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The Effect of Work Discipline and Work Motivation on Employee Productivity in the Die Cut Department of PT Mattel Indonesia

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Abstract

Employee productivity is a key measure of manufacturing performance in meeting production targets efficiently and effectively. This study examined the effects of work discipline and work motivation on employee productivity in the Die Cut Department of PT Mattel Indonesia. A quantitative explanatory design was applied to a population of 60 employees designated for saturated sampling. Data were collected using a Likert-scale questionnaire and analyzed through multiple linear regression using IBM SPSS Statistics version 29. Work discipline and motivation showed positive, significant associations with productivity, with unstandardized coefficients of 0.522 ($p = 0.002$) and 0.543 ($p < 0.001$). Their simultaneous association was significant ($F = 44.374$, $p < 0.001$). The multiple correlation coefficient was 0.876; R^2 and adjusted R^2 were 0.767 and 0.749, respectively. Both predictors accounted for 76.7% of productivity variation, leaving 23.3% unexplained by the fitted model. Motivation exhibited the larger standardized coefficient, suggesting a stronger conditional relationship. Findings support coordinated attention to employee discipline and motivational conditions in specialized manufacturing operations. Nevertheless, the regression output reported 30 observations, inconsistent with the stated population and sampling design, requiring clarification. The study also relied on questionnaire-based productivity measures and was restricted to one department, limiting generalizability beyond the investigated setting.

Keywords: *Die Cutting, Employee Productivity, Manufacturing Industry, Work Discipline, Work Motivation.*

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INTRODUCTION

Employee productivity in manufacturing reflects the interaction of operating procedures, workforce behavior, and production-system requirements rather than equipment utilization alone. Research on manufacturing process development indicates that productivity evaluations must consider employee conditions and the specific organization of departmental operations (Suokko et al., 2025). In assembly environments, technological assistance and task arrangements can influence motivational work characteristics, making employee responses relevant to the effectiveness of production activities (Walczok & Bipp, 2024). The expanding literature examining work motivation and productivity demonstrates sustained scholarly attention to employee behavior as a determinant of organizational output (Ay, 2025). PT Mattel Indonesia, an international toy manufacturer located in Cikarang, West Java, operates a Die Cut Department responsible for cutting materials according to product-design specifications before subsequent production stages. Preliminary observations in this department identified attendance delays, limited employee enthusiasm, and inconsistencies in achieving established production targets. Company production records for 2022–2024, presented in Figure 1, illustrate fluctuations between planned production targets and actual outcomes, providing an empirical basis for examining potential productivity determinants.



Figure 1. Die Cut Production Targets and Outcomes, 2022–2024
Source: PT Mattel Indonesia company records.

Figure 1 indicates that production-target attainment in the Die Cut Department fluctuated throughout 2022–2024, with actual production falling below established targets in certain periods, although these observations do not independently establish the causes of the deviations. Existing empirical research generally identifies work discipline and work motivation as distinct but potentially complementary factors associated with employee productivity (Farena & Dewanto, 2023). Evidence from an Indonesian manufacturing enterprise also associates employee motivation and work discipline with productivity, supporting their consideration within industrial workforce management (Fahmanagari et al., 2025). Research involving production employees suggests that motivational influences on productivity may involve work discipline rather than operating exclusively through a direct relationship (Mustikasari et al., 2023). Studies incorporating occupational safety, discipline, and motivation further indicate that employee productivity may reflect interrelated behavioral and organizational mechanisms (Yulianto et al., 2025). These findings establish the relevance of both explanatory variables while demonstrating that their relationships with productivity require examination under specific organizational and operational conditions.

The empirical literature nevertheless presents inconsistent findings concerning the independent contributions of work discipline and work motivation to employee productivity. Studies examining both predictors have identified their relationships with productivity, suggesting that employee compliance and motivational conditions may jointly contribute to productive work behavior (Farena & Dewanto, 2023). Contrasting evidence indicates that work discipline does not necessarily exert a significant independent effect on productivity, even when work motivation remains an influential explanatory factor (Purnomo & Jayadiningrat, 2023). Other findings suggest that work motivation may influence employee productivity indirectly through work discipline, raising questions about the stability of direct relationships across production environments (Mustikasari et al., 2023). Research examining the relationship between motivation and work performance introduces an additional conceptual limitation because general performance outcomes cannot automatically be equated with productivity in specialized manufacturing activities (Fiorini & Sammut, 2024). Differences in organizational characteristics, operational responsibilities, and outcome measurement therefore constrain the transferability of previous findings to departments performing specific production functions. The resulting research gap concerns the insufficiently established individual and simultaneous effects of work discipline and work motivation on employee productivity within the Die Cut Department of PT Mattel Indonesia.

