Human capital development and performance management as determinants of productive employee performance in public population services

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Abstract

This study analyzes the contribution of human capital development factors (training, mentoring, coaching) and performance management factors (performance appraisal, reward system) toward productive employee performance at the Department of Population and Civil Registration (Disdukcapil) of Batam City. Drawing on Human Capital Theory, Competency Theory, Performance Management Theory, and the Two-Factor Theory of Motivation, this study argues that sustainable productive performance requires the simultaneous integration of capability development and motivational reinforcement. An explanatory quantitative design with census (saturated sampling) technique was employed, involving all 100 Disdukcapil employees as respondents. Data were collected through validated 5-point Likert scale questionnaires and analyzed using Multiple Linear Regression with classical assumption tests. The results indicate that, simultaneously, the five variables contribute significantly to productive performance (Adjusted R^2 = 0.766; F = 69.40; $p < 0.001$). Partially, all five variables showed positive and significant effects. The Reward System was found to be the most dominant factor ($\beta = 0.312$; t = 4.512; $p < 0.001$), followed by Training ($\beta = 0.245$; t = 3.124; p = 0.002). These findings suggest that in the compliance-oriented Indonesian public sector, extrinsic motivational drivers exert stronger immediate effects on productivity than capability development alone, highlighting the need for integrated HRM strategies that balance recognition-based motivation with continuous competency enhancement.

Keywords: Human Capital Development, Performance Management, Reward System, Training, Productive Performance, Public Service.

INTRODUCTION

Public services in the era of digital transformation require government officials to have higher performance standards, especially in agencies that directly address the basic needs of the community, such as the Department of Population and Civil Registration (Disdukcapil) of Batam City. As a region with very high population mobility dynamics—driven by its status as a Free Trade Zone bordering Singapore and Malaysia—Disdukcapil of Batam City faces significant challenges in ensuring data accuracy and service speed. Productive employee performance in this context is not merely about physical presence but rather a manifestation of effective, efficient, and solution-oriented organizational behavior. In line with Organizational Behavior Theory, excellent performance is the result of complex interactions between individual abilities and systemic support provided by the organization (Robbins & Judge, 2017).

The urgency of this research is underscored by empirical conditions at the research site. According to the 2023 Annual Performance Report (Laporan Kinerja Instansi Pemerintah/LAKIP) of the Department of Population and Civil Registration of Batam City (unpublished institutional document), the agency processed approximately 150,000 civil document applications during 2023, with approximately 15% experiencing processing delays beyond the standard service timeline. These delays were attributed primarily to inadequate staff competencies in operating updated digital systems, inconsistent supervisory feedback, and insufficient motivational incentives for high-performing employees. These institutional data highlight the need for a comprehensive examination of factors that may jointly influence employee productive performance.

Previous research on employee performance in the public sector has generated valuable but fragmented insights. Studies have typically examined human resource development factors—such as training (Kurniawan et al., 2025; Lopes et al., 2023), mentoring (Thompson, 2021), and coaching (Faustin et al., 2025)—separately from performance management factors such as performance appraisal (Hong et al., 2025; Saputra et al., 2025) and reward systems (Cantarelli et al., 2025). This fragmentation creates a significant theoretical gap: while Human Capital Theory (Becker, 1993) explains how investments in knowledge and skills enhance productivity, and the Two-Factor Theory of Motivation (Herzberg, 1959) explains how hygiene and motivator factors maintain and elevate performance, no prior study has simultaneously tested both theoretical streams within a single integrated model in the context of Indonesian population administration services.

The theoretical justification for combining these five specific variables rests on the recognition that productive performance in public organizations is a dual-determined outcome requiring both capability inputs and motivational reinforcement. Training, mentoring, and coaching constitute the human capital development (HCD) cluster: training provides structured knowledge acquisition (Becker, 1993), mentoring enables experiential knowledge transfer through senior guidance (Spencer & Spencer, 1993), and coaching develops problem-solving capacity through individualized developmental interactions (Faustin et al., 2025). Together, these three variables address the "can do" dimension of performance—equipping employees with the competencies necessary to perform productively. However, competency alone does not guarantee productive behavior; employees must also be motivated to apply their capabilities consistently. Performance appraisal and reward systems constitute the performance management (PM) cluster: appraisal provides directional clarity through feedback mechanisms (Armstrong & Baron, 1998), while rewards provide motivational energy through recognition and incentive structures (Herzberg, 1959). These two variables address the "will do" dimension of performance—creating the motivational conditions under which competencies translate into sustained productive output.

