

Budgetary Participation and BOS Fund Manager Performance in Digitally Enabled School Finance

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Abstract

Decentralised school finance depends on the capacity and commitment of the staff responsible for administering funds. This study examines whether fund-manager capacity and organisational commitment mediate the association between budgetary participation and performance, and whether information and communication technology (ICT) use strengthens these pathways. A Google Forms survey, distributed through school principals to designated BOS fund-management personnel in Tangerang Regency, Indonesia, yielded 400 usable records relating to the 2025 BOSP funding cycle, covering Stage I (January–June) and Stage II (July–December). Partial least squares structural equation modelling with 10,000 bootstrap resamples showed positive direct and indirect associations. Budgetary participation was associated with performance directly ($\beta = 0.153$) and through capacity ($\beta = 0.114$, 95% BCa confidence interval [0.072, 0.167]) and commitment ($\beta = 0.057$, [0.029, 0.092]). ICT strengthened both first-stage relationships; the moderated mediation indices were 0.061 [0.034, 0.096] and 0.028 [0.013, 0.053], respectively. The model explained 39.7% of performance variance, with blindfolding $Q^2 = 0.253$. Supplementary regressions with individual covariates retained the principal associations. The findings connect participative budgeting to staff development and motivation in school-grant administration and suggest that meaningful involvement, applied financial training, and usable digital workflows should be considered together. The cross-sectional design, perceptual measures, aggregate control specification, and mixed fit diagnostics qualify the conclusions.

Keywords: *Budgetary Participation; BOS Funds; School Financial Management; ICT Use; Organisational Commitment*

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INTRODUCTION

School funding reforms decentralise responsibility more readily than they establish the organisational conditions needed to exercise it. Once operational resources reach a school, staff must reconcile educational priorities, spending restrictions, documentary requirements, and reporting deadlines. Formal access to funding therefore leaves an important management question unresolved: how does participation in budget decisions become effective financial practice? School-based management research indicates that

local discretion works through the capacity, relationships, and accountability arrangements surrounding decision-making, rather than through autonomy alone (Barrera-Osorio et al., 2009; Bandur, 2012).

Indonesia's School Operational Assistance programme is formally administered as Bantuan Operasional Satuan Pendidikan (BOSP). In this article, BOSP denotes the 2025 educational-unit funding programme and its Stage I and Stage II funding cycle, while BOS fund manager denotes the personnel appointed to plan, record, monitor, and report those funds. The terms therefore refer to different levels of the same administrative setting: BOSP is the programme and BOS fund manager is the role. The 2025 technical guidelines frame the planning, use, administration, and reporting of BOSP funds (Ministry of Primary and Secondary Education of the Republic of Indonesia, 2025). The outcome is the performance of BOS fund managers, rather than student achievement or the effectiveness of the national funding programme.

Budgetary participation can improve the information available before allocations are approved. Staff responsible for implementation can identify documentation needs, anticipate procurement difficulties, and explain the operational consequences of proposed spending. Participation also offers a social signal: staff whose contributions influence decisions may feel greater responsibility for their implementation. These informational and motivational arguments underpin longstanding work on participative budgeting (Shields & Shields, 1998; Nouri & Parker, 1998; Parker & Kyj, 2006). They do not, however, imply that every invitation to a budget meeting improves performance. Influence may be nominal, information may remain inaccessible, and staff may lack the skills needed to implement jointly agreed priorities.

Two mediating mechanisms are particularly relevant to school finance. Fund-manager capacity concerns the knowledge and practical competence needed to perform the role. Organisational commitment concerns identification with the school and willingness to sustain effort toward its goals. A manager may understand financial procedures without investing sufficient effort in them; another may be highly committed but unable to resolve technical problems. Examining the two mechanisms together allows the analysis to distinguish learning-related from motivational explanations of the participation-performance relationship.

ICT use may condition both mechanisms. Digital records, shared planning tools, and accessible financial information can make budget discussions more informative and decisions easier to trace. Their value nevertheless depends on use within work routines, rather than equipment ownership alone. Research on information systems and organisational performance treats such complementarity as central to the conversion of technological resources into operational value (DeLone & McLean, 2003; Melville et al., 2004). In budgeting, communication technologies have also been linked to contingent performance benefits of participation (Winata & Mia, 2005; Maiga et al., 2014).

The underlying combination of participation, capacity, commitment, and ICT is not entirely new. Blanco-Encomienda and Al Jasimee (2026) examine closely related mechanisms in industrial enterprises, while Alhasnawi et al. (2024) investigate mediated and moderated participation effects in higher education. The present contribution is a

contextual extension to regulated school-grant administration, where performance centres on accurate, timely, and accountable execution of public funds. It tests whether these mechanisms remain empirically distinguishable in this setting and whether ICT conditions the complete indirect pathways, rather than merely a component relationship.

The study analyses survey responses from 400 designated BOS fund managers across elementary, junior secondary, senior secondary, and vocational secondary schools in Tangerang Regency during the 2025 BOSP funding cycle. It asks whether budgetary participation is associated with fund-manager performance through capacity and organisational commitment, and whether ICT use changes the strength of these indirect associations. The methodological procedures used to estimate these relationships are described in the Methodology section.

The study contributes to human resource management by examining how opportunities to participate in budgeting relate to staff capability, commitment, and role performance in a regulated public-service setting. It distinguishes the learning-related and motivational pathways and evaluates whether digital use changes their strength. It also examines whether the substantive associations persist when school and respondent characteristics are represented individually in supplementary regressions. These contributions extend participation research to school-grant administration while distinguishing explanatory associations from causal and predictive claims.

THEORETICAL FOUNDATION AND HYPOTHESES

Participation within school financial governance

Budgetary participation refers to involvement in developing budgets, contributing relevant information, discussing alternatives, and influencing allocations. It differs from participation by citizens in public budget forums: the focal actors here carry operational responsibility inside the school. In this setting, their contributions can bring implementation knowledge into planning before expenditure decisions become difficult to reverse. Evidence from Indonesian school-based management connects participatory decision-making with stakeholder partnerships, while also recognising the organisational demands of decentralised responsibility (Bandur, 2012, 2018).

Contingency theory explains why participation may have different consequences across schools. Management practices depend on their alignment with technology, task conditions, and organisational arrangements (Chenhall, 2003; Otley, 2016). ICT affects access to and exchange of budget information, while capacity and commitment specify the individual mechanisms through which this context may matter. The model examines these mechanisms alongside the direct participation–performance association.

