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Enhancing Teacher Productivity Through Integrated Management Resources: A Mixed-Methods Study in Indonesian Islamic Elementary Schools

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ABSTRACT

Teacher productivity remains a critical challenge in achieving educational quality, particularly in resource-constrained contexts. This study examined the direct and mediated effects of empowerment, knowledge sharing, job design, and academic supervision on teacher productivity in Indonesian Islamic Integrated Elementary Schools. A sequential explanatory mixed-methods design combined qualitative interviews with 12 school principals and teachers with quantitative surveys of 176 teachers across 10 schools in East Jakarta. Structural equation modeling revealed that academic supervision was the strongest predictor of teacher productivity ($\beta=0.641$, $p<0.001$), explaining 41% of productivity variance, while empowerment, knowledge sharing, and job design showed no significant direct effects. However, knowledge sharing strongly influenced job design ($\beta=0.750$, $p<0.001$) and academic supervision ($\beta=0.749$, $p<0.001$), with academic supervision fully mediating empowerment effects and partially mediating knowledge sharing effects on productivity. The integrated model explained 83.1% of productivity variance with strong predictive validity ($Q^2=0.823$). SITOREM analysis identified follow-up, supervision discussion, knowledge donation, and teacher autonomy as priority improvement areas. Findings demonstrate that productivity enhancement requires quality academic supervision integrated with supportive organizational cultures rather than isolated interventions. The study provides evidence-based strategies for educational administrators in developing contexts where strategic resource allocation is essential for maximizing teacher performance and student outcomes.

Keywords: Academic Supervision, Islamic Elementary Education, Knowledge Sharing, Teacher Empowerment, Teacher Productivity

INTRODUCTION

Teacher productivity represents a fundamental determinant of educational quality in contemporary learning environments. As education evolves beyond traditional knowledge transmission toward developing 21st-century competencies, teachers face increasing demands to cultivate critical thinking, creativity, collaboration, and communication skills among students (Aditya et al., 2024). The emergence of deep learning-based curricula emphasizes profound understanding and meaning construction, requiring teachers to maintain high productivity in designing and implementing innovative learning strategies (Albani, 2025). This paradigm shift necessitates student-centered approaches, active learning methods, problem-based assignments, and authentic assessments that align with diverse student needs (Kadarismanto & Puspita Sari, 2025).

Deep learning frameworks prioritize mastery of 21st-century competencies encompassing technology literacy, information management, learning and innovation skills, and life and career capabilities (Yuni et al., 2016). In this science and technology-driven era, nations require human resources equipped with critical thinking capacity and problem-solving abilities (Amanulloh et al., 2024). Teacher productivity extends beyond the volume of material delivered to encompass the creation of meaningful learning experiences through effective technology integration, including online resources, interactive media, and learning platforms that enhance student motivation and engagement.

Despite its recognized importance, achieving optimal teacher productivity presents substantial challenges. Teachers frequently encounter excessive workloads involving administrative tasks, classroom management, and professional development demands. Additionally, inadequate resources, insufficient training, minimal feedback mechanisms, and poor physical and mental health conditions contribute to stress and burnout, ultimately diminishing productivity. These challenges are compounded by limited energy resources, inadequate learning facilities, minimal management support, lack of incentives and recognition, and imbalanced workload distribution (Devi et al., 2023).

Empirical evidence underscores the severity of these productivity concerns. The 2022 National Examination results indicated that Indonesian teachers achieved an average score of 54.6, below the minimum standard of 55 (Moerdijat, 2024). According to the Strategic Plan of the Directorate General of Teachers and Education Personnel, the percentage target for professional teachers in 2024 was set at 49.83%; however, baseline data and actual achievements revealed this target remained unmet, suggesting most teachers have not yet satisfied professional competency standards (Shintia, 2024).

A preliminary survey conducted in November 2023 involving 30 teachers from six schools in East Jakarta identified critical productivity gaps: 41% of teachers failed to achieve expected work quality standards through efficient

resource utilization; 36% produced insufficient evaluation materials and provided inadequate student guidance; 30% did not demonstrate expected work effectiveness in increasing student understanding and achieving character strengthening goals; and 37% exhibited inefficiency in utilizing teaching materials, managing classrooms, and responding to student assistance requests [survey data].

Minister of Education and Culture Regulation No. 15 of 2018 concerning the Fulfillment of Teacher, Principal, and School Supervisor Workloads establishes detailed requirements encompassing planning, implementing, assessing, and guiding students, as well as additional tasks across intracurricular, co-curricular, and extracurricular activities (Permendikbud No. 15 Tahun 2018 Tentang Pemenuhan Beban Kerja Guru, Kepala Sekolah, Dan Pengawas Sekolah, 2018). Teacher productivity, defined as the relationship between input (competence, effort, time, resources) and output (learning outcomes, curriculum achievement, student character and competency improvement), serves as the concrete manifestation of professional responsibilities (Anas & Sesmiarni, 2024). High productivity correlates not only with teaching hours but with teaching quality and achievement of superior student learning outcomes across attitude, knowledge, and skills domains (Bhoki, 2023).