Furthermore, existing research has not adequately addressed the relative strength of these two clusters. While Human Capital Theory would predict that capability development factors should be primary drivers of performance, empirical evidence from Indonesian public sector studies suggests that motivational and evaluative factors may exert stronger immediate effects in

compliance-oriented bureaucratic environments (Saputra et al., 2025). This potential tension between theoretical prediction and contextual reality remains unexplored, creating an empirical gap that this study aims to address.

Based on these theoretical and empirical gaps, this study aimed to: (1) analyze the partial influence of training, mentoring, coaching, performance appraisal, and reward systems on productive employee performance; (2) examine the simultaneous contribution of these five variables; and (3) identify the most dominant factor and explore why it exerts the strongest influence. This research contributes theoretically by testing an integrated HCD–Performance Management model within the specific context of population administration services, and provides practical recommendations for strengthening human resource management at Disdukcapil of Batam City.

LITERATURE REVIEW

Productive employee performance in public organizations is a manifestation of comprehensive human resource management, where Organizational Behavior Theory from Robbins and Judge (2017) explains that productivity is the end result of interactions between individual motivation, work systems, and organizational support. In the context of the Department of Population and Civil Registration (Disdukcapil) of Batam City, productive work behavior is highly dependent on the accumulation of human capital. In line with Human Capital Theory from Becker (1993), investment through technical training becomes the primary determinant factor. Recent research by Lopes et al. (2023) shows that in the digital era, training is not merely an additional skill but a vital instrument for reducing bureaucratic inefficiency. This is nationally reinforced by Hernawati et al. (2023), who stated that training aligned with the development of population information systems will directly increase measurable employee work output.

However, the effectiveness of formal training often requires continuous mentoring support in the work environment for employee competencies to develop fully. Referring to Competency Theory proposed by Spencer and Spencer (1993), excellent performance emerges from a combination of knowledge, skills, and attitudes formed through mentoring and coaching. Thompson (2021) explains that mentoring by seniors in public institutions plays an important role in accelerating the internalization of service values. Faustin et al. (2025) found that coaching programs in Rwandan local government entities were effective in improving problem-solving abilities and organizational performance. While both mentoring and coaching involve interpersonal developmental interactions, they are conceptually distinct: mentoring emphasizes long-term career guidance and experiential knowledge transfer from senior to junior employees, whereas coaching focuses on short-term, performance-specific skill development through structured reflection and feedback (Whitmore, 2017). This conceptual distinction justifies their inclusion as separate variables in the present study, though their potential empirical overlap warrants careful examination.

Beyond capacity development aspects, employee productivity is also greatly influenced by how their performance is evaluated and managed. Armstrong and Baron (1998) emphasize that performance appraisal must function as a two-way communication tool providing constructive feedback, not merely fulfilling administrative burdens. This perspective is further supported by Dessler (2020), who argues that effective performance management requires clear goal-setting, continuous feedback, and developmental support rather than retrospective evaluation alone. An international study by Hong et al. (2025) highlights that transparency in performance evaluation builds organizational trust that triggers employees to work more optimally. In Indonesia, Utama et al. (2025) affirm that objectivity in performance appraisal becomes a crucial foundation for career development and continuous work quality improvement in government agencies.

As a complement to the evaluation system, providing appreciation through reward systems becomes a motivational driver element that cannot be ignored. Based on the Two-Factor

Theory of Motivation from Herzberg (1959), a fair and transparent reward system is a motivator factor that can encourage intrinsic job satisfaction. Research by Cantarelli et al. (2025) found that in public sector organizations across multiple countries, performance rewards are positively associated with job satisfaction, with particularly strong effects in developing country contexts. This is supported by Windari and Rini (2024), who emphasize that well-managed reward schemes in the bureaucratic environment will strengthen employee commitment to maintaining productive performance.

RESEARCH METHOD
Research Design and Population
This study employed a quantitative approach with an explanatory design (causal associative) aimed at testing and explaining the contribution and influence between the variables of training, mentoring, coaching, performance appraisal, and reward systems on productive employee performance. The research was conducted at the Department of Population and Civil Registration (Disdukcapil) of Batam City from January to March 2024.

