



Human-Centred Production Performance in Indonesian Coal Contracting: A Dual-Mediation PLS-SEM Model

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Abstract

Purpose: This study develops an integrated human-resource model to examine how management policy, managerial capability, and employee loyalty influence production performance through job satisfaction and work discipline as complementary mediating mechanisms in an Indonesian coal-mining contractor.

Research Methodology: This study applies Partial Least Squares Structural Equation Modeling (PLS-SEM) using a model based on 250 analytical cases and 30 reflective indicators. The analysis evaluates measurement quality, direct effects, predictive relevance, and mediation pathways using 5,000 bootstrap resamples.

Results: The findings indicate acceptable reliability and validity, with moderate explanatory power for job satisfaction ($R^2=.516$), work discipline ($R^2=.511$), and production performance ($R^2=.569$). All direct relationships are positive and significant. Work discipline is the strongest direct predictor of production performance ($\beta=.308$), while managerial capability is the strongest exogenous predictor ($\beta=.224$). All indirect effects show partial mediation, with discipline-based pathways stronger than satisfaction-based pathways.

Conclusions: Production performance is shaped by both organizational and human factors. Effective policies, capable managers, employee loyalty, satisfaction, and discipline jointly contribute to improved operational outcomes.

Limitations: The study uses a synthetic dataset; therefore, the findings represent methodological demonstrations rather than verified company-level empirical evidence.

Contributions: This study contributes a dual-mediation framework that distinguishes affective and behavioral mechanisms in explaining production performance and provides managerial insights for strengthening human-centred operational improvement.

Keywords: Coal Mining, Employee Loyalty, Job Satisfaction, Managerial Capability, Production Performance

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1. Introduction

Production performance in contract mining is generated by a tightly coupled socio-technical system. Heavy equipment, haul-road conditions, maintenance availability, fuel efficiency, shift coordination,

and safety compliance interact continuously. Capital investment can expand technical capacity, but capacity is not automatically converted into reliable output. The conversion depends on decisions, routines, motivation, coordination, and disciplined execution by people working under operational uncertainty. This human conversion problem becomes especially important when production targets rise faster than organizational routines can adapt.

The thesis context is PT LAZ Coal Mandiri, a coal-mining contractor operating at the Kintap and Asam-Asam sites in South Kalimantan. The operating record reported in the thesis shows persistent gaps between plans and realized output. At Pit 9-IU, average production during 2023/2025 reached 4.87 million bank cubic metres (BCM) against a target of 5.63 million BCM, while average productivity reached only 83.5% of target. Pit 9N recorded a stronger production result in 2025, yet productivity remained below the ideal benchmark. The 2026 production target was increased by approximately 50%, intensifying the need to understand the organizational conditions through which technology and labour are transformed into output.

Management responded through technology investment, managerial rotation, wage restructuring, improvement of mess and meal facilities, and compensation for fixed term employees. The thesis notes that hybrid heavy duty units and electric haul trucks produced only a limited productivity increase. This pattern is analytically important: when technology generates less improvement than expected, the residual problem is not necessarily technological. It may reflect policy acceptance, managerial execution, employee attachment, satisfaction with work arrangements, and adherence to operating standards.

This study treats production performance as an organizational outcome rather than a purely engineering ratio. Management policy defines distributive and procedural rules; managerial capability determines whether those rules are translated into coherent plans and rapid operational decisions; and employee loyalty creates willingness to protect organizational continuity. These antecedents may influence performance directly, but they can also operate through employees' evaluations of work and through their observable discipline. Job satisfaction therefore represents the affective channel, whereas work discipline represents the behavioral control channel.

The distinction matters in mining because positive feelings about work and compliant execution are related but not identical. A satisfied worker may value the organization yet still work within a system that has ambiguous procedures. A disciplined worker may comply with procedures while remaining dissatisfied with promotion or pay. Sustainable performance requires both mechanisms: employees need reasons to value the employment relationship and clear standards for converting effort into safe and timely production.

Prior research has connected human resource practices, reward systems, leadership, satisfaction, commitment, and performance across service, manufacturing, construction, and public sector settings ([Abdelhamied et al., 2023](#); [Cahyadi et al., 2022](#); [Farmanesh et al., 2023](#); [Gazi et al., 2022](#); [Memon et al., 2023](#)). Mining research additionally emphasizes safety leadership, compliance, and participation ([Zhang et al., 2022](#); [Zhao et al., 2022](#)). Nevertheless, three gaps remain. First, policy, managerial capability, and loyalty are often tested separately. Second, satisfaction is frequently modeled as the sole mediator. Third, the behavioral role of work discipline is underdeveloped despite the procedural intensity of mining operations.

The study addresses these gaps by integrating three antecedents, two mediators, and production performance in a single PLS-SEM model. The dual mediation design allows the analysis to determine not only whether human resource factors matter, but also how they are converted into production outcomes. This is particularly relevant for companies that have already invested in technology and must identify the organizational bottlenecks limiting the productivity return on those investments.