A comprehensive review of national and international literature from 2017 to 2025 reveals that research on teacher productivity predominantly examines individual factors such as leadership style, work motivation, managerial competence, teacher discipline, organizational commitment, professional development, and peer learning (Anisah et al., 2020; Azainil et al., 2021; Baidi et al., 2020). However, these studies typically investigate factors in isolation rather than through integrated models that capture the complex interplay of multiple variables simultaneously. This fragmented approach limits understanding of how psychological, structural, social, and pedagogical factors interact to influence productivity outcomes.

The novelty of this research lies in its integration of four theoretically distinct yet practically interconnected variables: empowerment (psychological dimension), knowledge sharing (social dimension), job design (structural dimension), and academic supervision (pedagogical dimension). Previous studies have examined these variables separately or in paired relationships, but comprehensive modeling of their simultaneous direct and indirect effects through mediation pathways remains underexplored. This integrated approach addresses a critical gap by positioning teacher productivity as the result of synergistic interactions among multiple organizational and individual factors rather than isolated determinants.

Furthermore, this study advances methodological innovation by combining the Modeling and Optimization of Management Resources (POP-SDM) approach with mixed-methods sequential explanatory design, integrating qualitative exploration of contextual factors with quantitative validation through Partial Least Squares Structural Equation Modeling (PLS-SEM). The application of SITOREM

(Scientific Identification Theory to Conduct Operation Research in Education Management) analysis provides practical guidance for educational administrators by identifying specific indicators requiring intervention versus maintenance, thereby bridging the research-practice gap.

The research addresses three fundamental questions: First, what are the direct effects of empowerment, knowledge sharing, job design, and academic supervision on teacher productivity? Second, how do job design and academic supervision mediate the relationships between empowerment, knowledge sharing, and productivity? Third, which specific indicators within these variables require immediate improvement versus maintenance to optimize teacher productivity? By answering these questions through rigorous empirical investigation, this study enriches educational management literature and provides actionable strategies for productivity enhancement in continuously evolving educational contexts.

LITERATURE REVIEW

Teacher Productivity

Productivity fundamentally represents the ratio between organizational input and output, measuring success in achieving goals through effective resource utilization (Fauzi et al., 2024; Permata et al., 2020). In educational contexts, teacher productivity encompasses the balanced transformation of resources (time, effort, competence) into desired outcomes (learning achievement, student development, curriculum implementation). Teachers are considered productive when they maintain equilibrium between work input and output, measurable through work compliance, task completion speed, collegial relationships, self-development, target achievement, work quality, and positive contributions to the school environment (E. Suhardi et al., 2020).

Work productivity reflects employees' positive contributions to organizational goal achievement, wherein teachers as educational personnel provide added value through effectiveness, efficiency, work quality, and attainment of established educational objectives (Utami & Vioresa, 2021). From an operational perspective, productivity represents work results achieved within specific timeframes while considering output-input ratios, assessed through achievement of work standards, task implementation efficiency, timeliness, and work result quality according to provisions (Baidi et al., 2020). This conceptualization emphasizes two critical dimensions: effectiveness in achieving targets regarding quality, quantity, and time; and efficiency in resource utilization (Hakim et al., 2018).

Alternative theoretical frameworks view work productivity as the transformation process converting input into output within organizational applications. The input dimension manifests through work responsibility, constructive actions, and intrinsic motivation, while the output dimension reflects teachers' positive contributions and achievement of tangible work results [29]. Productive teachers consistently strive to improve teaching methods for more

effective educational goal attainment, demonstrating capabilities in learning planning, implementation, outcome assessment, student guidance, and execution of additional tasks (Asmarani et al., 2021).

Synthesizing these perspectives, teacher productivity is conceptualized as the effective and efficient utilization of resources to produce maximum quality and quantity of work that meets established job standards, thereby encouraging school quality improvement. This construct is operationalized through four primary indicators: quality (standard achievement in teaching and professional responsibilities), quantity (volume of work produced within specified timeframes), effectiveness (goal achievement and positive impact creation), and efficiency (optimal resource utilization minimizing waste and errors).

Empowerment

Teacher empowerment creates innovative and engaging learning environments that encourage active student participation (Mailizar et al., 2024). When teachers feel valued and supported, motivation to deliver optimal performance increases substantially. Empowerment represents the right granted to individuals to utilize their abilities in completing tasks, encompassing work skills, self-control ability, and sense of responsibility (M. Suhardi & Zinnurain, 2022). This conceptualization aligns with definitions emphasizing autonomy provision by leaders to employees, characterized by desire, trust, confidence, credibility, and accountability.

Contemporary empowerment theory emphasizes granting authority to teachers for making decisions related to specific tasks, encompassing four dimensions: general attitudes (including goal achievement success and goal clarity), organizational support (incorporating decision-making authority and risk-taking courage), knowledge and learning (encompassing adaptability, communication, and transformation), and fundamental recognition through reward systems (Vu, 2020). Furthermore, teacher empowerment represents educators' ability to assume responsibility for personal and professional development, requiring school systems to create competency development opportunities, expand collective participation, and encourage shared decision-making roles (Tindowen, 2019).

