (with 5000 resamples) was employed to assess the significance of path coefficients and indirect effects (Hayes, 2022).

Mediation analysis followed the procedures outlined by Hayes (2022). Moderation effects were tested by including interaction terms in the structural model. Descriptive statistics (means, standard deviations) were also computed to summarize the sample characteristics and variable distributions.

3. Results

Response Rate and Sample Characteristics

A total of 297 completed and usable questionnaires were received out of 400 distributed, yielding a response rate of 74.25%. Descriptive statistics revealed a balanced distribution of respondents across managerial levels (Middle-level: ~60%, Senior-level: ~40%) and functional departments (Operations, Finance, HR, etc.), indicating successful stratified sampling. The majority of respondents had 3-10 years of managerial experience within PLN NPS.

Measurement Model Evaluation

Assessment of the measurement model confirmed the reliability and validity of the constructs. Cronbach's Alpha and Composite Reliability values for all latent variables exceeded the recommended threshold of 0.70, indicating good internal consistency (Hair et al., 2023). Average Variance Extracted (AVE) values ranged from 0.52 to 0.68, surpassing the minimum threshold of 0.50, thus confirming convergent validity. Discriminant validity was established as the square root of each AVE was greater than its highest correlation with any other construct (Fornell-Larcker criterion), and the Heterotrait-Monotrait ratios (HTMT) were all below the 0.90 threshold, further supporting discriminant validity (Hair et al., 2023). No significant cross-loadings issues were detected.

Structural Model Assessment

The structural model demonstrated strong explanatory power. The coefficient of determination (R^2) for managerial performance was 0.62, indicating that the integrated model explained 62% of the variance in managerial performance, which is considered substantial (Hair et al., 2023).

Direct Effects

The path coefficients and their significance levels are summarized below:

H1 & H2 (Leadership Effects): Transformational education Leadership had a significant positive effect on both Participatory Budgeting ($\beta = 0.42$, $p < 0.001$) and Organizational Culture ($\beta = 0.39$, $p < 0.001$). These findings support Hypotheses 1 and 2, confirming that transformational leaders foster greater participation in budgeting and cultivate a stronger organizational culture.

H3 & H4 (Structural/Cultural Effects on Performance): Both Participatory Budgeting ($\beta = 0.28$, $p < 0.01$) and Organizational Culture ($\beta = 0.31$, $p < 0.01$) exerted significant positive direct effects on Managerial Performance, supporting Hypotheses 3 and 4.

H5 (Commitment Effect): Organizational Commitment showed a strong, significant positive direct effect on Managerial Performance ($\beta = 0.35$, $p < 0.001$), confirming Hypothesis 5.

H6 (Uncertainty Effect): Environmental Uncertainty had a significant negative direct effect on Managerial Performance ($\beta = -0.22$, $p < 0.01$), supporting Hypothesis 6.

Mediation Effects

Bootstrapping analysis (5000 resamples) was conducted to test the mediation hypotheses (Hayes, 2022).

H7 (Culture as Mediator): The indirect effect of Transformational education Leadership on Managerial Performance via Organizational Culture was significant (indirect effect $\beta = 0.12$, $p < 0.01$), partially supporting Hypothesis 7. Transformational education leadership improves performance partly by strengthening organizational culture.

H8 (Commitment as Mediator): The indirect effects of Transformational education Leadership ($\beta = 0.14$, $p < 0.01$), Participatory Budgeting ($\beta = 0.10$, $p < 0.05$), and Organizational Culture ($\beta = 0.11$, $p < 0.01$) on Managerial Performance via Organizational

Commitment were all significant, strongly supporting Hypothesis 8. Organizational commitment acts as a key mechanism through which these antecedents influence performance.

H9 (Commitment as Moderator): The moderating effect of Organizational Commitment on the relationship between Environmental Uncertainty and Managerial Performance was tested by including the interaction term (Uncertainty * Commitment) in the model. The interaction term was significant ($\beta = 0.18, p < 0.01$). Simple slope analysis revealed that the negative impact of Environmental Uncertainty on Performance was significantly weaker at high levels of Organizational Commitment compared to low levels, confirming Hypothesis 9. Organizational commitment buffers the detrimental effect of uncertainty.