The unresolved relationships between employee discipline, motivation, and productivity have implications for the scientific interpretation and managerial assessment of manufacturing performance. Research integrating resilience engineering, motivation, and occupational safety indicates that workforce productivity emerges from interconnected behavioral and organizational conditions rather than isolated individual characteristics (Putra et al., 2024). Evidence from manufacturing process

development similarly emphasizes the relevance of departmental circumstances and employee conditions when evaluating productivity improvements (Suokko et al., 2025). Research on intelligent assistance systems in assembly operations further demonstrates that production arrangements can influence motivational work characteristics, supporting the need to examine employee-related factors within operational processes (Walczok & Bipp, 2024). The continuing development of motivation-productivity research underscores the analytical importance of distinguishing behavioral determinants from observed productivity outcomes (Ay, 2025). Without department-specific evidence, productivity fluctuations at PT Mattel Indonesia could be interpreted through generalized assumptions about employee behavior, potentially limiting the precision of managerial evaluations concerning attendance, operational compliance, work enthusiasm, and production-target achievement.

The present study positions the Die Cut Department as a specialized manufacturing setting in which established human resource variables are examined against specific operational requirements. Unlike broader manufacturing investigations conducted across organizational areas, this research concentrates on employees performing material-cutting activities within a defined production department (Fahmanagari et al., 2025). Its analytical justification also emerges from inconsistent evidence regarding the independent effect of work discipline when motivation is considered as an additional productivity determinant (Purnomo & Jayadiningrat, 2023). Whereas previous studies have incorporated occupational safety and motivational mediation into more complex productivity models, the present investigation focuses on estimating the individual and simultaneous effects of work discipline and work motivation (Yulianto et al., 2025). The distinction between employee performance and productivity identified in motivation-related research further supports the need to maintain conceptual alignment between the dependent variable and the operational characteristics of the department (Fiorini & Sammut, 2024). The research gap lies in the absence of directly applicable department-specific evidence within the reviewed literature, while the proposed novelty consists of examining established behavioral predictors in the specialized production activities of PT Mattel Indonesia's Die Cut Department. The documented production-target fluctuations provide the operational justification for this investigation without presupposing that discipline or motivation has already been established as the cause of the observed productivity variations.

This study aims to analyze the effect of work discipline on employee productivity in the Die Cut Department of PT Mattel Indonesia. It also seeks to determine the effect of work motivation on employee productivity within the same department. A further objective is to examine the simultaneous effect of work discipline and work motivation on employee productivity. These objectives address the empirical uncertainty surrounding the relative contributions of behavioral compliance and motivational conditions to productivity in specialized manufacturing operations. The scientific contribution is expected to consist of department-specific empirical evidence concerning the applicability of established workforce productivity relationships to material-cutting activities. The practical contribution lies in providing an analytical basis for evaluating discipline-related and motivation-related workforce management practices in relation to departmental production requirements. Any managerial implications will be formulated according to the observed empirical relationships rather than assumptions concerning the causes of production-target fluctuations.

RESEARCH METHODS

This study employed a quantitative explanatory design to examine the individual and simultaneous effects of work discipline (X_1) and work motivation (X_2) on employee productivity (Y), consistent with previous empirical investigations of these relationships (Farena & Dewanto, 2023). The research was conducted at PT Mattel Indonesia, Jababeka V Industrial Estate, Block G, Numbers 4–6, Harja Mekar, North Cikarang District, Bekasi Regency, West Java, between September 2024 and May 2025. The population comprised all 60 employees in the Die Cut Department, and saturated sampling was employed to include every population member as a research respondent. The conceptual framework specified work discipline and work motivation as independent variables, reflecting their consideration as productivity determinants in manufacturing-related research (Fahmanagari et al., 2025). Figure 2 illustrates the proposed relationships between both explanatory variables and employee productivity, consistent with previous investigations involving production-department employees (Mustikasari et al., 2023). Primary data were collected using a structured questionnaire with a five-point Likert scale,

supported by direct observation and a literature review, while the operational indicators and measurement scales are presented in Table 1.

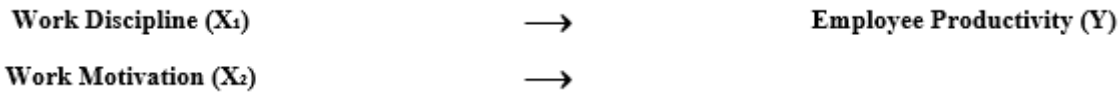


Figure 2. Conceptual Framework
Source: Developed by the researchers (2026)

Table 1. Operationalization of Research Variables

Variable / Source	Indicators	Scale
Employee Productivity (Y), Afandi (2021)	Ability, improvement in work output, self-development, work quality, and efficiency	Likert (1–5)
Work Discipline (X_1), Mangkunegara (2021)	Punctuality, compliance with rules, responsibility, adherence to supervisors' instructions, and work ethics	Likert (1–5)
Work Motivation (X_2), Nining (2023)	Physiological needs, safety needs, social needs, esteem needs, and self-actualization	Likert (1–5)

Questionnaire responses were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) and processed using IBM SPSS Statistics version 29. Instrument validity was evaluated through Pearson product–moment correlations, while reliability was assessed using Cronbach's alpha with a minimum threshold of 0.60 (Ghozali, 2021). Before regression estimation, normality, multicollinearity, heteroskedasticity, and linearity tests were conducted to assess the relevant statistical assumptions. Multiple linear regression was employed using the equation ($Y = a + b_1X_1 + b_2X_2 + e$), where (Y) represents employee productivity, (a) denotes the intercept, (b_1) and (b_2) represent regression coefficients, (X_1) denotes work discipline, (X_2) denotes work motivation, and (e) represents the error term (Purnomo & Jayadiningrat, 2023). Both independent variables were incorporated into the same regression equation to estimate their individual associations with productivity without specifying motivational mediation effects (Yulianto et al., 2025). Individual effects were evaluated using t-tests, the simultaneous effect was examined using an F-test, and the coefficient of determination (R^2) was used to quantify the proportion of productivity variation explained by the regression model.