Comprehensive empowerment frameworks integrate six critical components: desire (management's willingness to delegate responsibilities and involve members in problem identification), trust (establishing confidence between management and members, creating conducive atmospheres for information exchange), confidence (fostering self-assurance by appreciating individual capabilities), credibility (developing environments encouraging healthy competition for high-performing organizations), accountability (emphasizing members' responsibility for delegated authority), and communication (ensuring open channels for mutual understanding) (Prasetia et al., 2020).

Synthesizing these theoretical perspectives, empowerment is defined as the delegation of authority and responsibility from leaders to members, enabling members to feel empowered, trusted, responsible, and more competent in completing work and making effective decisions for organizational advancement. This construct operationalizes through six indicators: delegation of authority (distributing decision-making power), strengthening trust (building confidence in teacher capabilities), adding responsibility (expanding professional accountability), increasing competence (enhancing professional skills and knowledge), increasing self-determination (fostering autonomy and intrinsic motivation), and strengthening sense of meaning (reinforcing perceived work significance and contribution).

Knowledge Sharing

Knowledge sharing offers substantial benefits at individual and organizational levels, accelerating teacher productivity improvement through effective processes. This practice opens opportunities for individuals, teams, and organizations to enhance performance and generate innovative ideas (Sudjud et al., 2022). Knowledge sharing represents efforts to manage knowledge through specific behaviors involving information, experience, and work-relevant skills sharing, aiming to utilize knowledge for continuity, development, and benefit in problem-solving and organizational goal achievement. This process operationalizes through knowledge mastery, knowledge transfer, knowledge reception, and application of knowledge results (Sudjud et al., 2022).

As the most influential technique for knowledge management success, knowledge sharing enables business ability in managing information exchange. With effective knowledge management, knowledge sharing allows all teachers to share best experiences, generate new ideas, and save time overcoming challenges, operationalized through knowledge acquisition, knowledge transfer, and knowledge application (Prastianti et al., 2023). The interactive dimension of knowledge sharing involves information exchange both implicitly and explicitly related to tasks, including requests, knowledge supply through information exchange, contributions, and knowledge collection, measurable through learning exchange related to knowledge, experience exchange, skill exchange through contributions, and knowledge collection (Al-Husseini et al., 2021).

Research demonstrates that knowledge sharing significantly influences organizational outcomes. Studies reveal positive relationships between knowledge sharing and innovation capability, with knowledge sharing explaining substantial variance in organizational performance metrics. The social exchange theory perspective emphasizes reciprocity in knowledge sharing, where individuals engage in sharing behaviors expecting future returns, creating sustainable cycles of knowledge exchange within organizations.

Integrating theoretical frameworks, knowledge sharing is conceptualized as the exchange of knowledge between two or more individuals, both explicitly and

implicitly, rendering knowledge more understandable, developable, and beneficial for task achievements. This construct operationalizes through four indicators: knowledge acquisition (obtaining new information and expertise from various sources), knowledge donation (voluntarily sharing expertise and experience with colleagues), knowledge reception (absorbing and internalizing shared knowledge from others), and application of knowledge results (implementing acquired knowledge in teaching practices and problem-solving).

Job Design

Job design plays a pivotal role in achieving organizational goals, functioning as a vital strategic tool ensuring success rather than merely a document. This concept emphasizes arranging tasks, responsibilities, and functions into structured work units, regulating work content, methods, and interactions to achieve organizational objectives through skill variety, task identity, task significance, autonomy, and feedback (Aroosiya & Ali, 2014). Job design represents work type allocation considering relevant ideas and integrating employee tasks according to organizational goals and individual needs, focusing not only on organizational structure but balancing organizational objectives with individual interests through work content, applied methods, work implementation approaches, and inter-work relationships (Willard et al., 2020).

Effective job design composes clear job descriptions enabling teachers to develop deep understanding regarding work environments and responsibilities. This clarity allows teachers to work more efficiently and motivates optimal task completion. The Job Characteristics Model proposes five core dimensions influencing motivation and performance effectiveness: skill variety (degree to which jobs require diverse activities and talents), task identity (extent to which jobs involve completing whole, identifiable pieces of work), task significance (degree to which jobs impact others' lives), autonomy (freedom in scheduling work and determining procedures), and feedback (clarity of information about performance effectiveness) (Renwarin, 2021).

Contemporary job design theory emphasizes the psychological states mediating relationships between job characteristics and outcomes. When jobs incorporate high levels of core dimensions, employees experience meaningful work, responsibility for outcomes, and knowledge of results, leading to enhanced motivation, satisfaction, and performance. However, individual differences moderate these relationships, with growth need strength influencing responsiveness to enriched job designs.

Synthesizing theoretical perspectives, job design is defined as job description, task arrangement, authority arrangement, and accurate, effective, and efficient task completion methods to achieve organizational goals. This construct operationalizes through five indicators: task identity (clarity regarding complete work units and role boundaries), task significance (understanding of work importance and impact on

students and institution), task authority (decision-making power and autonomy in professional responsibilities), work variety (diversity and challenge level in assigned tasks), and feedback acquisition (receiving clear information about performance quality and improvement areas).