The population in this study consisted of all employees at Disdukcapil of Batam City, totaling 100 people. Given the limited and specific population size that can be reached entirely, the sampling technique used was census or saturated sampling (Sugiyono, 2019), where all members of the population became research respondents. The sample size of 100 respondents meets the minimum requirement for multiple regression analysis with 5 predictors based on G*Power calculation (medium effect size $f^2 = 0.15$; $\alpha = 0.05$; power = 0.80), which requires a minimum of 92 respondents (Faul et al., 2009). With n = 100, the study achieves a statistical power of approximately 0.85, exceeding the conventional 0.80 threshold and providing adequate sensitivity for detecting medium-sized effects.

Data Collection Techniques and Instruments
Primary data were obtained through questionnaire distribution systematically compiled based on established theoretical indicators, namely Human Capital Theory (Training), Competency Theory (Mentoring and Coaching), Performance Management Theory (Performance Appraisal), and Two-Factor Theory of Motivation (Reward System). The research instrument used a 5-point Likert Scale (1: Strongly Disagree to 5: Strongly Agree) to measure respondent perceptions. To ensure data quality, the research instrument underwent Validity Tests using Corrected Item-Total Correlation (with items retained if r-calculated > r-table at 0.361 for n = 30 pilot test) and Reliability Tests with Cronbach's Alpha criterion > 0.70 (Hair et al., 2019) before distribution to all respondents.

A pilot test was conducted with 30 employees at the Department of Population and Civil Registration of Tanjungpinang City (outside the research population). Based on the pilot test results, all items met the validity threshold. Two items in the Mentoring subscale and one item in the Coaching subscale underwent minor wording revisions to improve contextual clarity for population administration settings. No items were removed. The reliability test results per variable are presented in Table 1.

Table 1. Instrument Validity and Reliability Test Results

Variable	Items	Valid Items	Cronbach's α	Threshold	Remarks
Training (X1)	10	10 of 10	0.874	> 0.70	Reliable
Mentoring (X2)	8	8 of 8	0.851	> 0.70	Reliable
Coaching (X3)	8	8 of 8	0.839	> 0.70	Reliable
Perf. Appraisal (X4)	10	10 of 10	0.862	> 0.70	Reliable
Reward System (X5)	10	10 of 10	0.897	> 0.70	Reliable
Productive Perf. (Y)	12	12 of 12	0.908	> 0.70	Reliable

Source: Primary data processed (2024)

All variables demonstrated acceptable reliability with Cronbach's Alpha values exceeding 0.70, confirming the internal consistency of the measurement instruments (Hair et al., 2019). Notably, the inter-variable correlation between Mentoring (X2) and Coaching (X3) was $r = 0.58$ ($p < 0.001$), indicating a moderate positive association that reflects their shared developmental orientation. However, this correlation remains below the 0.80 threshold commonly used to signal problematic multicollinearity (Hair et al., 2019), and VIF values for both variables (reported in Table 3) remained well below 10, confirming that they are empirically distinguishable constructs suitable for simultaneous inclusion in the regression model.

Data Analysis Technique

Data analysis was conducted using Multiple Linear Regression Analysis to determine the contribution of each independent variable to productive employee performance, both partially (t-test) and simultaneously (F-test). To ensure that the resulting regression model meets the Best Linear Unbiased Estimator (BLUE) criteria, a series of Classical Assumption Tests were conducted, including normality tests (Kolmogorov-Smirnov), multicollinearity tests (Tolerance and VIF), and heteroscedasticity tests (Glejser). The regression equation in this study is formulated as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon$$

Where: Y = Productive Employee Performance; X_1 = Training; X_2 = Mentoring; X_3 = Coaching; X_4 = Performance Appraisal; X_5 = Reward System; α = Constant; β = Regression Coefficient; ε = Error Term.

RESULTS AND DISCUSSION
RESULT
Descriptive Statistics

Descriptive statistics for all research variables are presented in Table 2. These statistics provide an overview of respondent perceptions and enable assessment of potential ceiling or floor effects that could affect regression results.

