

The Impact of Artificial Intelligence (AI) Adoption on Employment Rates in Palopo City

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Advances in artificial intelligence (AI) technology have the potential to both diminish the role of the human workforce and open up new opportunities through job creation and increased industrial productivity. This study aims to analyze and empirically demonstrate the impact of artificial intelligence (AI) adoption on employment rates in Palopo City. The method used was a quantitative approach with a Likert-scale questionnaire distributed to 40 respondents. Data analysis was conducted using validity tests, Cronbach's Alpha reliability tests, classical assumption tests (Kolmogorov-Smirnov and Monte Carlo normality tests), and simple linear regression analysis. The results of the study show that all instruments were found to be valid ($R_{\text{calculate}} > 0,312, p < 0,05$) and very reliable ($\alpha_x = 0,964$; $\alpha_y = 0,943$). The regression equation obtained is $Y = 3.930 + 0.604X$, which indicates a positive and significant relationship between AI adoption and employment. $t_{\text{hitung}} 18,574 > t_{\text{tabel}} 2,024$; $p = 0,000$. Furthermore, the coefficient of determination (R^2) of 0.901 indicates that 90.1% of the variation in employment in Palopo City is explained by AI adoption, while the remaining 9.9% is influenced by other external factors. In conclusion, AI adoption in Palopo City has proven to serve as a complementary technology capable of driving the expansion of employment and realizing the reinstatement effect. These findings have important implications for local governments and businesses to continue accelerating the training and upskilling of local human resources so they can adapt to a technology-based job ecosystem.

Keywords: AI Adoption, Labor Absorption, Simple Linear Regression, Palopo City, Reinstatement Effect.

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1. Introduction

In recent years, Artificial Intelligence (AI) has become a technological trend that has significantly disrupted various aspects of human life, including the global and national labor markets. AI's ability to process data quickly, learn patterns, and make decisions automatically has sparked an industrial revolution that is transforming the way work is done across various sectors. In Indonesia, this transformation presents major

challenges; a report by the International Labor Organization (ILO) estimates that approximately 56% of jobs are at high risk of automation, particularly those involving routine and repetitive tasks. (1*Imam Zaenuddin, 2024)

At the regional level, the city of Palopo views the Micro, Small, and Medium Enterprises (MSMEs) sector particularly in trade and services as the main pillar of the local economy and the largest employer. The trade sector in Palopo includes businesses such as clothing retail, while the services sector encompasses laundry services, auto repair shops, and digital banking services. Along with the widespread adoption of the digital economy and financial technology (fintech) such as the use of QRIS and mobile banking by businesses in Palopo the integration of smarter technologies like AI is beginning to be seen as a necessity for enhancing competitiveness (Sukmawati Sultan Sahrir*1, 2025).

However, the adoption of AI in the trade and services sectors has sparked debate regarding its impact on employment levels. On the one hand, AI offers improvements in efficiency, productivity, and operational accuracy that can drive business growth and create new jobs in creative fields and data analysis. On the other hand, the use of AI through the automation of production processes and customer service (such as chatbots or automated inventory management systems) has the potential to replace human roles in manual and routine tasks, which could ultimately widen the economic gap and lead to unemployment if not managed wisely (Hasugian, 2026)

The main challenge faced in Palopo City is the low level of digital literacy and technological understanding among some traditional business owners, which hinders the equitable distribution of AI benefits. The Palopo City government has been working to address this through strategies to improve digital literacy and provide access to capital via the People's Business Credit (KUR) program to ensure this technological transition is inclusive. However, specific studies on how AI directly affects employment in the trade and services sectors in Palopo City remain very limited. (Arya Satya Pratama1, 2023)

There fore, this study aims to conduct an in-depth analysis of the impact of AI adoption on employment rates in Palopo City, with a focus on the trade and services sectors. The findings of this study are expected to provide recommendations for policymakers and industry stakeholders in Palopo in designing adaptive reskilling strategies and labor regulations, to ensure that digital transformation brings prosperity to the broader community without sacrificing workers' rights. (Netania Emilisa1, 2025)

2. Literature Review and Problem Statement

The impact of smart technology adoption on labor market dynamics is explained through the Task-Based Framework, which posits that automation triggers two opposing mechanisms: the displacement effect (replacement of workers in routine tasks) and the reinstatement effect (creation of new tasks and positions). In a macro context, a report by the International Labor Organization (ILO) estimates that approximately 56% of jobs in Indonesia are at high risk of automation, particularly in sectors that rely on repetitive administrative and operational work. In line with this, (Febri Andra Putra Sulistya1, Yuriske Okta Prastika2, 2026) emphasizes that the adoption of Artificial Intelligence (AI) drives labor polarization, where technology replaces mid-skilled positions involving routine tasks (such as cashiers or inventory clerks), while simultaneously boosting the productivity of workers with non-routine skills. Furthermore, the success of technological transition at the local level depends heavily on the community's absorptive capacity; underscore that levels of digital literacy and basic skills are absolute prerequisites for the adoption of technologies such as AI to drive efficiency without triggering structural unemployment. (Umar1)