Academic Supervision

Academic supervision plays a crucial role in teacher professional development, functioning to increase teaching effectiveness while ensuring continuous professional growth. This process represents conscious and continuous efforts by supervisors or school principals to stimulate, coordinate, and guide teachers in developing their potential through three main stages: preparation, implementation, and evaluation (Hulu et al., 2024). Beyond guidance, academic supervision focuses on achieving established standards, comparing planning with activity implementation while following up on results through providing guidance for teaching improvement, simplification of teacher roles and resources, participation of all staff, application of supervision techniques, and assistance in implementing more effective learning methods (Prasetyono et al., 2018).

Academic supervision constitutes a series of activities helping teachers manage learning to achieve academic goals, encompassing policy supervision, supervision implementation supporting performance, performance problem handling, and improvement solution development (Adnan et al., 2022). Effective supervision adopts clinical approaches emphasizing collaborative problem-solving rather than hierarchical evaluation, creating supportive environments where teachers view supervision as developmental opportunity rather than punitive assessment.

Contemporary supervision models emphasize differentiated approaches recognizing diverse teacher needs based on experience, competence, and developmental stages. Effective supervisors employ varied techniques including classroom observations, demonstration teaching, professional learning communities, action research facilitation, and individualized coaching. The supervision process creates feedback loops enabling continuous improvement cycles where teachers reflect on practices, implement changes, and assess impacts on student learning.

Research demonstrates strong correlations between supervision quality and teaching effectiveness, with well-implemented supervision programs associated with improved instructional practices, increased teacher efficacy, and enhanced student achievement. However, supervision effectiveness depends on supervisor competence, relationship quality between supervisors and teachers, and organizational support for professional development initiatives.

Integrating theoretical frameworks, academic supervision is defined as principal activities involving guidance and supervision to teachers, helping teachers improve and develop teaching to increase educational outcome quality. This

construct operationalizes through five indicators: supervision activity planning at the preparation stage (establishing clear objectives, schedules, and approaches), data collection and analysis at the observation stage (systematically gathering evidence about teaching practices), supervision result discussion at the final visit stage (engaging in reflective dialogue about observations), follow-up (implementing concrete action plans based on supervision findings), and supervision program evaluation (assessing overall supervision effectiveness and impact on teaching improvement).

RESEARCH METHODOLOGY

Research Design

This study employed a sequential explanatory mixed-methods design with the Modeling and Optimization of Management Resources (POP-SDM) approach (Creswell & Creswell, 2023). The design combined qualitative and quantitative methods sequentially, beginning with preliminary research revealing gaps between actual teacher productivity conditions and ideal expected behaviors (Creswell & Clark, 2017). Qualitative research through informant interviews explored factors and investigated inter-factor relationships hypothesized to positively influence teacher productivity. The POP-SDM approach develops modeling and optimization of management resources by exploring variables with positive and dominant influences on research themes through operational research methods (Setyaningsih, 2020).

The research followed seven phases: Research Theme identification, Pre-Modelling through qualitative exploration, Modelling development, Pre-Model Testing, Model Testing using PLS-SEM, Optimization Model creation, and Optimal Recommendation formulation. This comprehensive approach enabled both theory development through exploratory investigation and theory testing through confirmatory analysis.

Research Setting and Participants

The qualitative phase occurred over four months (June-October 2024) at six Islamic Integrated Elementary Schools (SDIT) in East Jakarta: SDIT Nurul Yaqin, SDIT Insan Mandiri, SDIT Teladan Suci, SDIT Darul Maarif 3, SDIT Buah Hati Islamic School 2, and SDIT Hidayatullah. Twelve informants participated, consisting of six school principals and six teachers selected based on comprehensive knowledge about teacher productivity conditions and influencing factors. Data saturation occurred at the eleventh informant, with interviews concluding at the twelfth informant.

The quantitative phase spanned five months (July-November 2024) across ten sub-districts in East Jakarta. The population comprised 314 permanent foundation teachers from 38 SDIT schools. Using the Taro Yamane formula with 5% error level, the required sample size was calculated as 176 respondents: $n = N / [1 +$

$N(e)^2 = 314 / [1 + 314(0.05)^2] = 176$. Multistage sampling employed two stages: random selection of sample schools per sub-district, and proportional random sampling of teacher respondents at each school. The final sample included 15 schools distributed across five sub-districts: Makasar (2 schools, 68 teachers), Kramat Jati (3 schools, 129 teachers), Pasar Rebo (1 school, 35 teachers), Cipayung (2 schools, 30 teachers), and Ciracas (2 schools, 52 teachers).

Research Instrument

Five research instruments measured the constructs using behavior rating scales and Likert scales. Teacher Productivity (dependent variable) was assessed through principals' evaluations using 35 valid items measuring quality, quantity, effectiveness, and efficiency on 5-point behavior rating scales. Empowerment (independent variable) employed 32 valid items measuring delegation of authority, strengthening trust, adding responsibility, increasing competence, increasing self-determination, and strengthening sense of meaning. Knowledge Sharing (independent variable) utilized 35 valid items assessing knowledge acquisition, knowledge donation, knowledge reception, and application of knowledge results. Job Design (intervening variable) comprised 34 valid items measuring task identity, task significance, task authority, work variety, and feedback acquisition on 5-point Likert scales. Academic Supervision (intervening variable) consisted of 34 valid items evaluating supervision activity planning, data collection and analysis, supervision result discussion, follow-up, and supervision program evaluation.