RESULTS AND DISCUSSION

Instrument Validity, Reliability, and Measurement Quality

The assessment of measurement quality constituted the initial stage of statistical analysis in examining the relationships between work discipline, work motivation, and employee productivity in the Die Cut Department of PT Mattel Indonesia. The questionnaire incorporated three constructs representing behavioral compliance, motivational conditions, and perceived productivity, each measured through ten items using a five-point Likert scale. Differences in the conceptual characteristics of these variables required separate evaluations of item validity and internal consistency before their scores could be employed in multiple linear regression. Previous manufacturing research has demonstrated the relevance of measuring work discipline and employee motivation as distinct explanatory factors associated with workforce productivity (Fahmanagari et al., 2025). Evidence from production-department employees further indicates that the relationship between motivation and productivity may differ from the relationship involving work discipline, reinforcing the importance of distinguishing the measured constructs (Mustikasari et al., 2023). The measurement assessment therefore focused on determining whether questionnaire items demonstrated adequate correlations with their respective variable scores and whether the resulting scales satisfied the reliability criteria adopted in the study.

Item validity was examined using Pearson product–moment correlation coefficients to assess the statistical association between each questionnaire item and its corresponding variable score. The original analysis established a critical correlation value of 0.361 and applied a significance threshold of 0.05 when determining item validity. An item was classified as valid when its calculated correlation coefficient exceeded the specified critical value and its reported probability value was below the significance threshold. These criteria permitted the assessment of the ten items assigned to each variable without combining the measurement results of work discipline, work motivation, and employee productivity. Pearson correlation analysis provides an established statistical procedure for examining associations among measured variables, although its interpretation depends on the characteristics and distribution of the analyzed observations (Ghozali, 2021). The use of both correlation magnitude and statistical significance provided two reported criteria for evaluating the questionnaire items before subsequent regression analysis. Nevertheless, meeting these criteria indicates acceptable item-level statistical associations under the adopted procedure rather than establishing comprehensive construct validity or the dimensional structure of the instrument.

The item validity results presented in Table 2 indicate that the reported correlation coefficients exceeded the established critical value of 0.361 across all three research variables. For work discipline (X_1), the calculated coefficients ranged from 0.406 to 0.831, indicating variation in the strength of item correlations with the discipline score. Work motivation (X_2) produced coefficients ranging from 0.523 to 0.780, with every reported coefficient exceeding the adopted validity threshold. Employee productivity (Y) demonstrated coefficients between 0.509 and 0.683, indicating that all ten productivity items also satisfied the reported correlation criterion. The significance values for the questionnaire items were generally below 0.05, although the entry for the tenth work-discipline item contains a reporting anomaly requiring verification. Establishing the statistical adequacy of these measurements is relevant to productivity research examining discipline and motivation as separate explanatory variables within the same analytical model (Farena & Dewanto, 2023).

Table 2. Item Validity Test Results

No.	Item	p(X_1)	p(X_2)	p(Y)	r(X_1)	r(X_2)	r(Y)	r critical	Result
1	Item 1	0.026	<0.001	<0.001	0.407	0.690	0.652	0.361	Valid
2	Item 2	0.011	<0.001	<0.001	0.458	0.655	0.648	0.361	Valid
3	Item 3	0.014	<0.001	<0.001	0.444	0.606	0.622	0.361	Valid
4	Item 4	<0.001	0.002	<0.001	0.571	0.533	0.683	0.361	Valid
5	Item 5	<0.001	<0.001	<0.001	0.597	0.570	0.661	0.361	Valid
6	Item 6	0.026	0.003	<0.001	0.406	0.523	0.628	0.361	Valid
7	Item 7	<0.001	<0.001	<0.001	0.580	0.780	0.619	0.361	Valid
8	Item 8	0.003	<0.001	<0.001	0.529	0.743	0.584	0.361	Valid
9	Item 9	<0.001	0.001	0.004	0.831	0.564	0.509	0.361	Valid
10	Item 10	<10.001*	<0.001	0.002	0.652	0.676	0.545	0.361	Valid

The value "<10,001" appears in the original table and requires verification against the statistical output.