The contribution is threefold. Theoretically, the study distinguishes affective and behavioral mechanisms in production performance. Methodologically, it demonstrates simultaneous testing of eleven direct paths and six indirect paths with reflective measurement. Managerially, it converts

structural results and low scoring indicators into a sequenced intervention portfolio. The paper does not claim verified company level effects because the thesis identifies the analyzed dataset as synthetic; instead, it provides a transparent, publication-oriented model that can be re estimated after a valid field survey.

2. Literature Review and Hypothesis/es Development

2.1 Management Policy as an Organizational Signal

Management policy represents the organizational mechanisms through which firms establish rules, allocate resources, define expectations, and coordinate employee behavior. In this study, management policy refers to employees' perceptions regarding fairness, consistency, transparency, adaptability, and participation in organizational decision-making. These dimensions reflect both distributive and procedural aspects of organizational governance, as employees evaluate not only the outcomes of policies but also the processes through which policies are developed and implemented ([Zhang, Hua, Huang, & Shi, 2022](#); [Dewi, Indrawan, & Yanti, 2024](#)).

Organizational policies serve as signals regarding the extent to which employees perceive organizational support and managerial commitment. When policies are perceived as fair, transparent, and consistently applied, employees are more likely to develop positive attitudes toward their work environment and demonstrate stronger organizational engagement ([Farmanesh, Mostepaniuk, & Alhamdan, 2023](#); [Junaidi, Yusuf, Budiwaluyo, & Astika, 2026](#)). In addition, effective reward and compensation systems can enhance employee productivity by improving job satisfaction and reinforcing positive work attitudes ([Tarigan, Cahya, Valentine, Hatane, & Jie, 2022](#)). This relationship is particularly relevant in mining operations, where employment conditions such as compensation structures, accommodation, transportation, shift arrangements, and operational procedures strongly influence employees' daily experiences.

Beyond its attitudinal effects, management policy also contributes directly to operational performance. Clear policies reduce uncertainty, improve coordination, and establish consistent behavioral expectations among employees. In high-risk industries such as mining, adaptive policies are essential because operational conditions frequently change due to equipment availability, environmental factors, production targets, and safety requirements ([Silva, Nursalam, & Toda, 2020](#)). Furthermore, employee participation in policy development may improve implementation effectiveness because frontline workers possess practical knowledge regarding operational constraints and workplace risks.

Therefore, management policy is expected to influence employee attitudes, behavioral compliance, and organizational outcomes. Accordingly, the following hypotheses are proposed:

H₁: Management policy has a positive and significant effect on job satisfaction.

H₄: Management policy has a positive and significant effect on work discipline.

H₇: Management policy has a positive and significant effect on production performance.

2.2 Managerial Capability in High-Risk Operations

Managerial capability reflects the ability of organizational leaders to plan, coordinate, communicate, make decisions, and adapt strategies according to changing operational conditions. In this study, managerial capability consists of technical competence, managerial skills, interpersonal competence, decision-making ability, and adaptability. These capabilities are particularly important in mining operations because production outcomes depend heavily on managers' ability to integrate human resources, equipment, safety requirements, and operational objectives ([Indrayani, Nurhatisyah, Damsar, & Wibisono, 2024](#)).

Effective managers influence employee perceptions by providing direction, support, and confidence in organizational processes. Previous studies indicate that leadership capability is associated with employee engagement, commitment, job satisfaction, and performance outcomes ([Cahyadi et al.,](#)

[2022](#); [Jiatong et al., 2022](#); [Pasaribu et al., 2022](#)). Moreover, managers with strong emotional and interpersonal capabilities are better able to establish constructive relationships and create supportive work environments ([Doğru, 2022](#)). In mining contexts, safety-oriented leadership is also essential because supervisors influence employees' understanding of risks, compliance with procedures, and participation in safety practices ([Zhang et al., 2022](#)).

Managerial capability may also influence production performance directly. Mining operations involve complex decisions related to equipment utilization, production scheduling, maintenance coordination, emergency responses, and safety control. Managers who possess adequate technical knowledge and decision-making capability can minimize operational disruptions and improve resource utilization. Conversely, ineffective managerial decisions may create delays, reduce productivity, and increase operational inefficiencies ([Nugroho, Riyanto, & Silitonga, 2026](#)).

Based on these arguments, managerial capability is expected to enhance employee satisfaction, strengthen disciplined behavior, and improve production performance. Therefore, the following hypotheses are proposed:

H₂: Managerial capability has a positive and significant effect on job satisfaction.

H₅: Managerial capability has a positive and significant effect on work discipline.

H₈: Managerial capability has a positive and significant effect on production performance.