Budgetary participation and performance

Meaningful participation allows fund managers to align planned activities with resources and administrative requirements. Early discussion can identify unrealistic schedules, incomplete documentation, and expenditure assumptions that would otherwise need correction. Participation may also clarify responsibilities and improve acceptance of priorities, supporting a performance association beyond capacity and

commitment. Prior studies identify several intervening processes, whose importance varies across settings (Brownell & McInnes, 1986; Parker & Kyj, 2006).

H1. Budgetary participation is positively associated with fund-manager performance.

Capacity as an informational and learning mechanism

Budget discussions allow fund managers to understand programme requirements, explain constraints, and learn the reasons behind allocations. Capacity comprises regulatory understanding, budgeting and reporting competence, continuing learning, and adaptation to procedural change. It concerns acquiring and applying useful knowledge, but is operationalised at the individual role level rather than as firm-level absorptive capability (Cohen & Levinthal, 1990).

Capacity should support performance because effective execution requires technical competence as well as effort. Regulatory knowledge can reduce expenditure-classification errors, while budgeting and reporting skills support coherent plans and complete documentation. He and Ismail (2023) connect staff capacity with budgeting implementation and performance in public universities. The present model examines whether capacity similarly links participation to individual school-fund performance.

H2. Budgetary participation is positively associated with fund-manager capacity.

H3. Fund-manager capacity is positively associated with fund-manager performance.

H4. Fund-manager capacity mediates the positive association between budgetary participation and fund-manager performance.

Commitment as a motivational mechanism

Participation may strengthen commitment when staff believe their knowledge is valued and influences decisions. This can support ownership of priorities and persistence in demanding tasks. Self-determination theory offers a complementary explanation through competence, autonomy, and relatedness at work (Deci et al., 2017). These processes inform the theoretical argument, but psychological need satisfaction is not separately measured here.

Commitment comprises attachment to the school, responsibility for its resources, and persistence toward its goals. It does not encompass the full three-component framework, particularly continuance commitment based on the costs of leaving (Meyer & Allen, 1991). Nouri and Parker (1998) connect organisational commitment with the participation-performance relationship, and Riketta (2002) identifies a broader association between attitudinal commitment and job performance. In BOS administration, commitment may sustain coordination and follow-up when reporting demands compete with other responsibilities.

H5. Budgetary participation is positively associated with organisational commitment.

H6. Organisational commitment is positively associated with fund-manager performance.

H7. Organisational commitment mediates the positive association between budgetary participation and fund-manager performance.

ICT as an enabling resource and boundary condition

ICT use encompasses digital recording and retrieval, budget preparation, monitoring, communication, and traceability. Access to rules, records, and feedback may support capacity. Greater information access and visibility of contributions may support commitment. ICT may also relate directly to performance by reducing repeated entry and facilitating validation and timely coordination. These expectations concern productive use in work processes, rather than technology acquisition alone (DeLone & McLean, 2003; Melville et al., 2004).

H8. ICT use is positively associated with fund-manager capacity.

H9. ICT use is positively associated with organisational commitment.

H10. ICT use is positively associated with fund-manager performance.

ICT may strengthen participation's learning value by enabling staff to retrieve records and compare alternatives during budget discussions. Traceable implementation can also make participation more credible and reinforce commitment. Previous budgeting studies suggest that communication technology conditions participation's consequences (Winata & Mia, 2005; Maiga et al., 2014). These arguments support first-stage moderation in both mediator equations.

H11. ICT use positively moderates the association between budgetary participation and fund-manager capacity.

H12. ICT use positively moderates the association between budgetary participation and organisational commitment.

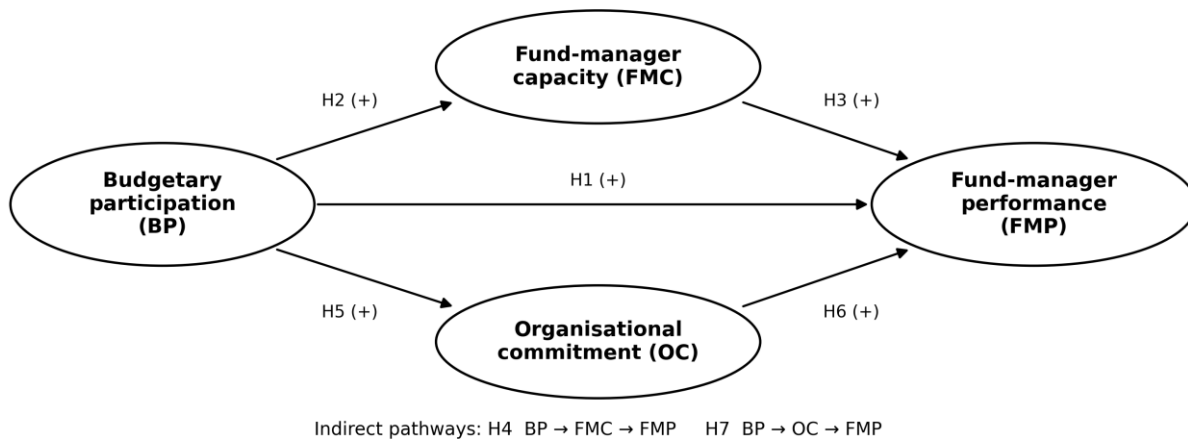
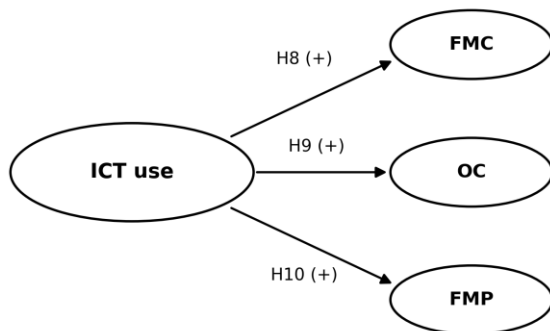
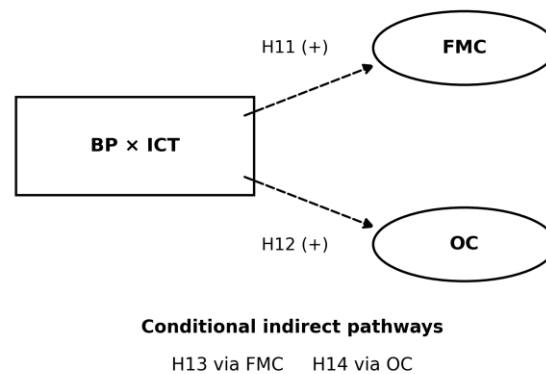
A first-stage interaction alone does not establish moderated mediation, which also depends on the mediator-to-performance association. The product of the interaction and mediator-to-performance coefficients indexes the linear change in the indirect effect (Preacher et al., 2007; Hayes, 2015). The final hypotheses concern these complete pathways.