The coefficients in Table 2 reveal differences in item-level association strengths that warrant interpretation beyond the binary classification of valid or invalid. Within the work-discipline construct, Item 9 recorded the highest correlation coefficient of 0.831, whereas Item 6 produced the lowest coefficient of 0.406, indicating unequal contributions to the observed correlation pattern. The motivation construct demonstrated its strongest correlation for Item 7 at 0.780 and its weakest for Item 6 at 0.523, while the productivity construct recorded its highest coefficient for Item 4 at 0.683 and its lowest for Item 9 at 0.509. These differences indicate that the items were not equally associated with their respective variable scores, although the reported correlations alone cannot establish which operational indicators contributed most strongly to the underlying constructs. This distinction is relevant because previous investigations have treated discipline, motivation, and employee productivity as multidimensional concepts whose measurement influences the interpretation of their empirical relationships (Purnomo & Jayadiningrat, 2023). The correlation results provide preliminary evidence supporting the item measurements, but they do not independently demonstrate dimensional consistency,

discriminant validity, or the absence of measurement bias. The anomalous significance notation for Item 10 of work discipline should therefore be checked against the original statistical output before the validity findings are treated as fully verified.

Following item validity assessment, internal consistency was evaluated using Cronbach's alpha to determine whether items assigned to each research variable demonstrated acceptable reliability. The original study adopted a minimum alpha coefficient of 0.60 as the criterion for classifying the questionnaire scales as reliable. This procedure complemented Pearson correlation testing by examining consistency across items within each scale rather than assessing individual item associations in isolation. Reliability assessment was particularly relevant because the three variables were measured using multiple questionnaire statements subsequently incorporated into the regression model. The application of internal consistency analysis is consistent with quantitative statistical procedures used to evaluate the reliability of multi-item research instruments (Ghozali, 2021). The calculated reliability coefficients for work discipline, work motivation, and employee productivity are reported in Table 3 to identify the relative consistency of the three measurement scales.

Table 3. Reliability Test Results

Variable	Cronbach's Alpha	Assessment
Work discipline (X_1)	0.746	Reliable
Work motivation (X_2)	0.832	Reliable
Employee productivity (Y)	0.816	Reliable

The reliability coefficients in Table 3 exceeded the minimum acceptance threshold of 0.60 for all three measured variables. Work motivation demonstrated the highest Cronbach's alpha coefficient at 0.832, indicating the strongest reported internal consistency among the scales included in the study. Employee productivity followed with a coefficient of 0.816, while work discipline recorded a coefficient of 0.746, which also satisfied the adopted reliability criterion. The comparatively higher coefficients for motivation and productivity should not be interpreted as evidence that these variables have stronger effects on employee productivity, because internal consistency and explanatory influence represent different statistical properties. Research examining motivational and organizational factors similarly distinguishes the measurement of employee-related constructs from the investigation of their relationships with performance outcomes (Asamani et al., 2025). The findings support the use of the three scales under the study's stated reliability standard without establishing their temporal stability or unidimensionality. Their adequacy for subsequent regression analysis must therefore be considered alongside the validity assessment and the assumptions underlying the selected statistical procedures.

The combined validity and reliability findings provide a preliminary basis for representing work discipline, work motivation, and employee productivity through their questionnaire measurements. All reported item correlation coefficients exceeded the adopted critical value, while the three Cronbach's alpha coefficients satisfied the predetermined internal consistency threshold. These findings support the statistical use of the measurement scales, subject to verification of the anomalous significance entry and the consistency of the sample information reported elsewhere in the analysis. Research on employee productivity has emphasized the importance of distinguishing discipline and motivation because their independent relationships with productivity may vary across organizational settings (Malik et al., 2025). Studies involving production employees also illustrate that work motivation may operate through behavioral characteristics associated with discipline, creating a need for sufficiently distinct and reliable measurements when interpreting their relationships (Mustikasari et al., 2023). The present measurement results establish the reported adequacy of the questionnaire scales but do not resolve whether the conceptual domains of discipline and motivation are empirically independent or whether their relationships with productivity are statistically significant.

Measurement quality is particularly consequential for the subsequent estimation of regression coefficients because inconsistent or inadequately specified variables can complicate the interpretation of relationships among the research constructs. The reported validity coefficients and reliability values indicate that the instrument met the original study's acceptance criteria, although these findings must be interpreted according to the specific statistical procedures employed. A methodological inconsistency remains between the population of 60 employees reported in the research design and the 30 observations

indicated in the subsequent regression diagnostic results, requiring clarification of the effective analytical sample. The critical correlation value of 0.361 should also be checked against the number of observations used in the validity analysis, since the relevant statistical threshold depends on the testing conditions and sample size (Ghozali, 2021). The anomalous probability notation for the tenth work-discipline item constitutes a separate reporting issue that should be resolved without modifying the recorded coefficient of 0.652. These qualifications do not negate the reported reliability coefficients or the item correlations, but they limit the certainty with which the instrument assessment can be considered fully documented. Subject to verification of these matters, the validity and reliability findings provide the measurement foundation for examining regression assumptions and estimating the individual and simultaneous relationships of work discipline and work motivation with employee productivity in the Die Cut Department of PT Mattel Indonesia.