2.3 Employee Loyalty as Relational Capital

Employee loyalty represents employees' psychological attachment, commitment, responsibility, and willingness to maintain a long-term relationship with the organization. In operational environments, loyalty functions as relational capital because experienced employees accumulate valuable knowledge regarding equipment operation, workplace conditions, safety practices, and coordination routines. Such knowledge contributes to operational stability and reduces the disruption caused by employee turnover ([Prihantoro & Sutianingsih, 2025](#)).

High-performance work systems demonstrate stronger organizational outcomes when employees develop commitment and willingness to sustain their relationship with the organization ([Pahos & Galanaki, 2022](#)). Furthermore, employee satisfaction and organizational commitment are closely related because positive employment experiences encourage stronger attachment and retention intentions ([Cinar et al., 2024](#); [Wang et al., 2022](#)). Employees with higher loyalty are more likely to interpret organizational practices positively, resulting in higher job satisfaction.

Employee loyalty may also encourage stronger work discipline. Employees who identify with organizational goals tend to demonstrate greater responsibility, compliance with procedures, and willingness to protect organizational resources. In mining operations, such behaviors are critical because production continuity depends on employee adherence to safety standards, operational procedures, and teamwork ([Eliyana & Muzakki, 2019](#)).

However, loyalty should be distinguished from retention. Employees may demonstrate responsible behavior and commitment during employment while still considering alternative opportunities due to concerns regarding career development, compensation, or employment security. Therefore, loyalty represents a behavioral and psychological resource that may influence performance but does not automatically eliminate turnover intentions.

Accordingly, the following hypotheses are proposed:

H₃: Employee loyalty has a positive and significant effect on job satisfaction.

H₆: Employee loyalty has a positive and significant effect on work discipline.

H₉: Employee loyalty has a positive and significant effect on production performance.

2.4 Job Satisfaction and Work Discipline as Complementary Mechanisms

Job satisfaction reflects employees' overall evaluation of their work experience, including satisfaction with job characteristics, supervision, compensation, promotion opportunities, and relationships with colleagues. According to two-factor theory, employee satisfaction develops when organizations provide both adequate working conditions and motivating factors such as recognition, responsibility, and career development ([Lee, Lee, Choi, & Kim, 2022](#)). Previous studies have demonstrated that job satisfaction contributes positively to employee performance across various industrial contexts ([Gazi, Islam, Shaturaev, & Dhar, 2022](#); [Memon, Khahro, Memon, Memon, & Mustafa, 2023](#); [Susanto, Hoque, Jannat, Emely, Zona, & Islam, 2022](#)).

In organizational settings, job satisfaction represents an affective mechanism through which employees respond positively to organizational practices and leadership behaviors. Satisfied employees are more likely to demonstrate persistence, cooperation, and willingness to contribute beyond minimum requirements. Therefore, job satisfaction may serve as a pathway through which management policy, managerial capability, and employee loyalty are translated into improved production outcomes ([Albalá-Genol, Díaz-Fúnez, & Mañas-Rodríguez, 2023](#)).

Meanwhile, work discipline represents the behavioral mechanism through which employees consistently perform according to organizational standards. Discipline includes attendance, compliance with procedures, adherence to safety requirements, vigilance, and professional conduct. In mining operations, disciplined behavior directly affects production reliability because deviations from procedures, unsafe practices, or poor attendance may reduce equipment utilization and interrupt operational continuity. Previous research highlights that safety leadership and organizational practices influence employee compliance and safety participation ([Wang, Li, Chen, Zheng, Zhang, Huang, & Birch, 2022](#); [Zhao, Yang, Liu, & Nkrumah, 2022](#)).

Although job satisfaction and work discipline are related, they represent different mechanisms. Satisfaction reflects employees' psychological evaluation of their work environment, whereas discipline reflects the consistency of employees' actual behavior. In highly regulated industries, discipline may provide a stronger pathway because production outcomes depend heavily on standardized execution and operational reliability ([Cahyadi, Poór, & Szabó, 2022](#); [Hendri, 2019](#)).

Therefore, this study proposes:

H₁₀: Job satisfaction has a positive and significant effect on production performance.

H₁₁: Work discipline has a positive and significant effect on production performance.

Furthermore, because management policy, managerial capability, and employee loyalty may influence production performance through both affective and behavioral mechanisms, the following mediation hypotheses are proposed:

H₁₂: Job satisfaction mediates the relationship between management policy and production performance.

H₁₃: Job satisfaction mediates the relationship between managerial capability and production performance.

H₁₄: Job satisfaction mediates the relationship between employee loyalty and production performance.

H₁₅: Work discipline mediates the relationship between management policy and production performance.

H₁₆: Work discipline mediates the relationship between managerial capability and production performance.

H₁₇: Work discipline mediates the relationship between employee loyalty and production performance.