H13. ICT use positively moderates the indirect association between budgetary participation and performance through fund-manager capacity.

H14. ICT use positively moderates the indirect association between budgetary participation and performance through organisational commitment.

Conceptual framework

Figure 1 integrates the hypotheses. BP is linked directly to FMP and indirectly through FMC and OC. ICT has main associations with both mediators and performance and conditions the BP-to-mediator paths through the BP-by-ICT product term. H13 and H14 concern the corresponding conditional indirect associations. From a human resource perspective, the framework connects opportunities for participation with staff capability and commitment, while treating ICT as a work resource that may strengthen these relationships.

A Participation and the two mediation pathways**B ICT main effects****C First-stage moderation by ICT****Figure 1.** Conceptual framework and hypothesised relationships**METHODOLOGY****Research setting and analytical sample**

This quantitative field study was conducted in the context of the 2025 BOSP funding cycle in Tangerang Regency, Banten, Indonesia. The research period covers the receipt and management of Stage I funds during January–June 2025 and Stage II funds during July–December 2025. The analytical dataset contains 400 usable respondent records from personnel appointed by their school principals to manage BOS funds. It includes BOS treasurers, management-team members, administrative finance staff, and other formally appointed personnel across SD, SMP, SMA, and SMK schools. Public and private schools and urban, peri-urban, and rural locations are represented.

Data were collected using a structured questionnaire administered through Google Forms. School principals circulated the survey link to the BOS personnel they had designated. These personnel completed the questionnaire and provided assessments based on their involvement in fund administration. The electronic survey was the data-collection channel; the estimated model uses the resulting respondent records rather than documentary audits of individual schools.

The unit of analysis is the individual BOS fund-management respondent. The two funding stages define the period of practice assessed; they are not modelled as two survey waves or as repeated observations of the same respondent. The structural analysis is therefore cross-sectional. Recruitment through principals targeted personnel with direct responsibility for BOS administration and is treated as purposive, non-probability recruitment. No sampling weights are applied. Sample composition describes the coverage of the study and does not establish population representativeness or temporal precedence among the constructs.

School names are not disclosed in the manuscript, and demographic and statistical findings are presented in aggregate. Supervisory-position information is used only to describe the organisational setting of respondents. The reporting format protects school identities without treating confidentiality as evidence of independent performance verification.

All 32 substantive indicators contain 400 usable observations on a five-point response scale. No substantive questionnaire responses required imputation. The SmartPLS export records no missing-value marker and no missing-data treatment. Before the supplementary calculations, original indicator values and descriptive statistics were reconciled. Blank displays in binary covariate columns were interpreted as zero only after checking their coding, observed ranges, record counts, and category totals against the demographic summary. The same reconciliation identified zero-coded observations in the training variable. This treatment concerns the export's display of coded values and was not applied to missing questionnaire responses.

Construct measurement and pre-survey assessment

Five reflective blocks represent budgetary participation (BP, six items), fund-manager capacity (FMC, six items), organisational commitment (OC, six items), ICT use (ICT, six items), and fund-manager performance (FMP, eight items). Higher responses indicate higher levels of the respective construct. The instrument frames agreement from 1, strongly disagree, to 5, strongly agree. The participation items concern planning involvement, influence over decisions, and information exchange, consistent with the budgeting literature (Milani, 1975; Parker & Kyj, 2006). Capacity items address regulatory understanding, technical competence, learning, and adaptation. Commitment items cover attachment, responsibility, and persistence, while ICT items describe practical use within financial workflows.

Performance is defined as the quality of role execution, including accuracy, timeliness, efficiency, compliance, evidential traceability, coordination, and contribution to planned activities. The assessments were supplied by the BOS fund-management personnel designated by school principals and reflect their experience of actual fund-administration work. Although the performance statements use a third-person assessment format, they are treated as respondent-reported assessments rather than independently matched supervisory appraisals. The supervisor-position variable describes the respondent's supervisory context. Neither the questionnaire nor the statistical model constitutes an independent financial audit. The FMP construct should

therefore not be interpreted as an objective measure of financial irregularities or educational outcomes.

All 32 questionnaire statements were assessed in a pre-survey and judged valid for inclusion in the main survey. All were retained in the administered instrument and the final measurement model. This preliminary screening is distinguished from the assessment of reliability, convergent validity, and discriminant validity in the 400-record main sample. Each substantive block is modelled as unidimensional. The main-sample results are interpreted alongside the breadth of item content, particularly the inclusion of learning behaviour within capacity and several related attitudes within commitment; they do not establish that all alternative dimensional structures have been ruled out.

Model estimation and inference

The inferential procedures described below implement the analyses referred to in the Introduction: complete bootstrapping with 10,000 resamples, conditional indirect-effect calculations at -1 , 0 , and $+1$ ICT standard deviations, and supplementary regressions with separately entered covariates. These procedures are reported here so that the Introduction remains focused on the research problem and contribution.

The primary specification is the interaction model estimated in SmartPLS 3 (Ringle et al., 2015). PLS-SEM was used to estimate the multi-item measurement blocks jointly with the direct, parallel indirect, and first-stage interaction relationships (Hair et al., 2019). BP and ICT predict FMC and OC, with a BP-by-ICT product term in each mediator equation. BP, FMC, OC, ICT, and the original CONTROL block predict FMP. The algorithm uses path weighting, a maximum of 300 iterations, and a stopping criterion of 10^{-7} . Substantive construct scores have a mean of zero and variance of one. The two interaction nodes contain the same product of the exported BP and ICT scores; they enter different mediator equations and do not represent distinct theoretical constructs.