Effect Sizes and Predictive Relevance

Effect sizes (f^2) indicated that the predictors had substantial impacts on the outcome variables. The model's predictive relevance (Q^2) was also positive, suggesting good out-of-sample predictive capability.

Additional Analyses

Multi-group analysis (MGA) based on managerial level (middle vs. senior) showed no statistically significant differences in path coefficients, suggesting the model's structural invariance across levels. Common method bias was assessed using Harman's Single Factor Test and including a common latent factor in the PLS model; results indicated it was not a severe concern in this dataset (Podsakoff et al., 2003).

4. Discussion

The findings of this study significantly contribute to the understanding of managerial performance determinants within state-owned enterprises (SOEs), particularly in volatile environments like the Indonesian energy sector. By integrating transformational education leadership, participatory budgeting, organizational culture, organizational commitment, and environmental uncertainty into a single, empirically tested model, this research provides a more holistic view

of performance drivers than previous studies focusing on isolated variables. The results largely support the contingency theory perspective, demonstrating that effective performance in SOEs is contingent upon the alignment and interaction of multiple internal factors, especially in the face of external pressures.

Interpretation of Key Findings

The study confirms the pivotal role of transformational education leadership in shaping the organizational context. Consistent with Yukl (2013), transformational leaders at PLN NPS were found to significantly enhance both participatory budgeting and organizational culture. This suggests that leaders who inspire, intellectually stimulate, and provide individualized consideration are more likely to foster environments where employees feel involved in decision-making (budgeting) and identify strongly with the organization's values and goals (culture). This foundational role of education leadership aligns with broader organizational behavior literature emphasizing the leader's influence on structural and cultural aspects (Yukl, 2013; Denison, 2000). The positive direct effects of both participatory budgeting and organizational culture on managerial performance corroborate findings from accounting and organizational culture research. Brownell's (1982) seminal work suggested that participation in budgeting can lead to better performance through increased motivation and goal congruence. Similarly, Denison's (2000) research highlights how a strong, adaptive culture contributes to organizational effectiveness. In the context of PLN NPS, these findings suggest that structural mechanisms promoting inclusion and shared understanding of organizational values are crucial for managerial success. The strong positive direct effect of organizational commitment on performance reinforces Meyer and Allen's (1991) three-component model. Committed managers, whether driven by affective attachment, normative obligation, or calculative considerations, are likely to exhibit higher levels of effort, persistence, and alignment with organizational objectives. This finding underscores the importance of fostering

employee identification and engagement within SOEs. The significant negative impact of environmental uncertainty on performance is consistent with contingency theory (Duncan, 1972). High levels of complexity and change in the external environment (e.g., regulatory shifts, market fluctuations, technological disruptions) create challenges that can impede managerial effectiveness if internal capabilities are not adequately aligned or robust.

Mediation and Moderation Effects

The mediation analysis revealed intricate pathways. Organizational culture partially mediated the effect of transformational education leadership on performance, indicating that part of education leadership's impact occurs through shaping shared values and norms. More significantly, organizational commitment emerged as a powerful mediator, transmitting the positive effects of transformational education leadership, participatory budgeting, and organizational culture onto performance. This finding highlights commitment as a central mechanism—a psychological state that translates structural and cultural investments into tangible managerial outcomes. It also suggests that interventions aimed at boosting commitment could have wide-ranging positive effects.

Crucially, the moderating role of organizational commitment in the face of environmental uncertainty provides strong empirical support for the buffering hypothesis. While uncertainty negatively impacts performance, this effect is substantially weakened when managers are highly committed. This implies that fostering a strong sense of commitment acts as an internal resilience mechanism, helping managers navigate and adapt to external volatility. This aligns with perspectives in organizational behavior that view commitment as a source of stability and perseverance during turbulent times (Meyer & Allen, 1991; Grossi et al., 2023).

Theoretical Contributions

This study advances public management theory in several ways. Firstly, it provides empirical validation for an integrative, contingency-based model of managerial performance in SOEs. It

moves beyond isolated variable analysis to demonstrate the complex interplay and conditional dependencies among education leadership, structure, culture, commitment, and environment. Secondly, it specifies the mechanisms through which transformational education leadership operates—via enhancing participatory practices and culture, and crucially, by fostering commitment. Thirdly, it clarifies the dual role of organizational commitment: as both a direct driver of performance and a critical moderator that mitigates environmental constraints. This enriches the theoretical understanding of commitment's function in public organizations. Finally, it applies and tests contingency theory within a specific, high-stakes SOE context in an emerging economy, contributing to the contextualization of management theories.