Regression Assumption Testing and Model Adequacy

The regression diagnostic stage examined whether the reported data were compatible with the statistical assumptions underlying the multiple linear regression model used to explain employee productivity in the Die Cut Department of PT Mattel Indonesia. Work discipline (X_1) and work motivation (X_2) were evaluated as predictors of employee productivity (Y) through residual normality, multicollinearity, heteroskedasticity, and linearity assessments. These diagnostic procedures addressed different properties of the regression specification and provided a basis for evaluating the appropriateness of subsequent hypothesis testing. Residual normality concerned the distribution of regression errors, whereas multicollinearity examined the degree of statistical overlap between the explanatory variables. Heteroskedasticity testing assessed the consistency of residual variance, while linearity testing evaluated whether the relationships between the predictors and employee productivity could reasonably be represented using linear terms. Statistical assessment of regression assumptions is essential because violations may affect the precision of parameter estimates and the reliability of inferential conclusions (Ghozali, 2021). The diagnostic findings are presented in Figure 3 and Tables 4–7, preserving the statistical values and classifications reported in the original analysis.

Residual normality was initially evaluated using a normal probability plot of standardized regression residuals, as presented in Figure 3. The original analysis described the plotted observations as generally following the diagonal reference line, indicating a pattern consistent with an approximately normal residual distribution. The concentration of observations around the reference line was interpreted as preliminary visual evidence that the distribution did not exhibit substantial departures from the expected normal pattern. Visual assessment remains relevant because formal normality tests alone do not identify every distributional characteristic potentially affecting regression interpretation. Research addressing manufacturing productivity has emphasized the importance of considering the statistical characteristics of operational and employee-related observations when evaluating performance relationships (Suokko et al., 2025). The normal probability plot was consequently interpreted alongside the Kolmogorov–Smirnov test rather than being treated as independent confirmation of the normality assumption.

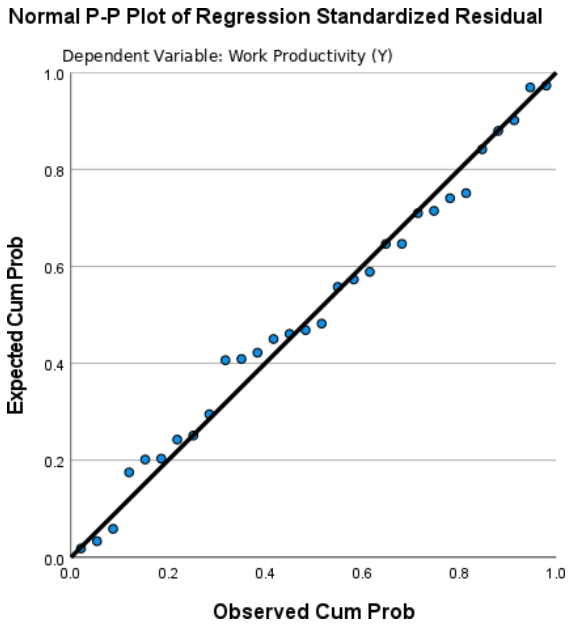


Figure 3. Normal Probability Plot of Standardized Regression Residuals

The formal normality assessment was conducted using the one-sample Kolmogorov–Smirnov test, with the corresponding statistical results presented in Table 4. The analysis reported 30 observations, a residual mean of 0.0000000, and a standard deviation of 3.18793435, indicating that the estimated residuals were centered around zero. The maximum absolute difference between the observed and reference distributions was 0.103, corresponding to the reported Kolmogorov–Smirnov test statistic. The asymptotic two-tailed significance value was 0.200, while the Monte Carlo significance value was 0.557, both exceeding the predetermined significance threshold of 0.05. The Monte Carlo result was accompanied by a 99% confidence interval ranging from 0.544 to 0.570, providing further information about the estimated probability under the testing procedure. A significance value above 0.05 indicates insufficient evidence to reject the specified distributional assumption, although it does not establish that the residuals are perfectly normally distributed (Ghozali, 2021). The reported analytical sample of 30 observations nevertheless requires reconciliation with the 60 employees identified in the research design because the difference affects the documentation and interpretation of the regression analysis.

Table 4. Kolmogorov–Smirnov Normality Test Results

Statistic	Reported Result
Number of observations (N)	30
Mean of unstandardized residuals	0.0000000
Standard deviation	3.18793435
Maximum absolute difference	0.103
Maximum positive difference	0.074
Maximum negative difference	−0.103
Test statistic	0.103
Asymptotic significance (two-tailed)	0.200
Monte Carlo significance (two-tailed)	0.557
99% confidence interval—lower bound	0.544
99% confidence interval—upper bound	0.570

Multicollinearity was examined to determine whether work discipline and work motivation exhibited excessive statistical overlap that could complicate the interpretation of their individual regression coefficients. As presented in Table 5, both independent variables recorded tolerance values of 0.578 and variance inflation factors of 1.731. The tolerance values exceeded the adopted minimum

criterion of 0.10, while the variance inflation factors remained below the maximum threshold of 10. These results indicated that the model did not exhibit problematic multicollinearity according to the diagnostic criteria employed in the original study. Previous investigations examining discipline and motivation simultaneously have demonstrated the relevance of distinguishing their statistical contributions when explaining employee productivity (Fahmanagari et al., 2025). The reported diagnostics supported the inclusion of both predictors in the regression model without indicating excessive inflation of coefficient uncertainty attributable to their statistical association.