The baseline specification omits the interaction terms, whereas the moderation, bootstrap, and blindfolding analyses use the interaction specification. Primary inference consistently refers to the latter. Baseline estimates are used only to compare explained variance before and after adding first-stage interactions. Figure 2 presents the SmartPLS algorithm output for the interaction model; Figure 1 presents the conceptual relationships. This separation ensures that the reported coefficients, confidence intervals, and explained variance refer to the appropriate specification.

Measurement assessment examines outer loadings, Cronbach's alpha, rho_A, composite reliability, and average variance extracted (AVE). Discriminant validity is assessed using the heterotrait-monotrait ratio (HTMT) and its bootstrap intervals, with the Fornell-Larcker comparison as supporting evidence (Fornell & Larcker, 1981; Henseler et al., 2015). Structural assessment considers inner variance inflation factors (VIFs), coefficient magnitudes, uncertainty intervals, f^2 , R^2 , and adjusted R^2 (Hair et al., 2019). Reliability criteria for substantive reflective constructs are not applied indiscriminately to deterministic interaction terms.

Inferential assessment uses complete nonparametric bootstrapping with 10,000 resamples, two-tailed tests, and a significance level of 0.05. Resampling is conducted at

the respondent-record level, with replacement and with the original sample size of 400. The primary 95% confidence intervals are taken from the SmartPLS bias-corrected interval tables under the bias-corrected and accelerated (BCa) setting. The reported t statistic is the absolute original-sample coefficient divided by its bootstrap standard error. P -values follow the two-tailed bootstrap standard-error-based tests in the export and are shown to three decimals, with $p < 0.001$ used for smaller values. Support for a directional hypothesis requires an estimate in the hypothesised direction and a 95% BCa interval excluding zero. Where a p -value and BCa interval disagree, the BCa interval governs interpretation. Tests are individual and are not adjusted for multiple comparisons.

Indirect effects are evaluated from the bootstrap distribution of coefficient products, rather than by requiring separate significance tests for every component path (Nitzl et al., 2016). For mediator M , the conditional indirect association at ICT score w is the product of its BP-to- M coefficient plus w times the interaction coefficient, and its M -to-FMP coefficient. The index of moderated mediation is the interaction coefficient multiplied by the M -to-FMP coefficient (Hayes, 2015). Thus, H4 and H7 assess the indirect associations at mean ICT, while H13 and H14 assess their linear change with ICT. Conditional indirect effects at ICT scores of -1 , 0 , and $+1$ were calculated within each of the 10,000 matched bootstrap draws. Their intervals use the empirical 2.5th and 97.5th percentiles and are labelled separately from the primary BCa intervals. The comparison of the two indirect pathways at mean ICT likewise uses a paired, within-draw contrast and a percentile interval.

Blindfolding uses an omission distance of seven. Cross-validated redundancy Q^2 is interpreted as evidence about reconstruction of omitted observations within this sample-reuse procedure. It is not treated as Q^2_{predict} or as evidence that the model outperforms a linear benchmark on new cases. Such claims require a separate predictive assessment, such as PLSpredict (Shmueli et al., 2019). Approximate and bootstrap-based fit diagnostics are both considered, so an acceptable conventional SRMR threshold does not override evidence against exact model fit.

Control specification and sensitivity analysis

The estimated PLS model includes ten observed school and respondent characteristics in a single reflective block labelled CONTROL: BOS value band, fund-management experience, peri-urban and rural location, private ownership, school-level indicators for SMP, SMA, and SMK, student enrolment, and training category. The reported PLS tables and algorithm figure retain this specification so that all primary estimates refer to the same fitted model. These attributes are heterogeneous and are not interpreted as interchangeable manifestations of a common underlying trait. Accordingly, the CONTROL coefficient is not attributed to any individual characteristic, and assessment of the five substantive constructs is separated from assessment of this auxiliary block.

To examine whether substantive conclusions depend on this aggregation, additional ordinary least squares regressions use the exported substantive construct scores as fixed inputs. All ten covariates are entered separately into each of the FMC, OC, and FMP

equations. Reference categories are SD, public ownership, and urban location. Continuous variables and coded covariates are standardised for computation. Training and BOS value band are retained as ordinal numeric codes, so this sensitivity check assumes linear differences across their coded categories. HC3 heteroskedasticity-consistent intervals are used (Long & Ervin, 2000). A further FMP regression omits controls entirely. These checks are additional analyses of the exported data, not new SmartPLS estimates: they do not re-estimate measurement weights or propagate uncertainty in construct-score estimation.

RESULTS

Respondent and school characteristics

The analytical sample includes 108 SD records (27.0%), 102 SMP records (25.5%), 94 SMA records (23.5%), and 96 SMK records (24.0%). Private schools account for 232 observations (58.0%) and public schools for 168 (42.0%). The territorial distribution comprises 168 urban, 153 peri-urban, and 79 rural observations. These counts reconcile with the location and school-category indicators in the PLS dataset. The demographic worksheet lists 29 districts, indicating coverage across the regency without establishing probability representativeness.

Table 1. Respondent and school characteristics

Characteristic	Category	n	%
School level	SD	108	27.00
	SMP	102	25.50
	SMA	94	23.50
	SMK	96	24.00
Ownership	Public	168	42.00
	Private	232	58.00
Location	Urban	168	42.00
	Peri-urban	153	38.25
	Rural	79	19.75
BOS role	Treasurer	282	70.50
	Management-team member	55	13.75
	Administrative finance staff	53	13.25
	Other formally appointed role	10	2.50
Training in previous 24 months	None	64	16.00
	One activity	138	34.50
	Two activities	115	28.75
	Three or more activities	83	20.75
Supervisor position	Principal	349	87.25
	Designated direct supervisor	51	12.75

BOS treasurers constitute 70.5% of respondents, followed by management-team members (13.75%), administrative finance staff (13.25%), and other formally appointed personnel (2.5%). For 87.25% of respondents, the recorded supervisor is the principal; for 12.75%, it is a designated direct supervisor. These categories are distinct from the BOS personnel who supplied the survey assessments. Mean BOS-management experience is

5.14 years (SD = 3.60), and mean enrolment is 652.31 students (SD = 278.61). The reported annual BOS amount averages IDR 879.87 million (SD = IDR 538.05 million). Training participation varies: 16.0% report none in the previous 24 months, while 20.75% report three or more activities.