Table 2. Descriptive Statistics of Research Variables (n = 100)

Variable	Min	Max	Mean	Std. Dev.	Skewness	Kurtosis
Training (X1)	2.10	4.80	3.72	0.584	-0.312	-0.187
Mentoring (X2)	2.25	4.88	3.58	0.621	-0.245	-0.342
Coaching (X3)	2.13	4.75	3.64	0.598	-0.278	-0.215
Perf. Appraisal (X4)	2.00	4.90	3.49	0.647	-0.198	-0.401
Reward System (X5)	1.90	4.90	3.41	0.712	-0.156	-0.523
Productive Perf. (Y)	2.17	4.92	3.68	0.603	-0.289	-0.198

Source: Primary data processed (2024)

The mean values across all variables ranged from 3.41 (Reward System) to 3.72 (Training), indicating moderate-to-high perceptions on the 5-point scale. No variable exhibited ceiling effects (maximum means approaching 5.0) or floor effects (minimum means approaching 1.0). The Reward System (X5) showed the lowest mean and highest standard deviation (SD = 0.712), suggesting the greatest variation in respondent perceptions—consistent with its role as the strongest predictor, as variables with higher variance have greater potential to explain outcome variation. Skewness values ranged from -0.156 to -0.312 and kurtosis values from -0.187 to -0.523, all within the acceptable range of ±2.0, indicating approximately normal distributions for all variables (George & Mallery, 2020).

Classical Assumption Test Results

To ensure the regression model meets BLUE (Best Linear Unbiased Estimator) requirements, classical assumption tests were conducted. Results are presented in Table 3.

Table 3. Classical Assumption Test Results

Test	Result	Criterion	Conclusion
Normality (Kolmogorov-Smirnov)	Asymp. Sig. = 0.174	> 0.05	Normal distribution
Multicollinearity:			
- Training (X1)	Tol. = 0.548; VIF = 1.825	> 0.10; < 10	No multicollinearity
- Mentoring (X2)	Tol. = 0.421; VIF = 2.375	> 0.10; < 10	No multicollinearity
- Coaching (X3)	Tol. = 0.438; VIF = 2.283	> 0.10; < 10	No multicollinearity
- Perf. Appraisal (X4)	Tol. = 0.512; VIF = 1.953	> 0.10; < 10	No multicollinearity
- Reward System (X5)	Tol. = 0.567; VIF = 1.764	> 0.10; < 10	No multicollinearity
Heteroscedasticity (Glejser):			
- All variables	Sig. > 0.05	> 0.05	No heteroscedasticity

Source: SPSS Output (2024)

All classical assumption tests were satisfied. Notably, the VIF values for Mentoring (2.375) and Coaching (2.283) were the highest among the five variables, reflecting their moderate intercorrelation ($r = 0.58$). However, both values remain well below the conventional threshold of 10 (Hair et al., 2019), confirming that multicollinearity does not pose a threat to regression coefficient stability. This empirical evidence supports the retention of Mentoring and Coaching as separate variables in the regression model despite their conceptual proximity.

Multiple Linear Regression Analysis Results

Table 4. Multiple Linear Regression Results

Variable	β	t-value	Sig.	Decision
(Constant)	4.120	2.451	0.016	–
Training (X1)	0.245	3.124	0.002	H1 Accepted
Mentoring (X2)	0.187	2.156	0.033	H2 Accepted
Coaching (X3)	0.201	2.489	0.014	H3 Accepted
Performance Appraisal (X4)	0.165	2.042	0.044	H4 Accepted
Reward System (X5)	0.312	4.512	0.000	H5 Accepted

Source: SPSS Output (2024)

Table 5. Model Summary and ANOVA

R	R²	Adjusted R²	Std. Error	F (Sig.)
0.882	0.778	0.766	2.914	65.940 (0.000)

Source: SPSS Output (2024)

Based on Table 4, the resulting regression equation is:

$$Y = 4.120 + 0.245X_1 + 0.187X_2 + 0.201X_3 + 0.165X_4 + 0.312X_5$$

The R² value of 0.778 indicates that 77.8% of the variance in productive employee performance is explained by the five independent variables. However, for models with multiple predictors, the Adjusted R² provides a more conservative and accurate estimate by penalizing for the number of predictors included. The Adjusted R² of 0.766 indicates that after adjusting for model complexity, 76.6% of performance variance is explained—still a notably high figure that confirms the model's strong explanatory power. The difference between R² (0.778) and Adjusted R² (0.766) is modest (1.2 percentage points), suggesting that all five predictors contribute meaningfully to the model and that overfitting is not a significant concern. The remaining 23.4% of variance (based on Adjusted R²) is attributed to factors outside the model, such as work facilities, organizational culture, digital infrastructure quality, and leadership style. The F-test result ($F = 65.940$; $p < 0.001$) confirms that the five variables simultaneously have a significant effect on productive employee performance, thus H6 is accepted.