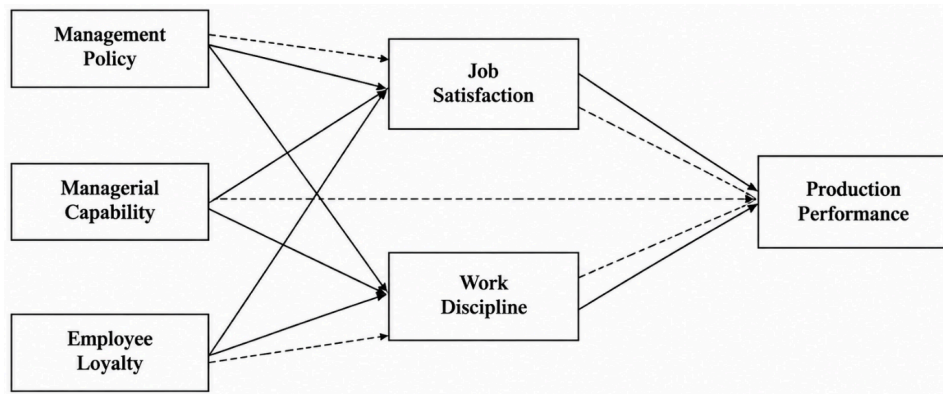


Figure 1. Proposed dual mediation model

Figure 1 illustrates the proposed conceptual framework, showing the relationships among management policy, managerial capability, employee loyalty, job satisfaction, work discipline, and production performance. The framework represents a dual-mediation mechanism in which job satisfaction functions as an affective pathway and work discipline serves as a behavioral-control pathway linking organizational factors to production performance.

Based on the theoretical framework and previous empirical findings discussed in the preceding sections, this study develops a structural model consisting of direct and indirect relationships among management policy, managerial capability, employee loyalty, job satisfaction, work discipline, and production performance. The proposed hypotheses and structural paths are presented in Table 1.

Table 1. Hypotheses and structural paths

Hypothesis	Path	Expected relationship
H_1	Management policy → Job satisfaction	Positive
H_2	Managerial capability → Job satisfaction	Positive
H_3	Employee loyalty → Job satisfaction	Positive
H_4	Management policy → Work discipline	Positive
H_5	Managerial capability → Work discipline	Positive
H_6	Employee loyalty → Work discipline	Positive
H_7	Management policy → Production performance	Positive
H_8	Managerial capability → Production performance	Positive
H_9	Employee loyalty → Production performance	Positive
H_{10}	Job satisfaction → Production performance	Positive
H_{11}	Work discipline → Production performance	Positive
H_{12}	Management policy → Job satisfaction → Production performance	Positive partial mediation
H_{13}	Managerial capability → Job satisfaction → Production performance	Positive partial mediation
H_{14}	Employee loyalty → Job satisfaction → Production performance	Positive partial mediation
H_{15}	Management policy → Work discipline → Production performance	Positive partial mediation
H_{16}	Managerial capability → Work discipline → Production performance	Positive partial mediation
H_{17}	Employee loyalty → Work discipline → Production performance	Positive partial mediation

3. Research Methodology

3.1 Research Context, Population, and Analytical Sample

The research context comprises employees of PT LAZ Coal Mandiri at the Kintap and Asam Asam operating sites in Tanah Laut Regency, South Kalimantan. The thesis defines a population of 463 employees across production, plant, engineering, support, safety, and supervisory roles. A Slovin calculation at a 5% tolerance produced a minimum of 215 cases; the analytical design increased this to 250 to improve coverage and protect against incomplete responses.

Purposive criteria in the thesis require at least one year of service, direct involvement in operational or production-support activities, willingness to participate, and complete responses. The current analytical file contains 250 complete cases, but the thesis also acknowledges that 30 synthetic profiles have tenure below one year. A future empirical implementation must apply the inclusion criteria before estimation. The present article retains the model outputs only as a transparent analytical demonstration.

The illustrative profile is consistent with an operational mining workforce: 94.0% male, 63.2% senior high school or vocational graduates, 86.8% fixed term employees, 54.4% assigned to Kintap, and 45.6% to Asam-Asam. Heavy-equipment operators and drivers/haulers form the largest occupational groups. The average age is 34.67 years and the average tenure is 3.95 years.

3.2 Measurement

Table 2. Construct definitions and measurement domains

Construct	Operational definition	Indicators
Management policy (X_1)	Employee perceptions of organizational decisions governing operations and welfare	Fairness, consistency, transparency, adaptability, participation
Managerial capability (X_2)	Perceived capacity of managers to plan, coordinate, lead, decide, and adapt	Technical, managerial, interpersonal, decision making, adaptation
Employee loyalty (X_3)	Attachment and willingness to protect and remain with the organization	Tenure, low absence, compliance, responsibility, dedication, intention to stay
Job satisfaction (Y_1)	Positive evaluation of major aspects of the employment experience	Work itself, supervision, pay, promotion, co-workers
Work discipline (Y_2)	Consistent compliance with organizational and safety expectations	Attendance, rules, standards, vigilance, ethical work
Production performance (Z)	Perceived contribution to production objectives	Target achievement, equipment productivity, efficiency, quality

Table 2 presents the operational definitions and measurement domains of the six reflective constructs used in this study. Each construct is represented by specific indicators that capture its theoretical dimensions, providing the basis for evaluating the measurement model in the subsequent analysis.