Unweighted item-average means are 3.399 for BP, 3.410 for FMC, 3.465 for OC, 3.398 for ICT, and 3.384 for FMP. Their sample standard deviations are 0.987, 0.964, 0.957, 1.038, and 0.945, respectively. These descriptive averages remain on the original one-to-five scale and are not substituted for the construct scores used in structural estimation.

Measurement model assessment

All substantive indicator loadings exceed 0.70, ranging from 0.758 to 0.867. Cronbach's alpha ranges from 0.900 to 0.924, rho_A from 0.901 to 0.925, and composite reliability from 0.923 to 0.937. AVE ranges from 0.652 to 0.693. These results support internal consistency and convergent validity of the five substantive blocks within the estimated specification. No substantive indicator is omitted in the reported model.

Table 2. Reliability and convergent validity of substantive constructs

Construct	Items	Loading range	Alpha	rho_A	CR	AVE
BP	6	0.787–0.846	0.900	0.901	0.923	0.668
FMC	6	0.778–0.840	0.904	0.907	0.926	0.675
OC	6	0.778–0.867	0.905	0.910	0.926	0.677
ICT	6	0.803–0.860	0.912	0.918	0.931	0.693
FMP	8	0.758–0.855	0.924	0.925	0.937	0.652

Note. BP = budgetary participation; FMC = fund-manager capacity; OC = organisational commitment; ICT = information and communication technology use; FMP = fund-manager performance. CR = composite reliability; AVE = average variance extracted. CONTROL and deterministic product terms are excluded from this substantive reliability assessment.

HTMT values among the five substantive constructs range from 0.282 to 0.566 (Table 3). All are below the conservative 0.85 benchmark, and the largest upper endpoint among their 95% bias-corrected bootstrap intervals is 0.642. The square roots of AVE, ranging from 0.808 to 0.833, also exceed the corresponding absolute interconstruct correlations. Together, these results support empirical separation of the substantive constructs, including capacity and commitment.

Table 3. Discriminant validity using HTMT

Construct	BP	FMC	FMP	ICT	OC
BP	—	—	—	—	—
FMC	0.506	—	—	—	—
FMP	0.471	0.566	—	—	—
ICT	0.282	0.417	0.438	—	—
OC	0.461	0.355	0.434	0.383	—

The same conclusion does not apply to the CONTROL block. Its alpha is 0.193, composite reliability is 0.302, and AVE is 0.110. Several indicators have small or negative loadings. These results are consistent with the conceptual problem of modelling different demographic and institutional characteristics as reflective indicators of a single trait.

Consequently, the substantive measurement conclusion is restricted to BP, FMC, OC, ICT, and FMP. The two interaction nodes correlate perfectly because they contain the same product score; this mathematical identity does not constitute evidence of overlap between the substantive constructs.

Direct relationships and first-stage moderation

Inner VIF values range from 1.006 to 1.427, suggesting that severe predictor collinearity is not the main explanation for the structural estimates. Table 4 presents the direct paths and interaction terms. BP is positively associated with FMP after the mediators and ICT are included ($\beta = 0.153$, $t = 3.207$, $p = 0.001$), supporting H1. Its associations with FMC ($\beta = 0.377$) and OC ($\beta = 0.346$) are also positive and statistically supported, consistent with H2 and H5.

Table 4. Direct associations and first-stage interaction tests

Test	Path	β	t	p	95% BCa CI	f^2
H1	BP $\rightarrow$ FMP	0.153	3.207	0.001	[0.061, 0.248]	0.027
H2	BP $\rightarrow$ FMC	0.377	8.248	<0.001	[0.286, 0.464]	0.197
H3	FMC $\rightarrow$ FMP	0.302	6.566	<0.001	[0.213, 0.394]	0.106
H5	BP $\rightarrow$ OC	0.346	7.884	<0.001	[0.256, 0.427]	0.152
H6	OC $\rightarrow$ FMP	0.165	3.945	<0.001	[0.085, 0.248]	0.034
H8	ICT $\rightarrow$ FMC	0.302	7.176	<0.001	[0.216, 0.381]	0.125
H9	ICT $\rightarrow$ OC	0.272	6.091	<0.001	[0.182, 0.357]	0.094
H10	ICT $\rightarrow$ FMP	0.184	4.403	<0.001	[0.103, 0.267]	0.044
H11	BP $\times$ ICT $\rightarrow$ FMC	0.202	4.578	<0.001	[0.112, 0.285]	0.059
H12	BP $\times$ ICT $\rightarrow$ OC	0.171	4.039	<0.001	[0.089, 0.255]	0.039
Control	CONTROL $\rightarrow$ FMP	0.138	3.078	0.002	[-0.156, 0.195]	0.030

Note. The CONTROL $\rightarrow$ FMP row is reported for transparency. Its standard-error-based bootstrap p -value is 0.002, but its 95% BCa interval includes zero; under the prespecified decision rule, the path is treated as non-conclusive.

FMC is positively associated with FMP ($\beta = 0.302$, $t = 6.566$), as is OC ($\beta = 0.165$, $t = 3.945$), supporting H3 and H6. ICT is positively associated with FMC ($\beta = 0.302$), OC ($\beta = 0.272$), and FMP ($\beta = 0.184$), supporting H8–H10. The CONTROL-to-FMP coefficient is positive ($\beta = 0.138$), but its inference is unstable: the bootstrap standard-error test reports $p = 0.002$, whereas the 95% bias-corrected and accelerated (BCa) interval $[-0.156, 0.195]$ includes zero. The discrepancy reflects the use of two different bootstrap summaries, and the BCa interval is the prespecified criterion for directional support in this study. Accordingly, the CONTROL path is treated as non-conclusive and is not given a firm substantive interpretation or attributed to any individual covariate.

The BP-by-ICT interaction is positive in both mediator equations: $\beta = 0.202$ for FMC and $\beta = 0.171$ for OC, supporting H11 and H12. The associated f^2 values are 0.059 and 0.039. Thus, ICT changes the participation-mediator relationships, although the incremental contributions are modest. Among the FMP predictors, f^2 is 0.106 for FMC, 0.044 for ICT, 0.034 for OC, and 0.027 for BP. Statistical support for each path should therefore not be confused with equally large practical effects.

Indirect effects and moderated mediation

The BP-FMC-FMP indirect effect is 0.114, with a 95% BCa interval of [0.072, 0.167]. The BP-OC-FMP indirect effect is 0.057, with an interval of [0.029, 0.092]. These estimates support H4 and H7. Because the direct BP-FMP coefficient remains positive and its interval excludes zero, the pattern is consistent with complementary partial mediation in the specified model. It does not establish that changes in participation temporally precede or cause changes in the mediators.

