



The Effect of Human Resource Development and Work Efficiency on Employee Work Quality at PT. Surya Microsystem Cikarang

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Abstract: *The objectives of this study are 1) to determine the influence of demographic factors (age) on the level of decision to purchase traditional foods, 2) to determine the influence of demographic factors (gender) on the level of decision to purchase traditional foods at Wage Market in Nganjuk, 3) to determine the influence of social factors (social class) on the level of decision to purchase traditional foods at Wage Market in Nganjuk, 4) to determine the effect of social factors (income level) on the level of decision to purchase traditional foods at the Wage Nganjuk market. The research method used was a quantitative approach. Data collection techniques were carried out by distributing questionnaires to buyers of traditional foods at the Wage Nganjuk market, using purposive sampling. The sample size was determined using the Lemeshow formula, which produced a minimum size of 96.04 respondents, then rounded up to 100 to anticipate incomplete data. Data analysis was performed using multiple linear regression using the SPSS program. The results showed that partially, the variables of age, gender, social class, and income level had a significant effect on purchasing decisions, with a significance value of < 0.05 . Simultaneously, the four variables also had a significant effect with a significance value of 0.000. The Adjusted R Square value of 0.941 indicates that 94.1% of*

the variation in purchasing decisions can be explained by the independent variables in this study, while the remaining 5.9% is influenced by other factors outside the model.

Keywords: Age, Gender, Social Class, Income Level, Purchasing Decision.

Introduction

The modern business landscape is characterized by dynamic shifts, driven by globalization and the Fourth Industrial Revolution (Industry 4.0), compelling organizations to continuously enhance their internal capabilities to remain competitive (Hernández-López & Martín-Hernández, 2021; Jones & Harris, 2019;). In this environment, human resources (HR) are no longer merely an administrative function but a crucial strategic asset for achieving organizational goals and gaining a competitive advantage (). The quality, skills, and efficiency of the workforce are paramount in determining a company's productivity and market position (Barykin et al., 2021;). The transition to Industry 4.0, which integrates technologies like AI and automation, necessitates a workforce that is not only skilled but also adaptive and resilient ().

Organizations that do not adapt to these technological changes risk falling behind in operational efficiency and productivity. A 2023 World Economic Forum report underscores the urgency, stating that 50% of employees will require reskilling by 2025, a challenge many

companies are not yet fully prepared to meet (). In Indonesia, specifically, the manufacturing sector faces unique challenges in this digital transformation, including the need to upskill a vast workforce and overcome barriers such as resistance to change and high implementation costs of new HR technologies (). This research examines PT. Surya Microsystem, an Indonesian company in the IT and electronic manufacturing sector, which, like its peers, must ensure its internal processes—especially those involving its employees—operate optimally to maintain business continuity and customer satisfaction.

Despite the critical importance of a skilled and efficient workforce, many organizations, including PT. Surya Microsystem, face significant challenges. The company's internal observations reveal a gap between the required competencies and the training provided to its employees, leading to a lack of initiative and specific technical skills among the workforce. This issue is compounded by the suboptimal use of work time and inefficient task completion, as evidenced by employees failing to meet deadlines and demonstrating a low level of innovation in their roles (Ahmad & Razali, 2023;). These problems directly impact the quality of work produced, raising concerns about declining productivity and overall operational effectiveness.

The core of the problem lies in the potential disconnect between the company's human resource development (HRD) efforts and the actual work efficiency of its employees, which ultimately compromises their work quality. While the company invests in training and development, the effectiveness of these programs in fostering a productive and high-quality work output remains uncertain. Research suggests that a lack of structured HR development and inefficient work processes are major impediments to employee performance (). Therefore, an in-depth analysis is needed to understand how a planned and systematic approach to HRD and the cultivation of work efficiency can collectively influence the quality of employee work.