Table 5. Multicollinearity Test Results

Variable	Tolerance	VIF	Assessment
Work discipline (X_1)	0.578	1.731	No multicollinearity
Work motivation (X_2)	0.578	1.731	No multicollinearity

Heteroskedasticity testing was conducted to assess whether the regression residuals exhibited systematic differences in variance across the explanatory variables. Table 6 presents significance values of 0.680 for work discipline and 0.127 for work motivation, both exceeding the significance threshold of 0.05. The original analysis consequently reported no evidence of heteroskedasticity, indicating that the applied diagnostic procedure did not identify statistically significant departures from the assumption of constant residual variance. The higher significance value for work discipline should not be interpreted as evidence that discipline produces more stable residual variance, because these values represent statistical test outcomes rather than direct measurements of variability. Likewise, the nonsignificant results do not establish that residual variance is identical across every possible level of the independent variables. Research integrating motivational and organizational conditions into workforce productivity analysis demonstrates that employee outcomes may reflect multiple interacting workplace factors, supporting the importance of assessing residual behavior in productivity models (Putra et al., 2024). The available results therefore provided no statistical basis for rejecting the homoskedasticity assumption under the reported procedure, although the specific heteroskedasticity test employed was not identified in the supplied statistical summary.

Table 6. Heteroskedasticity Test Results

Variable	Significance	Assessment
Work discipline (X_1)	0.680	No heteroskedasticity detected
Work motivation (X_2)	0.127	No heteroskedasticity detected

Linearity testing evaluated whether the relationships between employee productivity and each independent variable were compatible with the linear functional form specified in the regression equation. The deviation-from-linearity significance values reported in Table 7 were 0.065 for the relationship between employee productivity and work discipline and 0.801 for the relationship between employee productivity and work motivation. Both values exceeded 0.05, indicating that the tests did not identify statistically significant departures from linearity under the adopted decision criterion. The significance value for work discipline was closer to the threshold than that for motivation, although this difference does not independently demonstrate a nonlinear relationship. Previous research has reported variation in the estimated relationships between discipline, motivation, and employee productivity, reinforcing the need to evaluate the statistical specification rather than presuming identical relationships across organizational settings (Purnomo & Jayadiningrat, 2023). The reported linearity results supported retaining both independent variables in the specified linear regression model without introducing additional nonlinear terms.

Table 7. Linearity Test Results

Variable Relationship	Deviation-from-Linearity P-Value	Assessment

Employee productivity (Y) and work discipline (X_1)	0.065	Linear
Employee productivity (Y) and work motivation (X_2)	0.801	Linear

The combined regression diagnostics provided preliminary support for the statistical specification employed to estimate the relationships between work discipline, work motivation, and employee productivity. The normality assessment produced significance values exceeding 0.05, while the multicollinearity diagnostics indicated acceptable tolerance and variance inflation factor values for both explanatory variables. The heteroskedasticity and linearity tests similarly produced results that did not indicate statistically significant violations of their respective assumptions under the reported criteria. These outcomes suggested that the model satisfied the diagnostic thresholds applied in the original analysis, although compliance with these thresholds does not independently establish causal relationships or eliminate possible model specification errors. The difference between the stated population of 60 employees and the 30 observations reported in the statistical output remains an important methodological qualification requiring clarification before the findings can be interpreted as representative of the designated population. Research examining the relationships among workplace safety, discipline, motivation, and productivity illustrates the possibility that organizational conditions may influence the estimated relationships between behavioral predictors and employee outcomes (Yulianto et al., 2025). The adequacy of the regression specification must consequently be understood as conditional on the available diagnostics, the documented measurement procedures, and confirmation of the actual analytical sample used to estimate the model.

Based on the reported diagnostic results, the original study proceeded with multiple linear regression to examine the individual and simultaneous relationships of work discipline and work motivation with employee productivity. The absence of detected assumption violations under the selected statistical thresholds provided a basis for conducting the subsequent coefficient estimation and hypothesis tests. These diagnostic findings did not establish the direction, magnitude, or statistical significance of either independent variable because those properties require direct examination of the regression estimates. The individual t-tests, simultaneous F-test, and coefficient of determination were therefore necessary to evaluate the explanatory contributions of the two predictors within the specified regression framework. Previous empirical research has demonstrated the relevance of estimating discipline and motivation jointly while distinguishing their separate associations with employee productivity (Farena & Dewanto, 2023). The subsequent analysis consequently focuses on regression coefficients, hypothesis testing, and explained productivity variation, with interpretation restricted to the observed statistical associations and the operational characteristics of the Die Cut Department of PT Mattel Indonesia.

Effects of Work Discipline and Work Motivation on Employee Productivity

Multiple linear regression analysis was conducted to estimate the individual and simultaneous relationships of work discipline (X_1) and work motivation (X_2) with employee productivity (Y) in the Die Cut Department of PT Mattel Indonesia. The regression model incorporated both independent variables to determine their respective coefficients while statistically controlling for the other predictor. As presented in Table 8, the unstandardized regression coefficients were −2.093 for the intercept, 0.522 for work discipline, and 0.543 for work motivation. Both independent variables exhibited positive coefficients, indicating that higher scores on either predictor were associated with higher predicted employee productivity when the other variable was held constant. This pattern is consistent with previous empirical evidence identifying discipline and motivation as positively associated with employee productivity in organizational settings (Malik et al., 2025). The estimated coefficients provide the quantitative foundation for examining the magnitude and statistical significance of the relationships specified in the research model.