3.3 Analytical Procedure

Data analysis was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM), which is appropriate for predictive research models involving multiple constructs and examining simultaneous direct and indirect relationships. The analysis followed three sequential stages: measurement model assessment, structural model assessment, and bootstrapping analysis. The measurement model was evaluated through indicator reliability, convergent validity, internal consistency reliability, and discriminant validity. Indicator reliability was assessed based on outer

loadings, convergent validity was evaluated using the average variance extracted (AVE), internal consistency was examined through Cronbach alpha and composite reliability, and discriminant validity was assessed using the Fornell–Lareker criterion and the heterotrait–monotrait ratio (HTMT) (Hair, Howard, & Nitzl, 2020; Henseler, Ringle, & Sarstedt, 2015; Hair, Risher, Sarstedt, & Ringle, 2019; Shmueli, Sarstedt, Hair, Cheah, Ting, Vaithilingam, & Ringle, 2019).

The structural model assessment evaluated collinearity, explanatory power, predictive relevance, effect sizes, and the significance of hypothesized relationships. Specifically, inner variance inflation factors (VIF), coefficients of determination (R^2), predictive relevance (Q^2), effect sizes (f^2), standardized path coefficients, confidence intervals, and p-values were examined. Hypothesis testing was performed using 5,000 bootstrap resamples with a two-tailed significance level of $\alpha=0.05$. Mediation effects were assessed using indirect effects and variance accounted for (VAF), where VAF values below 20% indicate no mediation, values between 20% and 80% indicate partial mediation, and values above 80% indicate full mediation. The structural relationships were specified using the following equation Formula 1, Formula 2, Formula 3:

$$Y_1 = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon_1 \quad (1)$$

$$Y_2 = \beta_4 X_1 + \beta_5 X_2 + \beta_6 X_3 + \varepsilon_2 \quad (2)$$

$$Z = \beta_7 X_1 + \beta_8 X_2 + \beta_9 X_3 + \beta_{10} Y_1 + \beta_{11} Y_2 + \varepsilon_3 \quad (3)$$

4. Results and Discussions

4.1 Operational and Descriptive Context

The company context shows simultaneous improvement and unresolved retention pressure. Attendance reached 98.2% in 2026, slightly above the 98% target, after remaining marginally below target during 2023–2025. Turnover declined from 20.8% in 2024 to 8.9% in 2026 but remained above the 5% ceiling. This combination suggests that day to day attendance can improve while long-term attachment remains fragile. It also supports the analytical separation of work discipline from employee loyalty.

Table 3. Descriptive statistics of the six constructs

Construct	Mean	SD	Category
Management policy	3.394	1.000	Moderate
Managerial capability	3.420	1.002	High
Employee loyalty	3.453	0.960	High
Job satisfaction	3.346	0.957	Moderate
Work discipline	3.506	1.002	High
Production performance	3.418	1.006	High

Based on Table 3, work discipline has the highest construct mean (3.506), whereas job satisfaction has the lowest (3.346). At indicator level, promotion opportunity (3.188), participative policy (3.208), intention to stay (3.276), pay satisfaction (3.304), and managerial decision making (3.316) form the principal improvement gaps. Compliance (3.644) and responsibility (3.616) are the strongest behavioural assets.

4.2 Measurement Model

Table 4. Measurement-model quality

Construct	Cronbach α	CR	AVE	Loading range
Management policy	.872	.907	.662	.790–.822
Managerial capability	.877	.911	.672	.770–.863
Employee loyalty	.895	.920	.657	.796–.827
Job satisfaction	.852	.895	.630	.750–.834
Work discipline	.889	.919	.693	.787–.856
Production performance	.869	.911	.719	.836–.861

Table 4 presents the results of the measurement model assessment, including Cronbach alpha, Composite Reliability (CR), Average Variance Extracted (AVE), and indicator loading ranges for each construct. The results demonstrate that all constructs meet the recommended criteria for reliability and validity assessment. Specifically, all indicator loadings exceed the minimum threshold of 0.70, Cronbach alpha and composite reliability values indicate satisfactory internal consistency, and AVE values confirm adequate convergent validity. Furthermore, discriminant validity was supported by the Fornell–Larcker criterion and HTMT assessment, indicating that each construct demonstrates sufficient distinction from other constructs in the model.