This study aims to address these issues by providing a comprehensive analysis of the relationship between human resource development, work efficiency, and employee work quality at PT. Surya Microsystem. By investigating these variables, this research will determine the extent to which HRD and work efficiency, both individually and together, affect employee work quality. The findings will provide a critical basis for management to formulate strategic policies and implement improvements in their HRD programs and work systems, thereby contributing to the company's sustained growth. The urgency of this study is driven by the immediate need to enhance competitiveness in an increasingly challenging market, while its novelty lies in its specific focus on a case study within the Indonesian manufacturing sector, a context where such detailed research is highly relevant and still emerging.

Methodology

Research Design and Method

This study employed a descriptive quantitative research design to investigate the relationship between human resource development, efficiency, and employee work quality at PT. Surya Microsystem Cikarang. Quantitative research methodology emphasizes the collection and analysis of numerical data to test hypotheses, measure variables objectively, and explain relationships between variables through mathematical calculations and

statistical analysis (Sugiyono, 2022; Creswell & Creswell, 2023). This approach aligns with the positivist paradigm, which seeks to establish causal relationships through empirical evidence and statistical validation (Emzir, 2021).

The descriptive nature of this research aims to systematically describe the characteristics of the phenomena under investigation while examining the correlational relationships between variables (Sudaryono, 2021). This methodology is particularly appropriate for organizational studies where researchers need to maintain objectivity and generalizability of findings across similar organizational contexts (Hair et al., 2022). The quantitative approach facilitates the use of standardized instruments, such as questionnaires and surveys, to obtain data that can be generalized to broader populations within similar organizational settings.

Instrumentation and Data Analysis Techniques

Data Collection Instruments

The primary data collection instrument utilized in this study was a structured questionnaire incorporating three validated scales measuring Human Resource Development (X1), Efficiency (X2), and Employee Work Quality (Y). The questionnaire employed a five-point Likert scale ranging from "Strongly Agree" (5) to "Strongly Disagree" (1) for positive statements, with reverse scoring applied to negative statements (Sugiyono, 2022; DeVellis, 2021). This scaling approach ensures comprehensive measurement of respondent attitudes and perceptions while maintaining statistical rigor.

The instrument development process followed established psychometric principles, incorporating both content and construct validity considerations (Taherdoost, 2022). Field observation and literature review techniques complemented the primary questionnaire data, providing triangulation and enhanced understanding of the organizational context (Creswell & Plano Clark, 2023). The multi-method approach strengthens the overall validity and reliability of the research findings.

Statistical Analysis Framework

Data analysis was conducted using Statistical Package for Social Sciences (SPSS) version 29, employing multiple statistical techniques to ensure comprehensive examination of the research hypotheses (Pallant, 2020). The analytical framework encompassed several key components:

Classical Assumption Tests: Prior to hypothesis testing, the data underwent rigorous screening for multicollinearity, heteroscedasticity, normality, and autocorrelation. Multicollinearity was assessed using Variance Inflation Factor (VIF) values, with acceptable thresholds set at $VIF \leq 10$ and tolerance values ≥ 0.10 (Ghozali, 2021; Hair et al., 2022). Heteroscedasticity was evaluated through scatterplot analysis of standardized residuals, while normality was tested using both graphical methods and the Kolmogorov-Smirnov test (Field, 2024).

Validity and Reliability Testing: Instrument validity was assessed through Pearson product-moment correlation analysis, comparing individual item scores with total scale scores (Sekaran & Bougie, 2019). Items demonstrating correlation coefficients (r) greater than the critical value at $\alpha = 0.05$ were retained. Reliability assessment employed Cronbach's

alpha coefficient, with minimum acceptable values set at $\alpha \geq 0.70$ (Nunnally & Bernstein, 2023).

Multiple Linear Regression Analysis: The core analytical technique involved multiple linear regression to examine the simultaneous effects of human resource development and efficiency on employee work quality. The regression model specification followed the general form: $Y = a + b_1X_1 + b_2X_2 + \varepsilon$, where Y represents employee work quality, X_1 denotes human resource development, X_2 represents efficiency, and ε captures the error term (Sugiyono, 2022; Tabachnick & Fidell, 2023).