Table 5. Specific indirect associations and moderated mediation indices

Test	Association	Estimate	t	p	95% BCa CI
H4	BP → FMC → FMP	0.114	4.713	<0.001	[0.072, 0.167]
H7	BP → OC → FMP	0.057	3.514	<0.001	[0.029, 0.092]
H13	ICT moderation via FMC	0.061	3.948	<0.001	[0.034, 0.096]
H14	ICT moderation via OC	0.028	2.888	0.004	[0.013, 0.053]
Ancillary	ICT → FMC → FMP	0.091	4.853	<0.001	[0.058, 0.133]
Ancillary	ICT → OC → FMP	0.045	3.339	<0.001	[0.023, 0.076]

At mean ICT, the total indirect BP-FMP association is 0.171, with a 95% BCa interval of [0.117, 0.235]. Adding the direct coefficient yields a total association of 0.324 [0.240, 0.406]. The paired contrast between the capacity and commitment indirect effects is 0.057, with a 95% percentile interval of [0.004, 0.115]. This additional calculation supports a larger capacity pathway at mean ICT within the present specification, although the lower endpoint is close to zero and the comparison is not a general ranking of the mechanisms across contexts.

The complete first-stage moderated pathways are also supported. The capacity-pathway index is 0.061 [0.034, 0.096], and the commitment-pathway index is 0.028 [0.013, 0.053]. Both intervals exclude zero, supporting H13 and H14. These are the indirect effects from the relevant interaction term through its mediator to FMP. Interpreting them as moderated mediation indices is justified by the verified product-score construction and the linear specification of the mediator equations.

Table 6. Conditional indirect associations across ICT levels

ICT score	Mediator	Indirect estimate	95% percentile CI
Low -1 SD	FMC	0.053	[0.012, 0.105]
Low -1 SD	OC	0.029	[0.006, 0.059]
Mean 0	FMC	0.114	[0.070, 0.164]
Mean 0	OC	0.057	[0.027, 0.090]
High +1 SD	FMC	0.175	[0.114, 0.242]
High +1 SD	OC	0.085	[0.042, 0.131]

At ICT one standard deviation below its mean, the conditional indirect effects are 0.053 through FMC and 0.029 through OC. At mean ICT, they are 0.114 and 0.057; at one standard deviation above the mean, they increase to 0.175 and 0.085. All six percentile intervals exclude zero. The pattern therefore indicates amplification rather than a pathway that appears only at high ICT. The three values illustrate the fitted linear relationship and do not identify a threshold or Johnson-Neyman region of significance.

ICT also has positive indirect associations with FMP through FMC (0.091, 95% BCa interval [0.058, 0.133]) and OC (0.045, [0.023, 0.076]). These ancillary estimates complement the hypothesised direct ICT relationship. Taken together, Tables 4 and 5 provide statistical support for H1–H14 within the reported specification; this hypothesis disposition remains subject to the design and specification limitations discussed below.

Explanatory and predictive assessment

The interaction model explains 32.6% of FMC variance, 26.7% of OC variance, and 39.7% of FMP variance (Table 7). Adjusted R^2 values are 0.321, 0.261, and 0.390. Relative to the baseline without interactions, R^2 increases from 0.286 to 0.326 for FMC and from 0.238 to 0.267 for OC. FMP R^2 remains 0.397 because its direct predictor set and exported substantive scores are unchanged. The addition of first-stage interactions should therefore not be described as an observed increase in FMP explained variance.

Table 7. Explained variance and blindfolding predictive relevance

Outcome	Baseline R^2	Interaction R^2	Adjusted R^2	Q^2
FMC	0.286	0.326	0.321	0.215
OC	0.238	0.267	0.261	0.175
FMP	0.397	0.397	0.390	0.253

Blindfolding produces positive cross-validated redundancy values of 0.215 for FMC, 0.175 for OC, and 0.253 for FMP. These results support predictive relevance under the omission procedure. They do not establish forecasting performance for new schools or superiority to a benchmark model, since no PLSpredict or comparable holdout results are available.

Model-fit evidence is mixed. SRMR is 0.064 for both saturated and estimated models, and rms_theta is 0.096. Although the SRMR values fall below the conventional 0.08 guideline, the estimated-model SRMR of 0.0644 exceeds its bootstrap 95% reference value of 0.0471. The saturated-model SRMR similarly exceeds its 95% reference value. NFI is approximately 0.780. The results therefore do not warrant describing the complete model as exhibiting uniformly satisfactory or exact fit. The reflective control block is one plausible source of misspecification, but the available diagnostics do not isolate its contribution.