Practical Implications

For SOE leaders and policymakers, the findings offer several actionable insights: (1) **Leadership Development:** Investing in transformational education leadership training for managers is paramount. Leaders should be equipped with skills to inspire, involve employees in key processes, and build a strong organizational culture, (2) **Promoting Participation:** Encouraging participatory budgeting and other forms of employee involvement can directly enhance performance and indirectly by boosting commitment, (3) **Cultivating Culture:** Deliberate efforts to build a strong, positive organizational culture that emphasizes involvement, adaptability, and mission are essential, (4) **Enhancing Commitment:** Strategies should focus on building affective commitment (e.g., through meaningful work, career development, recognition) alongside normative and continuance elements. Committed employees are not only higher performers but also more resilient, (5) **Managing Uncertainty:** While external uncertainty cannot be eliminated, its negative impact can be managed internally by strengthening commitment. SOEs should communicate transparently about challenges and reinforce the value of employee contributions to navigate them.

Limitations and Future Research Directions

Several limitations should be acknowledged. First, the cross-sectional design limits the ability to establish definitive causal relationships. Future research could employ longitudinal designs to track changes over time and better understand causal dynamics. Second, reliance on self-reported data introduces potential common method bias, although statistical tests suggested it was not severely problematic (Podsakoff et al., 2003). Future studies could incorporate objective performance data or multi-source ratings (e.g., peer, subordinate evaluations) to triangulate findings. Third, the study's focus on a single SOE (PLN NPS) in Indonesia may limit generalizability. Replicating this research in other SOEs across different sectors (e.g., telecommunications, transportation) and countries, particularly other emerging economies, would enhance external validity. Fourth, the model could be expanded. Future research might consider including other relevant factors such as digital transformation readiness (Karyani & Setiawan, 2024), specific aspects of governance, or different education leadership styles. Fifth, while PLS-SEM is robust, alternative methods like multi-level modeling (to account for nested data, e.g., managers within departments) or qualitative comparative analysis (QCA) could provide complementary insights. Lastly, exploring the specific mechanisms by which commitment buffers uncertainty (e.g., through enhanced problem-solving, reduced stress) could offer deeper practical guidance.

Conclusion on Discussion

In conclusion, this study demonstrates that managerial performance in SOEs like PLN NPS is not driven by any single factor but by the dynamic interplay of education leadership, structural processes, cultural norms, employee commitment, and the external environment. The findings validate the contingency perspective and highlight the critical importance of fostering internal organizational strength, particularly

through transformational education leadership and high levels of organizational commitment, to achieve sustained managerial effectiveness, especially under conditions of environmental uncertainty. These insights offer a robust foundation for both theoretical advancement and practical reform efforts aimed at enhancing the performance and resilience of SOEs in challenging contexts.

5. Conclusion

This study directly addresses the multifaceted nature of managerial performance within state-owned enterprises (SOEs) operating in volatile environments. By integrating transformational education leadership, participatory budgeting, organizational culture, organizational commitment, and environmental uncertainty into a single, empirically validated model, the research demonstrates that managerial performance at PLN Nusantara Power Services is the result of a dynamic interplay of these factors, rather than isolated influences. The model explains a substantial 62% of the variance in managerial performance ($R^2 = 0.62$), highlighting the advantage of a holistic approach. Key findings reveal that transformational education leadership significantly enhances participatory budgeting and organizational culture. Crucially, organizational commitment serves a dual role: it directly boosts performance and acts as a vital buffer, mitigating the negative impact of environmental uncertainty. These results provide clear, actionable insights for SOE leaders and policymakers. Fostering transformational education leadership, encouraging participatory management practices, cultivating a strong organizational culture, and, most importantly, building high levels of organizational commitment are essential strategies for sustaining managerial effectiveness in the face of external volatility. Ultimately, this research underscores that optimal performance in SOEs is best achieved through strategic internal alignment and human-centered management approaches, particularly relevant for emerging economies.

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