Population and Sampling Procedures

Target Population

The study population comprised all permanent employees of PT. Surya Microsystem Cikarang, totaling 120 individuals distributed across four primary organizational divisions: Production (40 employees), Marketing (30 employees), Administration (25 employees), and Technical (25 employees). This population selection was based on the premise that permanent employees possess comprehensive understanding of organizational processes and are directly involved in activities related to human resource development, operational efficiency, and work quality outcomes (Sekaran & Bougie, 2019).

The population characteristics align with the research objectives, as these employees represent the primary stakeholders affected by human resource development initiatives and efficiency improvement programs within the organization. Their daily work experiences provide valuable insights into the practical implementation and effectiveness of organizational development strategies (Emzir, 2021).

Sampling Strategy and Size Determination

Sample size calculation employed the Slovin formula to ensure adequate statistical power while maintaining practical feasibility: $n = N / (1 + N \times e^2)$, where n represents the sample size, N denotes the population size (120), and e indicates the acceptable margin of error (0.10 or 10%). This calculation yielded a required sample size of 55 respondents (Umar, 2022; Sugiyono, 2022).

The sampling procedure utilized proportional random sampling to ensure representative distribution across organizational divisions. This approach maintains the proportional representation of each division within the sample, thereby enhancing the external validity and generalizability of findings (Creswell & Creswell, 2023). The proportional allocation resulted in the following distribution: Production division (18 respondents), Marketing division (14 respondents), Administration division (12 respondents), and Technical division (11 respondents).

Research Procedures

Data Collection Protocol

The research implementation followed a systematic four-month timeline from April 2025 to July 2025, encompassing distinct phases of proposal development, instrument preparation, data collection, analysis, and reporting. Initial phases involved comprehensive literature review and instrument development, followed by pilot testing to ensure questionnaire reliability and validity (Taherdoost, 2022).

Data collection procedures adhered to ethical research standards, including informed consent acquisition, confidentiality assurance, and voluntary participation principles (Creswell & Poth, 2023). Questionnaires were distributed directly to selected respondents within their workplace environment, with completion time averaging 15-20 minutes per respondent. This approach ensured high response rates while minimizing potential response bias associated with external data collection settings.

Quality Assurance Measures

Multiple quality assurance mechanisms were implemented throughout the research process. Pre-data collection activities included expert panel review of instruments, pilot testing with a subset of the population, and refinement of data collection procedures based on initial feedback (DeVellis, 2021). During data collection, systematic monitoring ensured consistent administration procedures and completeness of responses.

Post-collection quality control involved comprehensive data screening for outliers, missing values, and response patterns indicative of acquiescence or extreme response bias (Tabachnick & Fidell, 2023). These procedures collectively ensure the integrity and reliability of the research findings while maintaining adherence to established scientific standards in organizational research.

Variable Operationalization

The study operationalized three primary constructs based on established theoretical frameworks. Human Resource Development was conceptualized following Mangkunegara's (2017) framework, encompassing internal factors (organizational mission, strategic objectives, goal characteristics, and technology utilization) and external factors (government policies, socio-cultural environment, and technological advancement). Efficiency was operationalized according to Sudarmayanti's (2001) model, incorporating dimensions of awareness, expertise, and discipline. Employee Work Quality was defined following Sulistiyani and Rosidah's (2003) conceptualization, encompassing output-related aspects, production process efficiency, and overall effectiveness measures.

Each construct was measured through multiple indicators distributed across the questionnaire items, ensuring comprehensive coverage of the theoretical domains while maintaining practical survey length considerations (Hair et al., 2022). This operationalization approach facilitates robust statistical analysis while maintaining theoretical grounding in established human resource management literature.