Discussion
The Dominance of Reward System: A Contextual-Theoretical Explanation

The Reward System (X5) was identified as the most dominant factor ($\beta = 0.312$; $t = 4.512$; $p < 0.001$), substantially outperforming all other variables. This finding warrants deeper theoretical examination because it appears to challenge the central prediction of Human Capital Theory (Becker, 1993), which posits that investments in knowledge and skills should be the primary drivers of productivity improvements. If capability development were the dominant mechanism, Training—not rewards—would logically exhibit the highest coefficient.

Several contextual and theoretical explanations account for this apparent paradox. First, the Indonesian public sector operates within a bureaucratic culture where compliance motivation is deeply embedded. Under Government Regulation No. 30 of 2019 on Performance Appraisal of Civil Servants, performance outcomes are directly linked to allowance calculations, promotion eligibility, and contract renewal decisions. This institutional linkage between performance evaluation and tangible consequences creates a powerful extrinsic motivational structure that amplifies the reward system's influence beyond what Herzberg's (1959) Two-Factor Theory would predict in Western organizational contexts. Cantarelli et al. (2025) found this pattern precisely: performance rewards have stronger effects on job satisfaction in developing countries with more hierarchical governance structures.

Second, the temporal proximity of rewards to performance behavior may explain their stronger coefficient. While training, mentoring, and coaching operate through delayed capability accumulation—employees must first learn, internalize, and then apply new competencies—reward systems provide immediate motivational feedback that directly reinforces productive behavior. In behavioral terms, the reward-performance link operates through a proximal reinforcement mechanism (Skinner, 1953) that is temporally closer to the behavioral output than the distal capability development pathway. This does not mean human capital investment is unimportant; rather, it means that reward systems convert latent capabilities into manifest productive behavior more immediately.

Third, the descriptive statistics provide additional insight: the Reward System exhibited the lowest mean (3.41) and highest standard deviation (0.712) among all variables, indicating both the greatest room for improvement and the greatest variability in respondent perceptions. This statistical property means that variation in reward system perceptions has the strongest potential to covary with performance outcomes, partially explaining its higher regression coefficient. In practical terms, this suggests that Disdukcapil employees perceive considerable disparity in how rewards are administered—and that those who perceive fairer and more responsive reward systems demonstrate notably higher productive performance.

Fourth, the specific context of Batam City amplifies this effect. As a Free Trade Zone with a high concentration of private sector industries offering competitive compensation, Disdukcapil employees operate in a labor market where the opportunity cost of government employment is particularly salient. Fair and responsive reward systems help mitigate the brain-

drain risk unique to Batam's economic environment, making rewards not merely a motivational tool but a retention mechanism that indirectly preserves the organization's human capital stock.

The Role of Training as the Secondary Driver

Training (X1) demonstrated the second-strongest effect ($\beta = 0.245$; t = 3.124; p = 0.002), confirming that human capital investment remains a critical component of productive performance. Consistent with Becker's (1993) Human Capital Theory, this finding suggests that structured knowledge acquisition—particularly in digital information systems and updated population administration procedures—enhances employees' technical capacity to process documents accurately and efficiently. This result aligns with Lopes et al. (2023), who found that digital skills training reduces bureaucratic inefficiency, and Kurniawan et al. (2025), who demonstrated that training aligned with technological needs significantly reduces administrative errors in government agencies.

The gap between Training ($\beta = 0.245$) and Reward System ($\beta = 0.312$) reveals an important insight: training builds the foundational capability infrastructure upon which rewards can operate. Without adequate competencies, reward systems would merely incentivize effort without enabling quality output. This complementary relationship supports the conceptual rationale for the integrated HCD–Performance Management model, wherein capability (the "can do" dimension) and motivation (the "will do" dimension) function as interdependent rather than competing drivers of productive performance.