Table 8. Multiple Linear Regression Coefficients

Variable	Unstandardized coefficient (B)
Intercept	−2.093
Work discipline (X_1)	0.522

Work motivation (X_2)	0.543

The estimated regression equation was $Y = -2.093 + 0.522X_1 + 0.543X_2$, representing the conditional linear relationships between the two explanatory variables and employee productivity. The intercept of −2.093 denotes the predicted productivity score when both work discipline and work motivation equal zero. Because the underlying questionnaire employed a five-point Likert scale, a zero value lies outside the observed item-response range, limiting the substantive interpretation of this intercept. The coefficient of 0.522 indicates that a one-unit increase in work discipline is associated with a 0.522-unit increase in predicted employee productivity when work motivation remains constant. Similarly, the coefficient of 0.543 indicates that a one-unit increase in work motivation is associated with a 0.543-unit increase in predicted productivity when work discipline is held constant. These positive relationships are consistent with findings from research examining discipline and motivation as explanatory factors in manufacturing employee productivity (Fahmanagari et al., 2025). Nevertheless, comparison of their relative statistical contributions requires consideration of standardized coefficients and hypothesis-test results rather than relying exclusively on the magnitudes of unstandardized estimates.

The partial hypothesis tests evaluated whether work discipline and work motivation demonstrated statistically significant relationships with employee productivity after adjustment for the other independent variable. As reported in Table 9, work discipline produced an unstandardized coefficient of 0.522, a standard error of 0.152, and a standardized coefficient of 0.420. The corresponding t-statistic was 3.432, with a significance value of 0.002, indicating a positive and statistically significant association at the 5% significance level. These results supported the first hypothesis (H_1), which proposed that work discipline was associated with employee productivity in the Die Cut Department. The finding is consistent with previous research linking employee discipline and motivation to productivity among workers in a manufacturing production division (Shinutama et al., 2021). Statistically, the positive coefficient indicates that employees reporting higher discipline scores tended to demonstrate higher predicted productivity scores, although the observational data do not independently establish a causal effect.

Table 9. Partial t-Test and Regression Coefficient Results

Term	B	Std. error	Beta	t	p	Tolerance	VIF
Intercept	−2.093	4.336	—	−0.483	0.633	—	—
Work discipline (X_1)	0.522	0.152	0.420	3.432	0.002	0.578	1.731
Work motivation (X_2)	0.543	0.122	0.543	4.438	<0.001	0.578	1.731

Source: Original SPSS coefficient output, transcribed into an editable table.
Dependent variable: employee productivity (Y).

Work motivation also demonstrated a positive and statistically significant relationship with employee productivity, providing empirical support for the second hypothesis (H_2). Its unstandardized coefficient was 0.543, with a standard error of 0.122 and a t-statistic of 4.438, while the reported significance value was below 0.001. The standardized coefficient of 0.543 exceeded the corresponding coefficient of 0.420 for work discipline, indicating a larger standardized conditional association between motivation and productivity within the estimated model. This difference identifies work motivation as the stronger predictor according to the reported standardized coefficients, although it does not establish that the difference between the two coefficients is itself statistically significant. The finding is compatible with manufacturing-related research associating employee motivation with work performance, while recognizing that performance and productivity are not interchangeable measurement constructs (Fiorini & Sammut, 2024). The broader literature has similarly identified motivation and productivity as closely connected research domains, reinforcing the relevance of motivational conditions in explaining differences in workforce outcomes (Ay, 2025). Within the Die Cut Department, the positive motivation coefficient suggests that employees reporting stronger motivational conditions also tended to report higher productivity after accounting for their discipline scores.

The simultaneous hypothesis test examined whether work discipline and work motivation jointly contributed to the statistical explanation of employee productivity in the estimated regression model. Table 10 presents a regression sum of squares of 968.742, a residual sum of squares of 294.725, and a total sum of squares of 1263.467. The regression model produced an F-statistic of 44.374 with degrees of freedom of 2 and 27 and a reported significance value below 0.001. This result indicated that the two predictors jointly explained a statistically significant proportion of employee productivity variation, supporting the third hypothesis (H_3). The finding is consistent with previous research reporting significant simultaneous relationships between work discipline, work motivation, and employee productivity (Farena & Dewanto, 2023). However, the significant F-test demonstrates the statistical contribution of the predictors within the specified model and does not establish that their relationships are causal or that relevant organizational variables have been fully accounted for.

Table 10. Overall F-Test (ANOVA) Results

Source	Sum of squares	df	Mean square	F	Significance
Regression	968.742	2	484.371	44.374	<0.001
Residual	294.725	27	10.916	—	—
Total	1263.467	29	—	—	—

Dependent variable: employee productivity (Y). Predictors: work motivation (X_2) and work discipline (X_1).