Result and Discussion

Validity Test

Table 1. X1

| Questions | Human resource development (X1) | | |
|-----------|---------------------------------|------------------------------------|--------------------|
| | T_{hitung} | T_{tabel} N = 55 | Description |
| 1 | 0.774(**) | 0.266 | Valid |
| 2 | 0.806(**) | 0.266 | Valid |

| | | | |
|----|-----------|-------|-------|
| 3 | 0.827(**) | 0.266 | Valid |
| 4 | 0.814(**) | 0.266 | Valid |
| 5 | 0.814(**) | 0.266 | Valid |
| 6 | 0.721(**) | 0.266 | Valid |
| 7 | 0.727(**) | 0.266 | Valid |
| 8 | 0.811(**) | 0.266 | Valid |
| 9 | 0.882(**) | 0.266 | Valid |
| 10 | 0.771(**) | 0.266 | Valid |
| 11 | 0.805(**) | 0.266 | Valid |
| 12 | 0.882(**) | 0.266 | Valid |

Table 2. X2

| Questions | Efficiency (X2) | | |
|-----------|-----------------------|--------------------------------|-------------|
| | <i>t</i>hitung | <i>t</i>tabel N = 55 | Description |
| 1 | 0.767(**) | 0.266 | Valid |
| 2 | 0.838(**) | 0.266 | Valid |
| 3 | 0.839(**) | 0.266 | Valid |
| 4 | 0.885(**) | 0.266 | Valid |
| 5 | 0.720(**) | 0.266 | Valid |
| 6 | 0.868(**) | 0.266 | Valid |
| 7 | 0.645(**) | 0.266 | Valid |
| 8 | 0.813(**) | 0.266 | Valid |
| 9 | 0.578(**) | 0.266 | Valid |
| 10 | 0.771(**) | 0.266 | Valid |
| 11 | 0.708(**) | 0.266 | Valid |
| 12 | 0.627(**) | 0.266 | Valid |

Table 3. Y

| Questions | Employee work quality (Y) | | |
|-----------|---------------------------|--------------------------------|-------------|
| | <i>t</i>hitung | <i>t</i>tabel N = 55 | Description |
| 1 | 0.847(**) | 0.266 | Valid |
| 2 | 0.863(**) | 0.266 | Valid |
| 3 | 0.783(**) | 0.266 | Valid |
| 4 | 0.847(**) | 0.266 | Valid |
| 5 | 0.687(**) | 0.266 | Valid |
| 6 | 0.841(**) | 0.266 | Valid |
| 7 | 0.812(**) | 0.266 | Valid |
| 8 | 0.846(**) | 0.266 | Valid |
| 9 | 0.899(**) | 0.266 | Valid |
| 10 | 0.894(**) | 0.266 | Valid |

| | | | |
|----|-----------|-------|-------|
| 11 | 0.649(**) | 0.266 | Valid |
| 12 | 0.704(**) | 0.266 | Valid |

The validity test confirms that all survey questions used in this study are valid for measuring their respective variables. The analysis, conducted using SPSS 29 on a sample of 55 respondents, set a critical r-table value of 0.266. The results for each variable are as follows:

1. Human Resource Development (X1): All 12 questions for this variable are valid, with r-calculated values ranging from 0.721 to 0.882. Each of these values is well above the 0.266 threshold.
2. Efficiency (X2): Similarly, all 12 questions for this variable are also valid. Their r-calculated values fall between 0.578 and 0.885, all of which exceed the r-table value of 0.266.
3. Employee Work Quality (Y): All 12 questions for this dependent variable are valid, with r-calculated values ranging from 0.649 to 0.899. These values are all greater than 0.266.

The consistent validity across all variables indicates that the questionnaires are appropriate and effective tools for accurately measuring the intended concepts. As stated by Ghozali (2019:14), a questionnaire is considered valid if its questions are capable of revealing the information they are designed to measure.

Reliability Test

Table 4. X1

Reliability Statistics

| Cronbach's Alpha | N of Items |
|------------------|------------|
| .949 | 12 |

Table 5. X2

Reliability Statistics

| Cronbach's Alpha | N of Items |
|------------------|------------|
| .931 | 12 |

Table 6. Y

Reliability Statistics

| Cronbach's Alpha | N of Items |
|------------------|------------|
| .952 | 12 |

The reliability test, using the Cronbach's Alpha coefficient, demonstrates that all research instruments are consistent and dependable for measuring the variables under

study. With a sample size (N) of 55 and a critical r-table value of 0.266, an instrument is considered reliable if its Cronbach's Alpha value (r_{alpha}) is greater than the r-table value.