Research Gap

Although numerous studies on automation have been conducted at the national and metropolitan levels, there is a significant research gap regarding the impact of AI adoption on the local SME-based economy in secondary cities such as Palopo. Most of the literature focuses on the integration of AI in large manufacturing industries or digital corporations, whereas in Palopo, the mainstay of the labor market is dominated by SMEs in the trade sector (such as clothing retail) and services (such as laundries, auto repair shops, and fintech-based financial services). Furthermore, no empirical research has yet measured the effectiveness of local government interventions such as digital literacy programs and the distribution of People's Business Credit (KUR) in mitigating the risk of displacement caused by the use of chatbots, automated inventory management, or basic data analysis by local SME operators. The lack of empirical data on the interaction between AI adoption, digital literacy levels, and labor absorption in Palopo City represents a major academic gap that this study aims to fill. (Ni Komang Yasoda Syosti Sara^{1*}, 2025)

Problem Statement

Based on this gap, the main research question in this study is: How does the adoption of Artificial Intelligence (AI) affect employment rates in the trade and services MSME sector in Palopo City, and to what extent does the level of digital literacy moderate this effect?. Specifically, the research questions are formulated as follows:

1. To what extent have SMEs in the trade and services sectors in Palopo City adopted Artificial Intelligence (AI)-based technologies?
2. Does the adoption of Artificial Intelligence (AI) have a significant effect on employment rates in the trade and services sectors in Palopo City?
3. Does the level of digital literacy among business owners moderate (strengthen or weaken) the effect of AI adoption on local employment?

Research Hypotheses

To quantitatively test the relationship between variables, the following hypotheses are proposed in this study:

1. H₀ (Null Hypothesis): The adoption of Artificial Intelligence (AI) has no significant effect on employment rates in the trade and services MSME sector in Palopo City.
2. H_a (Alternative Hypothesis): The adoption of Artificial Intelligence (AI) has a significant effect on the level of employment in the trade and services MSME sector in Palopo City.

3. Method

This study employs a quantitative approach with a causal-associative design to examine the effect of Artificial Intelligence (AI) adoption on employment rates in Palopo City. The study population includes all formal business units and digitized MSMEs in Palopo City that have implemented automation technology or AI-based software for at least one year. Sampling was conducted using purposive sampling, with respondents selected based on their role as human resources decision-makers, such as HR managers or business owners. A total of 40 respondents were successfully recruited and met the criteria for analysis.

Table 1. Matrix for the Operationalization of Research Variables

Variable	Operational Definition	Indicator	Parameter/measurement	Scale	No. Item
AI Adoption (X) (Independent Variable)	The level of adoption, use, and operational reliance of organizations/companies on artificial intelligence (AI) technology.	1.Perceived Ease of Use	• Ease of Learning the AI System • Ease of using AI features in daily tasks	Likert(1–5)	1, 2
		2. Perceived Usefulness	• Improved work efficiency and productivity • Reduced margin of operational error	Likert(1–5)	3, 4
		3.System Integration Intensity	• Frequency of AI device/system use • AI integration into core workflows	Likert(1–5)	5, 6
Labor Absorption Rate (Y) (Dependent Variable)	The dynamics of recruitment, reduction, and qualification of human resources (HR) needs within organizations/companies.	1. Trends in Hiring Numbers	• Need to hire new employees • Frequency of new job openings	Likert(1–5)	7, 8
		2. Layoff Rate	• The impact of AI efficiency on workforce reduction • The shift of human work functions to automation	Likert(1–5)	9, 10
		4. Shifts in Human Resource Competency Qualifications (Rizqi Permana Widihartono 1, 2024)	• The need for digital and high-tech skills • The need for workforce retraining (reskilling/upskilling)	Likert(1–5)	11, 12

5. Results and Discussion

Validity Testing

Instrument validation is conducted to ensure the quality and validity of the data obtained. As explained by (Devi Yuniati Drajat1, 2025) validity reflects the correspondence between objective reality in the field and the empirical data collected by the researcher. In the context of this study, a questionnaire is considered to have good validity if the indicators within it are able to precisely measure the target concept or phenomenon, so that the resulting data is not only accurate but also reliable and trustworthy. The following are the results of the validity test data analysis