4.3 Structural Model and Direct Effects

Table 5. Structural-model explanatory and predictive quality

Table 5 presents the explanatory power and predictive relevance of the structural model based on the coefficients of determination (R^2) and predictive relevance (Q^2) values for each endogenous construct. The results indicate that management policy, managerial capability, and employee loyalty explain 51.6% of the variance in job satisfaction and 51.1% of the variance in work discipline, while the overall model explains 56.9% of the variance in production performance. All Q^2 values are positive, confirming the predictive relevance of the model. In addition, collinearity assessment shows that inner VIF values range from 1.022 to 2.066, indicating the absence of critical multicollinearity issues. The effect size analysis further shows that exogenous constructs have moderate effects on the mediating variables, while their direct effects on production performance are relatively small. Among the predictors, work discipline demonstrates the largest contribution to production performance ($f^2=.108$).

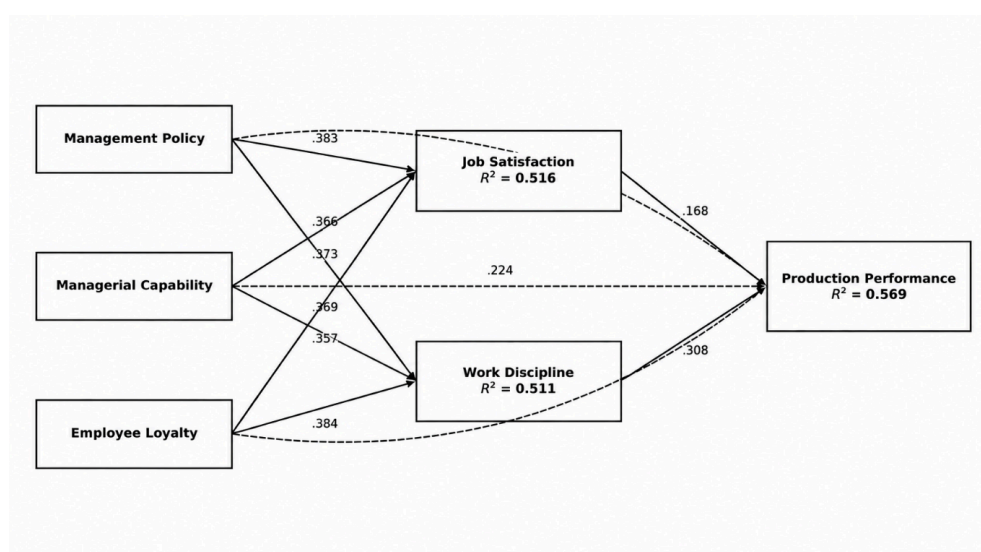


Figure 2. Standardized structural model and coefficients of determination

Figure 2 illustrates the structural model and the hypothesized relationships among management policy, managerial capability, employee loyalty, job satisfaction, work discipline, and production performance. The model presents both direct effects and indirect pathways, where job satisfaction represents the affective pathway and work discipline represents the behavioral-control pathway.

Table 6. Direct-effect hypothesis tests

H	Path	β	SE	<i>t</i>	<i>p</i>	95% CI	Decision
<i>H</i> ₁	Management policy → Job satisfaction	.383	.045	8.537	<.001	.293–.469	Supported
<i>H</i> ₂	Managerial capability → Job satisfaction	.366	.043	8.418	<.001	.280–.451	Supported
<i>H</i> ₃	Employee loyalty → Job satisfaction	.369	.045	8.279	<.001	.279–.452	Supported
<i>H</i> ₄	Management policy → Work discipline	.373	.045	8.269	<.001	.284–.462	Supported
<i>H</i> ₅	Managerial capability → Work discipline	.357	.043	8.380	<.001	.274–.439	Supported
<i>H</i> ₆	Employee loyalty → Work discipline	.384	.043	8.886	<.001	.298–.466	Supported
<i>H</i> ₇	Management policy → Production performance	.196	.051	3.812	<.001	.095–.296	Supported
<i>H</i> ₈	Managerial capability → Production performance	.224	.062	3.615	<.001	.103–.349	Supported
<i>H</i> ₉	Employee loyalty → Production performance	.151	.048	3.150	.002	.060–.246	Supported
<i>H</i> ₁₀	Job satisfaction → Production performance	.168	.064	2.646	.008	.040–.288	Supported
<i>H</i> ₁₁	Work discipline → Production performance	.308	.054	5.705	<.001	.204–.412	Supported

Table 6 presents the results of the direct-effect hypothesis testing using standardized path coefficients (β), standard errors (SE), *t*-values, *p*-values, and 95% confidence intervals. The results show that all eleven direct-effect hypotheses (*H*₁–*H*₁₁) are supported, indicating that management policy, managerial capability, and employee loyalty significantly influence job satisfaction, work discipline, and production performance. Among the direct relationships, employee loyalty demonstrates the strongest effect on work discipline (β =.384), while work discipline shows the strongest direct contribution to production performance (β =.308). These findings confirm the significant role of both organizational factors and employee behavioral mechanisms in explaining production performance.