All instruments underwent pilot testing with 30 teachers not included in the sample. Validity testing employed Pearson Product Moment correlation, with items retained when calculated correlation coefficients exceeded table values at $\alpha = 0.05$ significance level. Reliability testing using Cronbach's Alpha demonstrated high reliability across all instruments: Teacher Productivity ($\alpha = 0.933$), Empowerment ($\alpha = 0.970$), Knowledge Sharing ($\alpha = 0.826$), Job Design ($\alpha = 0.985$), and Academic Supervision ($\alpha = 0.981$), all exceeding the 0.70 threshold.

Data Collection and Analysis

Qualitative data collection employed semi-structured interviews using interview guidelines, with audio and visual recording upon informants' permission. Interview objectives included discovering actual teacher productivity conditions and exploring influencing factors. Qualitative analysis followed the Miles and Huberman model, encompassing data reduction (sorting information related to productivity variables), data codification (grouping information into supporting factors using variable name abbreviations), and Tally Mark analysis (selecting variables based on mention frequency by informants) (Qomaruddin & Sa'diyah, 2024).

Quantitative data collection utilized validated questionnaires distributed to 176 respondents. Data analysis proceeded through descriptive statistical analysis

and Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS application. PLS-SEM was selected because research constructs emerged from qualitative findings, grounding the model in constructivism principles consistent with variance-based analytical techniques (Hair et al., 2022). PLS-SEM offers advantages including applicability to small samples, higher statistical power, capability for both reflective and formative measurement models, robustness to non-normal distributions, and suitability for exploratory research (Hair et al., 2019).

Analysis followed Hair et al's (2019) seven-step procedure: specifying path models (establishing structural relationships among variables), specifying measurement models (formulating relationships between variables and indicators), collecting and screening data, estimating PLS-SEM models using algorithm procedures, evaluating measurement models through Composite Reliability and Average Variance Extracted (AVE), evaluating structural models through bootstrapping procedures, and interpreting results through direct effect, determination coefficient, and indirect effect analyses.

Model evaluation encompassed three stages. Outer model evaluation assessed convergent validity (factor loadings > 0.70 , AVE > 0.50), discriminant validity (Fornell-Larcker criterion, cross-loadings), and reliability (Composite Reliability > 0.70 , Cronbach's alpha > 0.70). Inner model evaluation examined R-squared (coefficient of determination), Q-squared (predictive relevance), and path coefficient significance. Overall model quality assessment evaluated model fit using SRMR and NFI criteria and predictive capability through PLS-predict procedures.

SITOREM (Scientific Identification Theory to Conduct Operation Research in Education Management) analysis facilitated identification of indicators requiring improvement versus maintenance. Analysis stages included contribution analysis calculating squared correlation coefficients, indicator analysis determining average scores reflecting actual conditions, indicator weight analysis based on expert judgment using Cost, Benefit, Urgency, and Importance criteria, and indicator classification determining priorities for improvement (high weight and low score) versus maintenance (high weight and high score).

Hypothesis Testing

Hypothesis testing examined significance levels of relationships between variables using bootstrapping procedures in SmartPLS, evaluating t-statistic values and p-values. Twelve path hypotheses were tested: eight direct effects (empowerment to productivity, knowledge sharing to productivity, job design to productivity, academic supervision to productivity, empowerment to job design, empowerment to academic supervision, knowledge sharing to job design, knowledge sharing to academic supervision) and four indirect effects (empowerment to productivity through job design, empowerment to productivity

through academic supervision, knowledge sharing to productivity through job design, knowledge sharing to productivity through academic supervision). For each hypothesis, statistical formulation specified $H_0: \beta \leq 0$ (no positive effect) and $H_1: \beta > 0$ (positive effect exists), with H_0 rejected when $t\text{-statistic} > t\text{-table}$ or $p\text{-value} < 0.05$, indicating significant positive effects.

RESULT AND DISCUSSION

Descriptive Analysis

Descriptive analysis revealed relatively high levels across all variables. Teacher Productivity ($n=176$) demonstrated mean score 145.16 ($SD=23.22$) from possible range 34-170, with empirical median (149) exceeding theoretical median (102). Indicator means converted to 1-5 scale showed quality (4.15), quantity (4.04), effectiveness (3.75), and efficiency (3.72). Quality achieved the highest score, indicating strong performance in achieving teaching standards, while efficiency received the lowest score, suggesting resource utilization required improvement.

Empowerment exhibited mean score 132.78 ($SD=17.88$) from possible range 32-160, with empirical median (137) surpassing theoretical median (96). Indicator means revealed strengthening sense of meaning (4.37), strengthening trust (4.19), adding responsibility (4.04), increasing competence (4.04), delegation (3.98), and increasing self-determination (3.92). High scores in sense of meaning and trust indicated teachers perceived work as valuable and experienced adequate confidence from administration, while lower self-determination scores suggested autonomy required enhancement.

Knowledge Sharing showed mean score 149.01 ($SD=25.55$) from possible range 38-190, with empirical median (153) exceeding theoretical median (114). Indicator means demonstrated application of knowledge results (4.26), knowledge reception (4.10), knowledge acquisition (3.96), and knowledge donation (3.81). High application scores indicated effective utilization of acquired knowledge in teaching, while low donation scores suggested voluntary sharing practices remained suboptimal.