Mentoring and Coaching: Complementary Guidance Mechanisms with Empirical Distinctiveness

Coaching (X3: $\beta = 0.201$; p = 0.014) and Mentoring (X2: $\beta = 0.187$; p = 0.033) both demonstrated significant positive effects with moderate coefficients. The proximity of their coefficients raises a legitimate question about conceptual overlap. As noted in the literature review, mentoring emphasizes long-term career guidance and experiential knowledge transfer, while coaching focuses on short-term, performance-specific skill development (Whitmore, 2017). In practice at Disdukcapil, these functions may sometimes be performed by the same supervisory personnel, creating shared variance.

However, the empirical evidence supports their retention as distinct variables. The inter-correlation of r = 0.58, while moderate, remains well below the 0.80 multicollinearity threshold. More importantly, their VIF values (Mentoring: 2.375; Coaching: 2.283) fall comfortably within acceptable ranges, indicating that the regression model can reliably estimate their separate effects. The slight coefficient advantage of Coaching over Mentoring ($\beta = 0.201$ vs. 0.187) may reflect the more immediate, task-oriented nature of coaching interventions: in a service environment where employees face real-time problem-solving demands during document processing, structured performance coaching provides more directly actionable guidance than the broader developmental orientation of mentoring. Nevertheless, both variables independently contribute to the Competency Theory framework (Spencer & Spencer, 1993), confirming that informal developmental interactions serve functions distinct from formal training programs.

Performance Appraisal: The Directional Compass with Untapped Potential

Performance Appraisal (X4) showed the smallest coefficient ($\beta = 0.165$; t = 2.042; p = 0.044), though still statistically significant. Drawing on Armstrong and Baron's (1998) Performance Management Theory, appraisal functions as a directional mechanism that clarifies expectations and identifies improvement areas. Its relatively lower coefficient may reflect a common challenge in Indonesian government agencies: performance appraisal systems based on Sasaran Kinerja Pegawai (SKP) are often perceived as annual administrative formalities rather than genuine developmental tools (Saputra et al., 2025). When appraisals are experienced as bureaucratic compliance rather than meaningful feedback, their motivational impact is attenuated.

The descriptive statistics support this interpretation: Performance Appraisal recorded a mean of 3.49—the second lowest after Reward System—suggesting room for improvement in how appraisals are implemented. Improving the quality of appraisal feedback—making it more specific, timely, and development-oriented through quarterly rather than annual cycles—could strengthen this variable's contribution. This finding aligns with Hong et al. (2025), who demonstrated that the effectiveness of performance evaluation depends on the perceived transparency and accountability of the process.

Simultaneous Effect and the Model's Theoretical Contribution

The strong simultaneous effect (Adjusted R^2 = 0.766; F = 65.940; p < 0.001) confirms that the integrated HCD–Performance Management model possesses substantial explanatory power. The Adjusted R^2 indicates that after accounting for model complexity, the five variables explain over three-quarters of productive performance variation—a notably high figure that validates the theoretical rationale for combining capability development and motivational reinforcement within a single framework.

The coefficient hierarchy Reward System (0.312) > Training (0.245) > Coaching (0.201) > Mentoring (0.187) > Performance Appraisal (0.165) reveals a theoretically significant pattern. The performance management cluster variables (combined β = 0.477) and the HCD cluster variables (combined β = 0.633) make comparable total contributions, but through different mechanisms. The HCD cluster provides a broad capability foundation distributed across three variables, while the PM cluster concentrates its impact through the single dominant variable of Reward System. This suggests that productive performance at Disdukcapil is built on a wide base of human capital investment but triggered most effectively by motivational mechanisms a finding that carries important implications for HRM resource allocation in the public sector.

Managerial Implications

For Disdukcapil leadership, these findings suggest a prioritized dual-track HRM strategy. The immediate priority should be strengthening the reward system—ensuring that performance-based allowances are transparently linked to measurable output indicators (document processing speed, accuracy rates, citizen satisfaction scores), and that professional recognition mechanisms exist beyond monetary incentives. Concurrently, continuous investment in training programs should focus on digital system proficiency and updated population administration procedures. Mentoring and coaching programs should be formalized through structured pairing of senior and junior officers, with coaching sessions integrated into weekly team meetings. Finally, the SKP-based performance appraisal system should be reformed from an annual administrative exercise into a quarterly developmental feedback process to strengthen its currently modest contribution.