The coefficient of determination was examined to assess the explanatory capacity of the regression model beyond the statistical significance established through the partial and simultaneous hypothesis tests. Table 11 reports a multiple correlation coefficient (R) of 0.876, indicating a strong association between observed productivity scores and the values predicted by the two-variable model. The R-squared value of 0.767 indicates that work discipline and work motivation jointly accounted for 76.7% of the observed variation in employee productivity within the analyzed data. The adjusted R-squared value was 0.749, representing an explanatory proportion of 74.9% after adjustment for the number of predictors and the analytical sample size. The standard error of the estimate was 3.304, describing the residual dispersion around the fitted regression values in the measurement units of the dependent variable. Research integrating motivation, workplace safety, and resilience-related factors demonstrates that workforce productivity may be associated with organizational characteristics extending beyond the behavioral predictors incorporated into a particular model (Putra et al., 2024). The remaining 23.3% of productivity variation was not explained by the fitted model, but the available evidence does not establish how much of this unexplained variation was attributable to particular omitted variables, measurement error, or other sources of residual variation.

Table 11. Model Summary and Coefficient of Determination

Model	R	R^2	Adjusted R^2	Standard error of estimate
1	0.876	0.767	0.749	3.304

Predictors: work motivation (X_2) and work discipline (X_1). Dependent variable: employee productivity (Y).

The regression findings provide empirical evidence that work discipline and work motivation were positively associated with employee productivity, although their statistical contributions differed in magnitude. The positive association between discipline and productivity corresponds with previous research involving employees in an Indonesian manufacturing company, where compliance with workplace requirements was examined in relation to productive performance (Roshida & Paskarini, 2021). The significance of both explanatory variables also aligns with evidence demonstrating relationships between workforce discipline, motivation, and productivity in organizational settings (Wahyitno et al., 2022). Contrasting findings have nevertheless been reported in research where work motivation demonstrated a significant relationship with productivity while work discipline did not exert a statistically significant independent effect (Purnomo & Jayadiningrat, 2023). These differences

suggest that organizational characteristics, measurement procedures, and the composition of explanatory models may contribute to variation in reported relationships across empirical investigations. The present results extend the available evidence to material-cutting operations at PT Mattel Indonesia without establishing that the estimated relationships necessarily apply to other production departments or manufacturing organizations.

The findings identify work discipline and work motivation as statistically significant correlates of employee productivity in the Die Cut Department, providing evidence relevant to the assessment of workforce management practices. The larger standardized coefficient for work motivation suggests a stronger conditional association with productivity, although this difference does not independently establish that motivation-focused interventions would produce larger productivity improvements. Managerial evaluation could address attendance punctuality, compliance with operating procedures, employee recognition, and motivational conditions, consistent with research examining organizational determinants of productivity in manufacturing companies (Wardana et al., 2025). Evidence concerning Lean production and Industry 4.0 further indicates that employee outcomes and operational performance may also be associated with technological and process-related arrangements beyond individual workforce characteristics (Frank et al., 2025). The employee productivity variable in the regression was measured through questionnaire indicators, whereas the production-target records presented in the introduction served as contextual evidence rather than the directly modeled dependent variable. A methodological limitation also remains because the research design identified 60 employees, while the regression degrees of freedom indicate an analytical sample of 30 observations, requiring clarification before population-level generalizations can be justified. The findings consequently support the statistical relevance of discipline and motivation within the reported regression model, while their practical application should remain conditional on verification of the analytical sample and further evaluation of proposed productivity-management measures.

CONCLUSION

Work discipline and work motivation were positively and significantly associated with employee productivity in the Die Cut Department of PT Mattel Indonesia. The separate effects were supported by the t-tests, with significance values of 0.002 for work discipline and below 0.001 for work motivation, while the joint effect was supported by the F-test ($F = 44.374$, $p < 0.001$). The estimated coefficient for motivation (0.543) exceeded that for discipline (0.522), indicating a larger unstandardized association within the regression model. The standardized coefficients also indicated a stronger conditional relationship for motivation (0.543) than for discipline (0.420). The multiple correlation coefficient was 0.876, and R^2 was 0.767, indicating that the two predictors explained 76.7% of the observed productivity variation, while the adjusted R^2 was 0.749. These results demonstrated statistically significant relationships between the explanatory variables and employee productivity without establishing direct causal effects. The findings provided empirical support for considering both employee discipline and motivational conditions when evaluating workforce productivity and production management practices within the department.

The findings highlighted the potential value of maintaining consistent work discipline while supporting employee motivation to strengthen productivity management in manufacturing operations. The study was restricted to one specialized production department and two explanatory variables, limiting the generalizability of its findings to other organizational settings. A methodological limitation concerned the discrepancy between the population of 60 employees identified in the research design and the 30 observations reported in the regression analysis, which requires clarification before broader statistical inferences can be justified. Employee productivity was measured through questionnaire indicators, while production-target records provided contextual evidence rather than directly measured regression outcomes. The remaining 23.3% of unexplained productivity variation indicated that the regression model did not capture every factor associated with differences in employee productivity. Future research could incorporate employees from other production departments or manufacturing companies and examine additional determinants, including leadership, compensation, work environment, organizational culture, and job satisfaction. Subsequent investigations should reconcile analytical sample information and integrate objective production indicators to assess whether the observed statistical relationships remain consistent across different manufacturing environments and operational productivity measures.

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