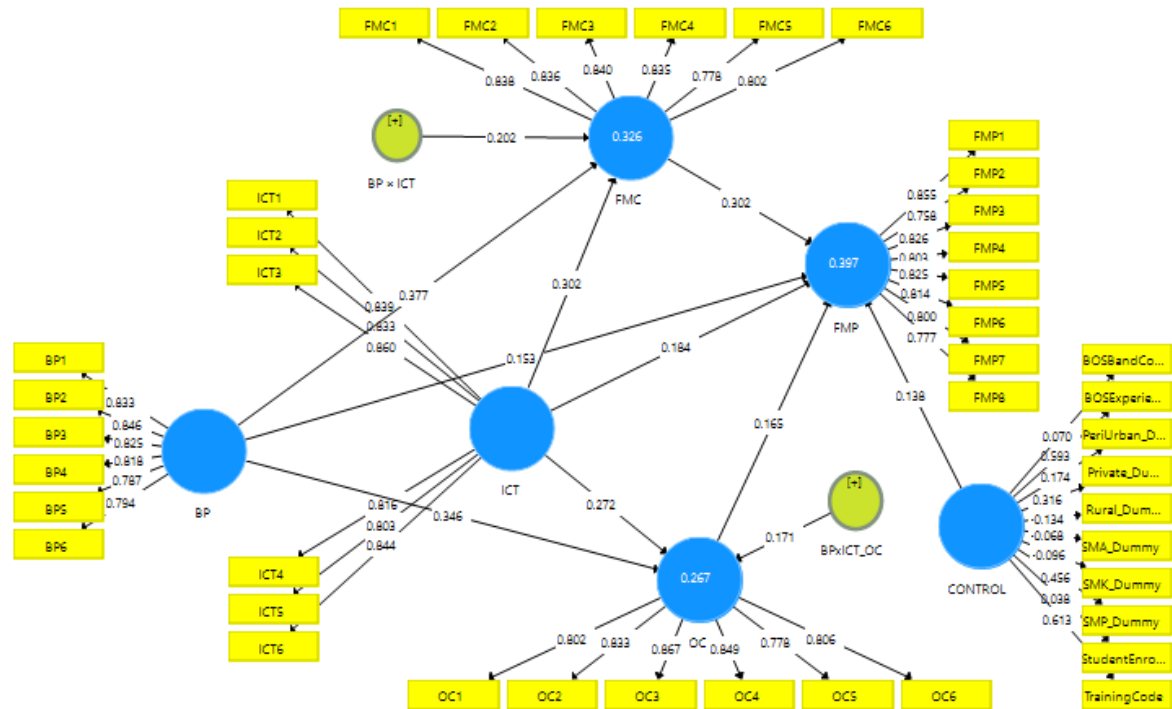


Figure 2. SmartPLS algorithm output for the estimated interaction model

Sensitivity to the representation of controls

Separately entering the ten covariates into regressions on exported construct scores retains the direction and statistical support of all ten substantive direct and interaction paths (Table 8). In the FMC equation, the BP coefficient is 0.364 and the interaction coefficient is 0.196. In the OC equation, the corresponding coefficients are 0.342 and 0.178. The FMP equation retains positive coefficients for BP (0.155), FMC (0.306), ICT (0.192), and OC (0.157). All associated HC3 intervals exclude zero.

Table 8. Additional regressions with individual covariates

Outcome	Predictor	Coefficient	95% HC3 CI	p
FMC	BP	0.364	[0.267, 0.460]	<0.001
FMC	ICT	0.302	[0.218, 0.386]	<0.001
FMC	BP × ICT	0.196	[0.107, 0.285]	<0.001
OC	BP	0.342	[0.250, 0.434]	<0.001
OC	ICT	0.283	[0.188, 0.378]	<0.001
OC	BP × ICT	0.178	[0.090, 0.265]	<0.001
FMP	BP	0.155	[0.057, 0.254]	0.002
FMP	FMC	0.306	[0.211, 0.401]	<0.001
FMP	ICT	0.192	[0.105, 0.279]	<0.001
FMP	OC	0.157	[0.069, 0.244]	<0.001

The separate-covariate regressions produce R^2 values of 0.335 for FMC, 0.282 for OC, and 0.402 for FMP. The FMP regression without controls yields $R^2 = 0.379$, with positive BP, FMC, ICT, and OC coefficients of 0.170, 0.319, 0.183, and 0.163. The principal

associations are therefore not confined to a regression containing the aggregate CONTROL score. This check evaluates sensitivity while holding the substantive construct scores fixed; it neither re-estimates the PLS measurement model nor incorporates uncertainty in those scores. The primary PLS estimates remain those reported in Tables 2–7 and Figure 2.

DISCUSSION

How participation is associated with financial performance

The results support an interpretation in which participation operates through both capability and commitment. Budget involvement is associated with stronger capacity and commitment, each of which is associated with performance after accounting for the other. The remaining direct association suggests that these two mechanisms do not exhaust the relationship. Role clarity, coordination, or access to implementation information may provide additional explanations, but they were not separately measured and should not be inferred as established mediators.

The capacity pathway is particularly relevant to regulated school finance. Participation gives staff an opportunity to confront the practical implications of proposed spending before implementation. When deliberation develops usable knowledge, fund managers may be better positioned to prepare coherent budgets, identify documentation requirements, and respond to changes in procedures. This interpretation is consistent with evidence connecting budgeting capability and organisational outcomes in public universities (He & Ismail, 2023), while extending the focus to individual school-fund responsibilities. The larger estimated capacity indirect effect at mean ICT suggests that learning and technical competence deserve explicit attention in participation initiatives.

The commitment pathway nevertheless remains meaningful. Accurate administration requires sustained effort in tasks that can be repetitive and poorly visible. Staff who identify with school goals may be more willing to follow up incomplete records, coordinate across work units, and persist when administrative problems emerge. The finding aligns with the commitment mechanism examined by Nouri and Parker (1998) and with evidence on budget-goal commitment in higher education (Alhasnawi et al., 2024). Organisational and budget-goal commitment remain different constructs, so the comparison concerns a shared motivational logic rather than interchangeable measurements.

The dual-pathway result also sets a boundary around managerial prescriptions. Training alone does not address whether staff perceive participation as meaningful, while efforts to encourage commitment do not remove technical demands. The model supports considering both dimensions, without implying that either is sufficient for good governance. Its coefficients describe associations across respondents, not the effect of implementing a particular training programme or leadership intervention.

ICT and the credibility of participation

Positive interaction coefficients indicate that the participation–capacity and participation–commitment relationships are stronger at higher ICT use. The positive

moderated mediation indices extend this conclusion to the complete indirect pathways. The conditional estimates further show that the pathways remain positive at lower ICT levels, suggesting that digital use strengthens an existing relationship rather than making participation relevant for the first time.

One interpretation is that ICT improves the continuity between deliberation and execution. During planning, accessible data can help participants assess alternatives; during implementation, retrievable records can help them revisit decisions and detect discrepancies. Capacity may develop because discussions are supported by evidence that remains available after meetings. Commitment may strengthen because contributors can observe how agreed priorities enter actual work. This interpretation is compatible with budgeting research on communication technology (Winata & Mia, 2005; Maiga et al., 2014), although the present indicators do not separately identify information visibility, trust, or feedback as mediating mechanisms.

The contextual extension to BOSP management is consequential because regulated discretion differs from unrestricted managerial choice. Blanco-Encomienda and Al Jasimee (2026) examined ICT-enabled participation, staff capacity, and organisational commitment in industrial enterprises, whereas Alhasnawi et al. (2024) tested mediated and moderated budget-participation effects in higher education. Neither study addressed designated school fund managers working within a nationally regulated grant cycle, and neither tested whether capacity and commitment operate as parallel pathways while ICT moderates both first-stage relationships in that setting. The unanswered question is therefore whether the combined conditional mechanism transfers to school-grant administration, where performance means accurate, timely, and accountable execution of public funds. This study addresses that gap while retaining cautious, non-causal interpretation.