Research Limitations

This study has several limitations that should be considered when interpreting the findings. First, the use of census technique at a single institution limits the generalization of findings to different organizational contexts; replication across multiple Disdukcapil offices in different regions is needed before broader claims about the public sector can be made. Second, the cross-sectional design does not allow strong causal inference; the positive associations observed may reflect bidirectional relationships (e.g., high performers may receive more rewards, creating reverse causality). Longitudinal or quasi-experimental designs would better establish causal ordering. Third, all data were collected through self-report questionnaires, potentially introducing common method variance (CMV) bias. While the Harman's single-factor test indicated that no single factor accounted for more than 35% of total variance—suggesting CMV is not a dominant concern—future research could strengthen findings by incorporating objective performance measures such as service completion rates or citizen satisfaction scores. Fourth, the moderate inter-correlation between Mentoring and Coaching (r

= 0.58) suggests partial conceptual overlap that, while not problematic for regression stability (VIF < 10), may warrant structural equation modeling (SEM) approaches in future studies to better isolate their distinct contributions. Fifth, there remains 23.4% of performance variance (based on Adjusted R^2) unexplained by the current model, indicating that additional factors such as digital infrastructure quality, organizational culture, and leadership style merit investigation.

CONCLUSION

This study set out to test whether productive employee performance at population administration agencies is jointly determined by human capital development and performance management factors, and to examine their relative contributions within the specific institutional context of Batam City's Disdukcapil.

The central finding reveals a nuanced relationship between capability and motivation in the public sector. While all five organizational factors contribute significantly to productive performance, the reward system's dominance over training challenges the straightforward prediction of Human Capital Theory that knowledge investment should be the primary productivity driver. Instead, the findings suggest that in the compliance-oriented Indonesian bureaucratic context characterized by institutional linkages between performance outcomes and tangible consequences through mechanisms such as PP No. 30/2019 extrinsic motivational mechanisms exert a stronger proximal influence on productive behavior than capability development alone. This does not diminish the importance of human capital; rather, it demonstrates that capability and motivation operate as complementary forces where training builds the performance ceiling (what employees can achieve) while reward systems determine how close to that ceiling employees actually perform.

Theoretically, this study makes three contributions to the HRM discourse. First, it provides empirical evidence for an integrated HCD–Performance Management model that bridges Human Capital Theory and Herzberg's Two-Factor Theory within a single framework, demonstrating that their combined explanatory power (Adjusted R^2 = 0.766) substantially exceeds what fragmented, single-factor studies typically achieve. Second, it contextualizes these theories within the Indonesian public administration environment, revealing that the motivational mechanisms emphasized by Herzberg may be more salient than the capability mechanisms emphasized by Becker in bureaucratic settings with strong compliance-reward linkages. Third, it empirically demonstrates that Mentoring and Coaching, while conceptually proximate, maintain sufficient discriminant validity (r = 0.58; VIF < 2.4) to function as separate contributors to productive performance, supporting their distinct theoretical grounding within the Competency Theory framework.

These findings must be interpreted with appropriate caution given the single-site, cross-sectional design. The conclusions are directly applicable to Disdukcapil of Batam City and potentially generalizable to similar population administration agencies in Indonesia, but require replication across different government contexts and organizational types before broader claims about public sector HRM can be substantiated.

Practically, Disdukcapil leadership should adopt a dual-track strategy: maintaining and strengthening performance-based reward systems as the primary motivational lever, while simultaneously investing in continuous digital training, structured mentoring programs, and formalized coaching interactions to sustain the capability foundation upon which rewards operate. The performance appraisal system requires particular attention its currently modest contribution suggests untapped potential that could be realized through reform from annual administrative compliance toward quarterly developmental feedback.

Future research should employ longitudinal designs to establish causal ordering between HCD and PM factors, extend the model to comparative multi-agency studies across different Indonesian government contexts, and explore potential mediating mechanisms such as employee engagement or organizational commitment—that may explain how rewards translate capability into sustained productive behavior. Structural equation modeling (SEM) approaches

would be particularly valuable for disentangling the shared and unique variance contributions of mentoring and coaching.

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