Job Design displayed mean score 144.11 ($SD=20.86$) from possible range 40-200, with empirical median (142) surpassing theoretical median (120). Indicator means showed task identity (4.26), task significance (3.98), feedback acquisition (3.78), task authority (3.73), and work variety (3.46). High task identity indicated clarity in work scope and role understanding, while low work variety suggested insufficient challenge diversity in assigned tasks.

Academic Supervision exhibited mean score 139.14 ($SD=21.66$) from possible range 34-170, with empirical median (133.5) exceeding theoretical median (102). Indicator means revealed data collection and analysis (4.15), supervision activity planning (4.07), supervision program evaluation (4.01), supervision results discussion (3.96), and follow-up (3.95). High scores in data collection and planning

indicated adequate supervision implementation, while low discussion and follow-up scores suggested these aspects required enhancement for supervision to provide tangible productivity impacts.

Measurement Model Evaluation

Outer model evaluation employed an Embedded Two-Stage approach for Hierarchical Component Model (HCM), dividing measurement into Level 1 (relationships between manifest indicators and indicator factors) and Level 2 (relationships between indicators and dimensions with latent variables). All variables demonstrated composite reliability exceeding 0.70 and AVE surpassing 0.50, indicating adequate reliability and convergent validity. Following two-stage validation, all manifest sub-indicators achieved loading factor values greater than AVE, satisfying convergent validity requirements.

Discriminant validity assessment through HTMT (Heterotrait-Monotrait ratio) criterion showed values below 0.90 threshold for all constructs, confirming adequate discriminant validity. Fornell-Larcker criterion testing revealed that inter-indicator correlations with respective constructs exceeded correlations with other construct indicators, further supporting discriminant validity. Formative indicator evaluation through bootstrapping demonstrated all p-values below 0.05 and t-statistics exceeding 1.96, confirming convergent validity without multicollinearity concerns across all five variables.

Structural Model Evaluation

Inner model evaluation revealed no multicollinearity issues, with all VIF values below the threshold of 5. R-squared analysis indicated the structural model explained 83.1% of teacher productivity variance. This substantial explanatory power suggested the four independent variables collectively accounted for most productivity variation, with 16.9% attributable to factors beyond the model scope.

Path coefficient analysis revealed differential effects across relationships. Academic Supervision demonstrated the strongest direct effect on Teacher Productivity ($\beta=0.641$, $t=4.055$, $p<0.001$), explaining 41% of productivity variance individually. Knowledge Sharing exerted significant positive effects on both Job Design ($\beta=0.750$, $t=4.285$, $p<0.001$) and Academic Supervision ($\beta=0.749$, $t=8.501$, $p<0.001$), contributing 75% and 74.9% respectively to these mediating variables. Empowerment showed significant positive effect on Academic Supervision ($\beta=0.226$, $t=2.514$, $p=0.012$) but not on Job Design ($\beta=0.138$, $p=0.452$).

Direct effects of Empowerment ($\beta=0.162$, $p=0.344$), Knowledge Sharing ($\beta=0.145$, $p=0.555$), and Job Design ($\beta=-0.029$, $p=0.754$) on Teacher Productivity were not statistically significant, suggesting these variables influenced productivity primarily through mediating pathways rather than direct mechanisms. The negative coefficient for Job Design, though statistically insignificant with minimal effect size, indicated potential complex relationships requiring further investigation.

Model fit assessment using SRMR and NFI criteria demonstrated adequate fit, with saturated model values of 0.072 and 0.745 respectively, and estimated model values of 0.073 and 0.743. Both SRMR values below 0.08 threshold confirmed acceptable model fit. Predictive relevance evaluation revealed strong Q^2 values for Teacher Productivity (0.823), Job Design (0.772), and Academic Supervision (0.932), indicating the model possessed excellent predictive capability. PLS-predict comparison with linear regression showed the PLS-SEM model achieved lower error values (RMSE and MAE) for most indicators, confirming superior predictive performance.

Hypothesis Testing Results

Bootstrapping analysis of twelve path hypotheses yielded the following results. Among eight direct effect hypotheses, four received empirical support. H_4 (Academic Supervision $\rightarrow$ Teacher Productivity) was strongly supported ($\beta=0.641$, $t=4.055$, $p<0.001$). H_6 (Knowledge Sharing $\rightarrow$ Job Design) demonstrated strong support ($\beta=0.750$, $t=4.285$, $p<0.001$). H_7 (Knowledge Sharing $\rightarrow$ Academic Supervision) received robust support ($\beta=0.749$, $t=8.501$, $p<0.001$). H_8 (Empowerment $\rightarrow$ Academic Supervision) was supported ($\beta=0.226$, $t=2.514$, $p=0.012$).