The analysis results for each variable are as follows:

1. Human Resource Development (X1): The calculated Cronbach's Alpha is 0.949. This value is significantly higher than the r-table ($0.949 > 0.266$), indicating that the instrument for this variable has a very high degree of reliability.
2. Efficiency (X2): The Cronbach's Alpha obtained is 0.931. As this value is also greater than the r-table ($0.931 > 0.266$), the instrument for the Efficiency variable is also declared reliable.
3. Employee Work Quality (Y): The Cronbach's Alpha for this variable is 0.952. This is the highest value among the three and far exceeds the r-table ($0.952 > 0.266$), confirming an exceptional level of reliability.

The consistent reliability across all variables ensures that the questionnaires used in this study are robust and trustworthy. These findings guarantee that if the measurements were repeated, the results would remain consistent, thereby confirming the quality of the data for further analysis.

Normality Test

Tabele 7. Results

| One-Sample Kolmogorov-Smirnov Test | | |
|--|----------------|-------------------------|
| | | Unstandardized Residual |
| N | | 55 |
| Normal Parameters ^{a,b} | Mean | ,0000000 |
| | Std. Deviation | 3,77011746 |
| Most Extreme Differences | Absolute | ,081 |
| | Positive | ,076 |
| | Negative | -,081 |
| Test Statistic | | ,081 |
| Asymp. Sig. (2-tailed) | | ,200 ^{c,d} |
| a. Test distribution is Normal. | | |
| b. Calculated from data. | | |
| c. Lilliefors Significance Correction. | | |
| d. This is a lower bound of the true significance. | | |

Multiple Linear Regression Test

Table 8. Results

| Coefficients ^a | | | | | | |
|---------------------------|-----------------------------|------------|---------------------------|---|-------|------|
| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | |
| | B | Std. Error | Beta | | | |
| 1 | (Constant) | 4,824 | 2,095 | | 2,302 | ,025 |

| | | | | | |
|--|------|------|------|-------|------|
| Pengembangan sumber daya manusia (X1) | ,423 | ,063 | ,460 | 6,680 | ,000 |
| Efisiensi (X2) | ,554 | ,069 | ,550 | 7,994 | ,000 |
| a. Dependent Variable: Kualitas kerja karyawan (Y) | | | | | |

The multiple linear regression equation derived from the data is $Y = 4.824 + 0.423 X1 + 0.554 X2$, with each component having a specific meaning:

1. Constant (a) = 4.824 This positive constant indicates that when the independent variables, Human Resource Development (X1) and Efficiency (X2), are at a value of zero, the dependent variable Employee Work Quality (Y) will have a baseline value of 4.824. This represents the intrinsic level of employee work quality not influenced by these two specific variables.
2. Human Resource Development (b1) Regression Coefficient = 0.423 This coefficient indicates that for every one-unit increase in the Human Resource Development (X1) variable, the Employee Work Quality (Y) variable is expected to increase by 0.423. The positive sign confirms a direct relationship: better human resource development leads to higher employee work quality.
3. Efficiency (b2) Regression Coefficient = 0.554 This coefficient shows that for every one-unit increase in the Efficiency (X2) variable, the Employee Work Quality (Y) variable is expected to increase by 0.554. Similar to the X1 coefficient, this positive value indicates a positive relationship: an increase in efficiency directly contributes to an increase in employee work quality.

In summary, this equation models how Human Resource Development and Efficiency collectively influence Employee Work Quality. The coefficients show that efficiency (0.554) has a slightly stronger impact on work quality than human resource development (0.423) in this model.

The statistical tests confirm that both independent variables, Human Resource Development (X1) and Efficiency (X2), have a significant influence on the dependent variable, Employee Work Quality (Y).