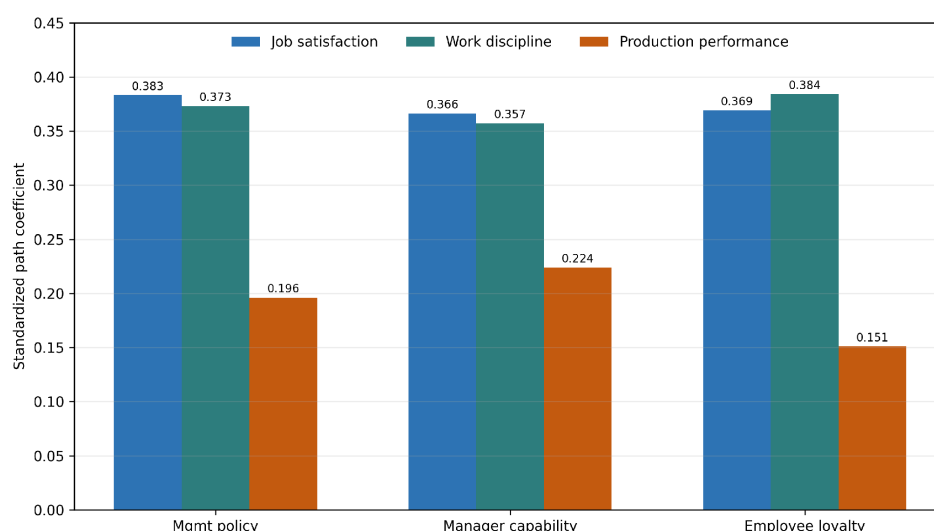


Figure 3. Comparison of antecedent effects across endogenous constructs

Figure 3 presents the comparison of standardized path coefficients across the three exogenous constructs: management policy, managerial capability, and employee loyalty. The visualization highlights their relative contributions to job satisfaction, work discipline, and production performance.

The results indicate that employee loyalty has the strongest effect on work discipline ($\beta=.384$), while managerial capability demonstrates the strongest direct effect on production performance ($\beta=.224$) among the three organizational predictors.

4.4 Indirect Effects and Dual Mediation

Table 7. Indirect effects and mediation classification

H	Mediated path	Effect	SE	<i>t</i>	<i>p</i>	95% CI	VAF	Type
<i>H</i> ₁₂	Policy → Satisfaction → Performance	.064	.026	2.466	.014	.015–.117	24.73%	Partial
<i>H</i> ₁₃	Capability → Satisfaction → Performance	.062	.023	2.627	.009	.015–.106	21.54%	Partial
<i>H</i> ₁₄	Loyalty → Satisfaction → Performance	.062	.025	2.479	.013	.014–.113	29.07%	Partial
<i>H</i> ₁₅	Policy → Discipline → Performance	.115	.025	4.520	<.001	.070–.170	36.96%	Partial
<i>H</i> ₁₆	Capability → Discipline → Performance	.110	.024	4.672	<.001	.067–.160	32.90%	Partial
<i>H</i> ₁₇	Loyalty → Discipline → Performance	.118	.026	4.573	<.001	.072–.172	43.89%	Partial

Table 7 presents the results of the mediation analysis, including indirect effects, standard errors, *t*-values, *p*-values, confidence intervals, variance accounted for (VAF), and mediation classifications. The results indicate that all six mediation hypotheses (*H*₁₂–*H*₁₇) are supported, confirming that job satisfaction and work discipline significantly mediate the relationships between organizational factors and production performance. The VAF values range from 21.54% to 43.89%, indicating partial mediation for all indirect pathways. Furthermore, the behavioral-control pathway through work discipline demonstrates stronger mediation effects ($\beta=.110$ – $.118$) compared with the affective pathway through job satisfaction ($\beta=.062$ – $.064$), suggesting that disciplined execution represents a more dominant mechanism in translating organizational factors into production performance outcomes.