Four direct effect hypotheses were not supported. H_1 (Empowerment $\rightarrow$ Teacher Productivity) showed positive but non-significant relationship ($\beta=0.162$, $t=0.947$, $p=0.344$). H_2 (Knowledge Sharing $\rightarrow$ Teacher Productivity) exhibited positive but non-significant effect ($\beta=0.145$, $t=0.591$, $p=0.555$). H_3 (Job Design $\rightarrow$ Teacher Productivity) demonstrated non-significant negative relationship ($\beta=-0.029$, $t=0.314$, $p=0.754$). H_5 (Empowerment $\rightarrow$ Job Design) showed positive but non-significant effect ($\beta=0.138$, $t=0.752$, $p=0.452$).

Among four indirect effect hypotheses, two received support. H_{10} (Empowerment $\rightarrow$ Academic Supervision $\rightarrow$ Teacher Productivity) was supported ($\beta=0.125$, $t=2.448$, $p=0.014$), indicating Academic Supervision fully mediated the Empowerment-Productivity relationship. H_{12} (Knowledge Sharing $\rightarrow$ Academic Supervision $\rightarrow$ Teacher Productivity) received strong support ($\beta=0.377$, $t=3.588$, $p<0.001$), demonstrating Academic Supervision as significant mediator in the Knowledge Sharing-Productivity pathway.

Two indirect effect hypotheses were not supported. H_9 (Empowerment $\rightarrow$ Job Design $\rightarrow$ Teacher Productivity) showed non-significant indirect effect ($\beta=0.006$, $t=0.241$, $p=0.810$). H_{11} (Knowledge Sharing $\rightarrow$ Job Design $\rightarrow$ Teacher Productivity) demonstrated non-significant indirect effect ($\beta=0.021$, $t=0.320$, $p=0.749$). These results indicated Job Design did not effectively mediate relationships between either Empowerment or Knowledge Sharing and Teacher Productivity.

Mediation analysis revealed Academic Supervision as the strongest mediator. For the Empowerment-Productivity pathway, Academic Supervision provided full

mediation with indirect effect (0.652) substantially exceeding direct effect (0.234). For the Knowledge Sharing-Productivity pathway, Academic Supervision provided partial mediation with strong indirect effect (0.633) surpassing direct effect (0.262). In contrast, Job Design demonstrated minimal mediating capacity, with weak partial mediation for the Empowerment pathway (indirect effect 0.160 vs. direct effect 0.727) and Knowledge Sharing pathway (indirect effect 0.085 vs. direct effect 0.805).

SITOREM Analysis

SITOREM analysis identified indicators requiring improvement versus maintenance based on contribution analysis, indicator scores, expert weighting, and classification determination. Contribution analysis ranked variable contributions to teacher productivity: Knowledge Sharing (80.2%, $r=0.896$), Empowerment (78.6%, $r=0.887$), Academic Supervision (76.7%, $r=0.876$), and Job Design (66.3%, $r=0.814$). These strong correlations confirmed all variables positively associated with productivity, justifying their inclusion in the enhancement model.

Expert evaluation using Cost, Benefit, Urgency, and Importance criteria assigned weighted percentages ranging 15% to 27% across variables. For Teacher Productivity, highest weights appeared for quality (27%) and quantity (21%). For Empowerment, strengthening sense of meaning (18%) and increasing competence (17%) received highest weights. For Knowledge Sharing, application of knowledge results (27%) and knowledge donation (26%) were prioritized. For Job Design, feedback (22%) and task significance (21%) received highest weights. For Academic Supervision, program evaluation (21%) and follow-up (21%) were emphasized.

Indicator classification based on weighted scores and actual performance levels identified twelve indicators requiring immediate improvement (priority ranking): follow-up (Academic Supervision), supervision results discussion (Academic Supervision), knowledge acquisition (Knowledge Sharing), knowledge donation (Knowledge Sharing), delegation (Empowerment), increasing self-determination (Empowerment), feedback (Job Design), task authority (Job Design), task significance (Job Design), work variety (Job Design), effectiveness (Teacher Productivity), and efficiency (Teacher Productivity).

Twelve indicators recommended for maintenance and development included: program evaluation (Academic Supervision), data collection and analysis (Academic Supervision), supervision planning (Academic Supervision), knowledge application (Knowledge Sharing), knowledge reception (Knowledge Sharing), competence enhancement (Empowerment), responsibility addition (Empowerment), trust strengthening (Empowerment), meaning strengthening (Empowerment), task identity (Job Design), quality (Teacher Productivity), and quantity (Teacher Productivity). These classifications provided actionable guidance for educational administrators in prioritizing intervention strategies.

This study reveals that empowerment does not exert a significant direct effect on teacher productivity ($\beta=0.162$, $p=0.344$), contrasting with theoretical expectations. This finding suggests that the empowerment initiatives in this context, potentially focused on psychological aspects like sense of meaning and trust, have not yet translated into productivity gains, possibly due to insufficient structural autonomy in decision-making. However, the significant mediation through academic supervision ($\beta=0.125$, $p=0.014$) indicates that empowerment's influence is indirect. This extends the work of Prasasti (2016), who found empowerment worked in combination with competence, and aligns with Manggung et al. (2023) by showing empowerment operates within a broader system where its benefits are realized through structured developmental processes like supervision.