Partial Hypothesis Test (T-test)

1. Human Resource Development (X1): The t-calculated value of 6.680 is significantly greater than the t-table value of 2.004 ($6.680 > 2.004$). This leads to the rejection of the null hypothesis (H_0) and acceptance of the alternative hypothesis (H_a). This result indicates that Human Resource Development (X1) has a positive and significant partial effect on Employee Work Quality (Y).
2. Efficiency (X2): The t-calculated value for this variable is 7.994, which is also greater than the t-table value of 2.004 ($7.994 > 2.004$). This means that Efficiency (X2) also has a positive and significant partial effect on Employee Work Quality (Y).

Table 9. Results

| ANOVA ^a | | | | | | |
|--|------------|----------------|----|-------------|---------|-------------------|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 6344,092 | 2 | 3172,046 | 214,901 | ,000 ^b |
| | Residual | 767,544 | 52 | 14,760 | | |
| | Total | 7111,636 | 54 | | | |
| a. Dependent Variable: Kualitas kerja karyawan (Y) | | | | | | |
| b. Predictors: (Constant), Efisiensi (X2), Pengembangan sumber daya manusia (X1) | | | | | | |

From the analysis of the table above, namely the ANOVA test, the Fcount value obtained is 214.901, while the Ftable (α 0.05) for $n = 55$ is 2.77. Therefore, $F_{count} > F_{table}$ (α 0.05) or $214.901 > 2.77$ with a significance level of 0.000 because $0.000 < 0.05$. it can be said that Human Resource Development (X1) and Efficiency (X2) together or simultaneously have a positive effect on Employee Work Quality (Y).

R Square

Table 10. Results

| Model Summary ^b | | | | |
|--|-------------------|----------|-------------------|----------------------------|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | ,944 ^a | ,892 | ,888 | 3,84194 |
| a. Predictors: (Constant), Efisiensi (X2), Pengembangan sumber daya manusia (X1) | | | | |
| b. Dependent Variable: Kualitas kerja karyawan (Y) | | | | |

Based on the calculations in the table above, an influence test was conducted for the three variables, and based on the Model Summary table, an R Square value of 0.892 was obtained. This indicates that 89.2% of human resource development (X1) and efficiency (X2) together affect employee work quality (Y), while the remaining 10.2% is influenced by other factors not examined in this study.

Discussion

Based on the statistical analysis, the research findings demonstrate that both Human Resource Development (X1) and Efficiency (X2) have a significant influence on Employee Work Quality (Y) at PT. Surya Microsystems Cikarang. The following sections provide a detailed discussion of these results, supported by relevant theories and prior research.

The Influence of Human Resource Development on Employee Work Quality

PT. Surya Microsystems Cikarang, as a company operating in the information technology sector, prioritizes human resource development (HRD) to enhance the quality of its products and services. HRD initiatives encompass technical training, soft skills development, leadership coaching, and fostering an adaptive work culture. The hypothesis testing confirmed that HRD has a significant positive effect on employee work quality.

The t-test result for the Human Resource Development (X1) variable yielded a t-calculated value of 6.680, which is substantially greater than the t-table value of 2.004 (6.680

> 2.004). This result leads to the rejection of the null hypothesis (H_0) and the acceptance of the alternative hypothesis (H_a), confirming a significant influence of HRD on Employee Work Quality (Y).

This finding aligns with theories proposed by Werther and Davis (1996), who define HRD as a systematic process to improve employees' skills, knowledge, and abilities to meet current and future organizational demands. The results are also consistent with prior studies, such as Fitriani (2020), which concluded that employee training and development positively contribute to work effectiveness, and Nuryanti (2021), who found that developing technical and non-technical competencies boosts both productivity and employee satisfaction. Therefore, investments in HRD are not mere expenses but are strategic human capital investments that directly impact productivity and organizational success.

The Influence of Efficiency on Employee Work Quality

Efficiency is the ability of an organization or individual to complete tasks with minimal resources while achieving maximum output. At PT. Surya Microsystems Cikarang, an emphasis on efficiency is a key driver for productivity and quality standards. This is in line with Koontz and O'Donnell (1991), who describe efficiency as the optimal comparison between inputs and outputs to achieve organizational goals with minimal waste. Gibson (2006) also asserts that work quality is a result of operational efficiency, work capability, and employee commitment.