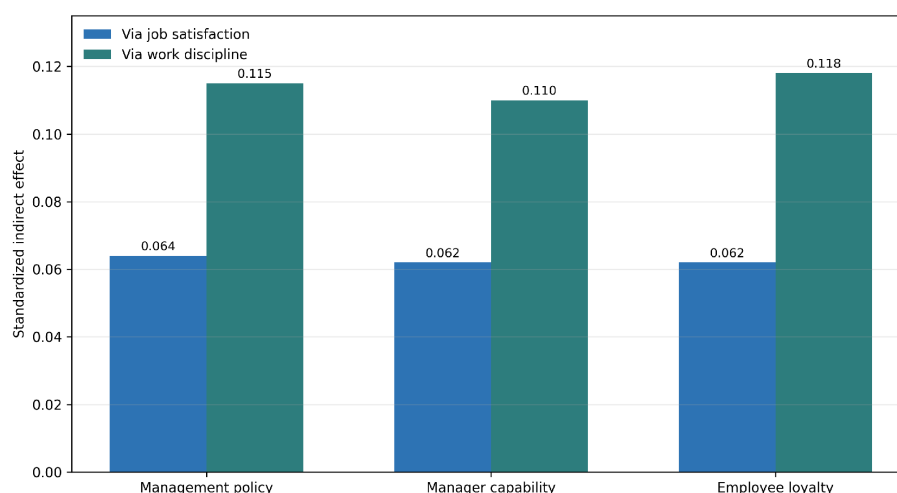


Figure 4. Indirect effects through job satisfaction and work discipline

Figure 4 illustrates the comparison of standardized indirect effects through job satisfaction and work discipline. The figure shows that the mediation effects through work discipline are consistently stronger than those through job satisfaction across all antecedent constructs. Employee loyalty demonstrates the strongest indirect effect through work discipline ($\beta=.118$), followed by management policy ($\beta=.115$) and managerial capability ($\beta=.110$). In contrast, the indirect effects through job satisfaction remain relatively lower, ranging from $\beta=.062$ to $\beta=.064$. These results visually support the findings that the behavioral-control pathway provides a stronger mechanism for translating organizational factors into production performance.

4.5 Discussion

The results support a human center explanation of production performance. Management policy has its strongest effect on job satisfaction, indicating that fairness, consistency, transparency, adaptability, and participation primarily shape employees' evaluation of the employment relationship. This is consistent with research connecting human-resource practices, trust, satisfaction, and performance ([Abdelhamied et al., 2023](#); [Farmanesh et al., 2023](#)). The low participative policy score is therefore not a minor communication issue, it is a structural weakness that can reduce both acceptance and implementation quality.

Managerial capability has the largest direct effect among the three exogenous predictors of production performance. This result fits the operational logic of mining: managers must interpret technical information, coordinate people and equipment, make time-sensitive decisions, and maintain safety priorities. Leadership research shows similar links with engagement, commitment, and performance ([Cahyadi et al., 2022](#); [Jiatong et al., 2022](#)). The relatively low decision making score suggests that managerial development should move beyond generic leadership workshops toward decision checklists, escalation protocols, scenario simulation, and post-decision review.

Employee loyalty has its strongest direct relationship with work discipline. This finding clarifies the behavioural content of loyalty. Loyalty is not merely emotional attachment; it is expressed through compliance, responsibility, and protection of organizational continuity. The company's turnover ratio nevertheless remains above the stated ceiling, while intention to stay is among the weakest indicators. Behavioural loyalty can therefore coexist with retention risk. Management must distinguish employees who work responsibly from employees who intend to remain.

Job satisfaction positively affects production performance, consistent with evidence from industrial, construction, and small enterprise settings ([Gazi et al., 2022](#); [Memon et al., 2023](#); [Susanto et al., 2022](#)). Yet its coefficient is lower than that of work discipline. In a procedural production system, satisfaction encourages effort and cooperation, but production continuity depends more immediately on punctual attendance, adherence to standard operating procedures, vigilance, and ethical conduct.

The dominance of work discipline should not be interpreted as support for punitive control. The relevant construct is productive and safety-oriented discipline. It combines reliable attendance, standard compliance, vigilance, and professional conduct. Safety leadership research indicates that employees' safety participation depends on credible management priorities and communication ([Zhang et al., 2022](#); [Zhao et al., 2022](#)). Discipline is therefore built through system design, supervisory coaching, recognition, and consistent consequences not through sanctions alone.

The dual-mediation results provide the main theoretical insight. Policy, capability, and loyalty retain direct effects, but part of their influence is transmitted through affective evaluation and behavioural regularity. The stronger discipline pathway suggests that the production system rewards behavioural reliability more immediately than positive affect. However, discipline without satisfaction may generate minimum compliance and eventual turnover. Satisfaction without discipline may generate goodwill without operational consistency. The optimal configuration is complementary: fair policy and capable managers create a satisfying employment experience while also making safe, disciplined performance easier and more legitimate.

5. Conclusions

The integrated model shows how management policy, managerial capability, and employee loyalty can be converted into production performance through job satisfaction and work discipline. In the illustrative results, all direct and indirect paths are positive, the model explains a moderate share of endogenous variance, and discipline is the strongest immediate production mechanism. Managerial capability is the strongest exogenous direct predictor, while loyalty produces its largest mediated contribution through discipline. The practical message is clear: technology investment must be supported by fair and participative policy, competent operational decisions, credible career and reward

systems, retention of experience, and disciplined safety execution. The analytical architecture is ready for empirical re-estimation, but publication as company evidence requires verified survey data.

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Conflict of Interest

The author declares that there is no conflict of interest regarding the publication of this article. The author confirms that the research was conducted independently and that there are no financial, commercial, or personal relationships that could have influenced the research findings or interpretation.

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