Theoretical implications

First, the findings locate contingency within the mechanisms linking a management practice to performance. ICT is associated with the strength of participation's relationship with both capacity and commitment. This gives a more specific account of contextual fit than treating technology only as an additional performance predictor. It is consistent with the contingency perspective that organisational practices work in relation to their information-processing environment (Chenhall, 2003; Otley, 2016).

Second, the empirical distinction between capacity and commitment clarifies why similar participation arrangements may be associated with different outcomes. A school may create opportunities for voice without improving technical understanding, or may improve understanding without generating ownership. Modelling both pathways avoids treating participation as a single motivational treatment. The evidence for a larger capacity pathway at mean ICT is a setting-specific result that future research can test under different regulatory complexity, staff turnover, or technological conditions.

Third, the study connects behavioural management accounting with the administration of earmarked public resources. The performance construct concerns execution quality rather than profit or budget attainment alone. This broadens the

practical domain of participation research, but the distinction between perceived role performance and independently observed accountability must be maintained. A favourable managerial rating is not evidence that funds produced better learning outcomes or that financial misconduct was prevented.

Implications for human resource and school management

School leaders can use the findings to reconsider how fund managers enter the budget process. Their involvement is likely to be more useful before allocations are finalised, when implementation knowledge can still affect decisions. Discussion should address the rationale for proposed activities, documentary requirements, timing, and resource constraints. Meeting attendance alone is an incomplete indicator of participation; schools should also consider whether managers receive usable information and whether their proposals receive a reasoned response.

Capacity development can be connected to the two stages of the annual BOSP cycle. Before each stage, school leaders can use exercises on eligible expenditure, transaction evidence, reconciliation, and reporting to prepare designated personnel for their responsibilities. During implementation, peer review of anonymised cases and feedback on reporting errors can connect regulatory knowledge with practice. These proposals follow from the observed associations and have not been tested as interventions. Their effectiveness should be evaluated using subsequent reporting timeliness, correction rates, and documentary completeness.

Digital development should concentrate on practical access and use. Authorised staff need to retrieve the same current information, trace approved changes, and locate supporting evidence without duplicating work. Training should therefore include the financial reasoning behind system entries and the organisational responsibilities attached to them. Where connectivity or digital competence is limited, phased implementation and assisted workflows may be more appropriate than relying on the availability of an application as proof of organisational readiness.

The commitment findings suggest a role for credible involvement and visible responsibility. Principals can explain how financial tasks support school priorities, acknowledge contributions, and provide feedback on implementation. Such practices should complement appropriate workloads and technical support. Because this study does not estimate subgroup differences, it does not support different intervention effects for public versus private schools or for particular school levels. Local implementation should be evaluated before broader recommendations are scaled.

Limitations and future research

Several limitations qualify the evidence. Although the survey concerns actual BOS fund-management practice during both stages of the 2025 BOSP cycle, the analytical design is cross-sectional and does not establish temporal ordering. More capable or committed managers may be invited to participate more extensively, while stronger performance may facilitate access to technology. Longitudinal designs, credible interventions, or defensible quasi-experimental variation are needed to distinguish these

alternatives. The statistical indirect effects should be read as model-consistent associations, rather than identified causal mechanisms.

Recruitment was conducted through school principals and targeted designated BOS personnel in one regency. This purposive approach may favour accessible respondents and does not establish national representativeness. The number of eligible staff who received the survey link is not available for calculating a response rate, so nonresponse bias cannot be quantified. The dataset also does not identify school clusters for cluster-adjusted inference; respondent-level bootstrapping assumes independent records. Replication across regencies and school systems, with documented sampling frames and clustering, would help assess transferability. Measurement invariance should precede formal comparisons by school level, ownership, or location.

Pre-survey assessment supported retaining all questionnaire statements, and the main-sample results support the reliability and discriminant validity of the five substantive blocks. Further validation remains useful because capacity includes learning behaviour as well as competence, while commitment combines attachment, responsibility, and persistence. Ratings were supplied by designated BOS fund-management personnel and may reflect shared organisational expectations, social desirability, and evaluation pressures. The supervisor-position variable does not establish an independent source of performance measurement. Statistical separation of constructs and low inner VIFs cannot rule out common-method bias (Podsakoff et al., 2003). Independent administrative outcomes would strengthen future research.

The auxiliary CONTROL block combines conceptually distinct characteristics and has weak reflective measurement properties. Its confidence-interval evidence is also inconclusive. The supplementary regressions show that the principal associations persist when these characteristics enter separately, but their inference is conditional on fixed construct scores. This limitation bounds interpretation of the reported PLS model. Future analyses can estimate school and respondent characteristics as theoretically justified individual covariates throughout the measurement and structural estimation procedure, and examine categorical alternatives to the ordinal coding of training and BOS value bands.

Fit and prediction require similarly bounded interpretation. Conventional SRMR values are favourable, but bootstrap reference comparisons and NFI provide less reassuring evidence. The model should therefore be treated as an informative but incomplete account of the observed covariance structure. Positive blindfolding Q^2 values support within-sample predictive relevance only. Future studies should assess predictions on genuinely held-out cases, compare them with appropriate benchmarks, and determine whether the model improves decisions beyond simpler alternatives. The remaining 60.3% of FMP variance also encourages investigation of leadership, workload, oversight, and task complexity without assuming that any particular omitted variable explains the residual.

CONCLUSIONS

Among 400 designated BOS fund-management respondents in Tangerang Regency, assessments relating to the 2025 BOSP funding cycle show that budgetary participation is positively associated with performance directly and through capacity and organisational commitment. ICT use strengthens the first stage of both indirect pathways, and the bootstrap indices support moderated mediation within the estimated model. The capacity pathway is larger at mean ICT, while the commitment pathway remains positive and statistically supported. Supplementary regressions with individual covariates retain the principal substantive associations.

For human resource and school management, the findings support connecting meaningful budget participation with practical competence development, credible responsibility, and access to usable digital information across the funding cycle. These associations provide a basis for designing and evaluating staff-development practices, but do not establish causal intervention effects, national generalisability, or out-of-sample predictive superiority. The aggregate control specification and mixed fit diagnostics remain qualifications. Future research should combine more detailed covariate specification with longitudinal observations and independent measures of accountable financial performance.

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