Similarly, knowledge sharing showed no significant direct effect on productivity ($\beta=0.145$, $p=0.555$), a finding that diverges from previous studies such as Wahyudi and Laily (2020). The asymmetry between high knowledge application/reception and low knowledge donation suggests a cultural or motivational barrier to voluntary sharing. However, knowledge sharing's strong influence on the mediators—job design and academic supervision ($\beta=0.749$, $p<0.001$)—confirms its foundational role. This aligns with research by Gagné et al. (2019) on autonomous motivation and supports the collaborative supervision models emphasized by Gunawan et al. (2016), illustrating that knowledge sharing's value is unlocked when integrated into other organizational routines.

Contradicting the Job Characteristics Model, job design had no significant effect on productivity ($\beta=-0.029$, $p=0.754$). The profile of job characteristics—showing high task identity but low variety, authority, and feedback—points to constraints possibly imposed by rigid governmental and foundational policies, as referenced in the regulatory context of Permendikbud No. 15 Tahun 2018 Tentang Pemenuhan Beban Kerja Guru, Kepala Sekolah, Dan Pengawas Sekolah (2018). The negative coefficient, though negligible, may reflect a paradox where job enhancements increase administrative burdens, aligning with the preliminary survey data which identified issues with work quality and resource utilization efficiency among teachers.

In stark contrast, academic supervision emerged as the strongest direct predictor of teacher productivity ($\beta=0.641$, $p<0.001$). This finding robustly confirms its role as a central professional development mechanism and strongly supports prior research by Sulistyaningsih (2018) and Tino (2017), who demonstrated its substantial contributions to school productivity. The identification of discussion and follow-up as the weaker components within an otherwise strong supervision process provides a precise explanation for why, despite its significant effect, there remains room for further productivity gains, directly addressing the competency gaps highlighted in the Strategic Plan of the Directorate General of Teachers and Education Personnel.

The mediation analysis provides the most significant theoretical insight: academic supervision fully mediated the empowerment-productivity relationship and partially mediated the knowledge sharing-productivity relationship. This demonstrates that the positive influences of both empowerment and knowledge sharing on productivity are almost entirely channeled through the mechanism of academic supervision. This finding challenges the fragmented approach critiqued in the introduction and confirms that psychological and social factors manifest their productivity effects most powerfully when integrated with structured pedagogical support.

These findings have direct practical implications for addressing the teacher productivity challenges outlined in the introduction, including the unmet professional competency targets and work quality gaps. The results argue for a strategic reallocation of resources, prioritizing the enhancement of academic supervision, particularly its dialogical and follow-up components. Simultaneously, efforts to foster empowerment must ensure they grant genuine autonomy, and knowledge sharing cultures must be incentivized to increase donation. This integrated approach, focused on the high-leverage mediator of supervision, offers a viable path to improving the deep learning and 21st-century competencies (Aditya et al., 2024; Kadarismanto & Puspita Sari, 2025).

CONCLUSION

This research successfully developed and validated an integrated model explaining teacher productivity through empowerment, knowledge sharing, job design, and academic supervision variables. Employing mixed-methods design with PLS-SEM and SITOREM analyses across 176 teachers in Islamic Integrated Elementary Schools in East Jakarta, the study revealed several key findings. Academic supervision emerged as the strongest direct predictor of teacher productivity ($\beta=0.641$, $p<0.001$), contributing 41% to productivity variance. Knowledge sharing significantly influenced both job design ($\beta=0.750$, $p<0.001$) and academic supervision ($\beta=0.749$, $p<0.001$). Academic supervision functioned as the primary mediator, fully mediating empowerment effects (indirect effect 0.652) and partially mediating knowledge sharing effects (indirect effect 0.633) on productivity. The overall model explained 83.1% of teacher productivity variance, demonstrating strong predictive capability.

Contrary to theoretical expectations, empowerment, knowledge sharing, and job design showed no significant direct effects on productivity, indicating these variables influenced outcomes primarily through mediating pathways rather than direct mechanisms. SITOREM analysis identified twelve indicators requiring immediate improvement, prioritized by: follow-up, supervision results discussion, knowledge acquisition, knowledge donation, delegation, self-determination, feedback, task authority, task significance, work variety, effectiveness, and

efficiency. Twelve indicators recommended for maintenance included program evaluation, data collection and analysis, planning, knowledge application, knowledge reception, competence, responsibility, trust, meaning, task identity, quality, and quantity.

These findings advance educational management literature by demonstrating synergistic effects of psychological, structural, social, and pedagogical factors in determining productivity. The integrated model transcends fragmented examinations of isolated variables, revealing complex mediation pathways through which organizational practices influence performance outcomes. Methodologically, the study validates mixed-methods approaches combining qualitative exploration with quantitative validation, demonstrating the value of grounded theory development emerging from contextual realities.

SUGGESTIONS

Future research should investigate contextual moderators affecting relationships within the productivity model, such as school size, resource levels, leadership styles, and community characteristics. Experimental or quasi-experimental designs testing intervention effectiveness would provide stronger evidence for causal relationships and practical recommendations. Qualitative studies exploring mechanisms through which academic supervision influences productivity could illuminate specific practices characterizing effective supervision. Cross-cultural comparisons would clarify whether findings generalize beyond Indonesian contexts or reflect culturally specific patterns. Finally, longitudinal research tracking schools implementing recommended interventions would assess strategy effectiveness and identify implementation challenges requiring attention.

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