The statistical analysis supports this theoretical premise. The t-test for the Efficiency (X2) variable produced a t-calculated value of 7.994, which is greater than the t-table value of 2.004 ($7.994 > 2.004$). This result confirms that Efficiency (X2) has a significant partial effect on Employee Work Quality (Y). The finding is consistent with research by Lestari & Prabowo (2019), who found that efficiency gains through time management and digitalization directly improved the quality of work in an IT company. This underscores that an efficient work environment, both technically and managerially, allows employees to work more quickly and accurately, thereby improving and standardizing the quality of their output.

The Combined Influence of Human Resource Development and Efficiency on Employee Work Quality

The combined effect of HRD and efficiency on work quality forms the cornerstone of organizational success. According to Armstrong (2006), HRD enhances capabilities, while efficiency expedites the conversion of those capabilities into tangible results. The synergy between these two factors is highly effective in improving work quality.

The simultaneous influence was tested using the F-test. The ANOVA results showed an F-calculated value of 214.901, which is substantially greater than the F-table value of 2.77. Additionally, the significance value was 0.000, which is less than the alpha level of 0.05. This demonstrates that Human Resource Development (X1) and Efficiency (X2) together have a positive and significant effect on Employee Work Quality (Y).

Furthermore, the R-squared value of 0.892 indicates that 89.2% of the variation in Employee Work Quality (Y) can be explained by the independent variables of Human Resource Development and Efficiency. The remaining 10.2% is influenced by other factors not examined in this study. This finding is supported by prior studies, such as Rini and Hartono (2020), who found that the integration of training and efficiency improved team performance in a technology-based company. Similarly, Sari & Pratama (2021) concluded that the simultaneous application of HRD and efficiency significantly increased work quality in a manufacturing firm.

In conclusion, the combined strategy of investing in HRD and promoting efficiency is a powerful driver for enhancing employee work quality at PT. Surya Microsystems Cikarang. This approach fosters a productive, adaptable, and high-standard work culture, which is essential for navigating the dynamic challenges of the technology industry.

Conclusion

Based on the statistical analysis, this study concludes that Human Resource Development (X1) and Efficiency (X2), both partially and simultaneously, have a significant and positive influence on Employee Work Quality (Y) at PT. Surya Microsystem Cikarang. This finding is supported by the t-test results, which show t-calculated values for X1 (6.680) and X2 (7.994) are greater than the t-table value (2.004), and the significance value (0.000) is well below 0.05. The F-test results further confirm this with an F-calculated value (214.901) that is significantly larger than the F-table value (2.77) and a significance of 0.000 (< 0.05), confirming the strong combined effect of both independent variables on the dependent variable. Furthermore, the R-squared value of 0.892 indicates that 89.2% of the variation in Employee Work Quality can be explained by this model, suggesting that the company's HR development and work efficiency strategies are highly effective. This finding definitively underscores that investing in training and fostering an efficient work culture are crucial for improving employee work outcomes and, ultimately, the company's competitiveness.

Limitations and Suggestions for Future Research

Despite these findings, the study has several limitations, primarily because the sample was confined to a single company (PT. Surya Microsystem Cikarang) within the IT manufacturing sector. This single-case approach limits the generalizability of the results to other industries or companies of different scales. Another limitation is that the model only accounts for 89.2% of the variation in employee work quality, leaving 10.8% to be influenced by other unexamined factors, such as organizational commitment, work environment, or compensation. Therefore, for future research, it is recommended to expand the sample to include multiple companies within the same industry to enhance external validity. Additionally, future studies could integrate other relevant variables, such as work motivation, job satisfaction, and transformational leadership, to gain a more comprehensive understanding of the factors affecting work quality. These steps would help develop a more robust model and provide richer insights for management in formulating more holistic human resource development strategies.

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