Table 2

Pernyataan	r-Hitung	r-Tabel	Nilai Sig. (2-tailed)	KETERANGAN
X1	0,834	0,312	0,000	VALID
X2	0,870	0,312	0,000	VALID
X3	0,869	0,312	0,000	VALID
X4	0,875	0,312	0,000	VALID
X5	0,881	0,312	0,000	VALID
X6	0,873	0,312	0,000	VALID
X7	0,884	0,312	0,000	VALID
X8	0,862	0,312	0,000	VALID
X9	0,850	0,312	0,000	VALID
X10	0,924	0,312	0,000	VALID
Y1	0,744	0,312	0,000	VALID
Y2	0,829	0,312	0,000	VALID
Y3	0,810	0,312	0,000	VALID
Y4	0,819	0,312	0,000	VALID
Y5	0,891	0,312	0,000	VALID
Y6	0,873	0,312	0,000	VALID
Y7	0,799	0,312	0,000	VALID
Y8	0,817	0,312	0,000	VALID
Y9	0,824	0,312	0,000	VALID

Source: Primary Data Processed Using SPSS, 2026

Based on Table 2 above, the validity test results can be interpreted as follows:

Artificial Intelligence Adoption Variable (X): All items measuring the AI Adoption variable (X₁ through X₁₀) have calculated r values ranging from 0.834 to 0.924. The calculated r values for all of these items are greater than the table r values (0.834–0.924 > 0.312) at a significance level of 0.000 ($p < 0.05$). Thus, the 10 items for the AI Adoption variable are deemed valid and can be used in the study.

Labor Absorption Variable (Y): All items measuring the Labor Absorption variable (Y₁ through Y₉) have calculated r values ranging from 0.744 to 0.891. The calculated r values for all of these items are greater than the table r value (0.744–0.891 > 0.312) with a significance level of 0.000 ($p < 0.05$). Therefore, the 9 items for the Labor Absorption variable are deemed valid and suitable for use as a data collection instrument.

Validity Test Conclusion: Overall, the questionnaire used to measure the variables of Artificial Intelligence Adoption (X) and the Labor Absorption Rate in Palopo City (Y) has met the criteria for construct validity. Based on the results of the validity test conducted on 40 respondents with a table r value of 0.312, all items

in the Artificial Intelligence (AI) Adoption (X) and Labor Absorption Rate (Y) variables had calculated r values greater than the table r value. Thus, all items were deemed valid and suitable for use as research instruments.

Reliability test

Reliability testing aims to assess the consistency and reliability of a research instrument. A measurement instrument is considered reliable if it consistently produces the same, stable data when used under comparable conditions over time (Fitriana Umar¹) The use of a reliable instrument is crucial in this study to ensure that the collected data are highly reliable and free from measurement bias. The results of the reliability test data analysis are presented below

Table 3. Reliability Test

Variabel Penelitian	Jumlah Item	Nilai Croncbach's Alpha	Nilai Cut-off	Keterangan
Adopsi AI (X)	10	0,964	0,60	Sangat Reliabel
Tingkat Penyerapan Tenaga Kerja (Y)	9	0,943	0,60	Sangat Reliabel

Source: Primary Data Processed Using SPSS, 2026

Based on the above, the reliability test results can be interpreted as follows:

Artificial Intelligence Adoption Variable (X): The test results show that the 10 items measuring the AI Adoption variable have a Cronbach's Alpha value of 0.964. Since $0.964 > 0.60$, the AI Adoption variable instrument is deemed highly reliable.

Labor Force Absorption Rate Variable (Y): The test results show that the 9 items measuring the Labor Force Absorption Rate variable have a Cronbach's Alpha value of 0.943. Since $0.943 > 0.60$, the instrument for the Labor Force Absorption Rate variable is deemed highly reliable.

Conclusion of the Reliability Test: Overall, the questionnaire instrument in this study has met the reliability criteria with a "very good" rating. This proves that all statement items in the questionnaire have a high level of internal consistency and are reliable for use as a data collection tool.

One-Sample Kolmogorov-Smirnov

According to (Dr. Lucky Herawa), the normality test aims to determine whether the data or residuals in a regression model are normally distributed. One method that can be used is the One-Sample Kolmogorov-Smirnov test, which compares the distribution of the sample data with the normal distribution. The test criterion is that if the significance value (Asymp. Sig.) is greater than 0.05, the data are normally distributed; whereas if the significance value is less than 0.05, the data are not normally distributed. The results of the One-Sample Kolmogorov-Smirnov test are presented in Table 4 below.

table 4

Parameter / Description	Value (Unstandardized Residual)
N	40
Normal Parameters (Mean)	0
Normal Parameters (Std. Deviation)	1.8614778
Most Extreme Differences (Absolute)	0.131
Most Extreme Differences (Positive)	0.088
Most Extreme Differences (Negative)	-0.131
Test Statistic	0.131

Parameter / Description	Value (Unstandardized Residual)
Asymp. Sig. (2-tailed)	0.084
Monte Carlo Sig. (2-tailed)	0.086

Source: *Processed Primary Data* (SPSS)

Based on the results of the One-Sample Kolmogorov-Smirnov test in the table above, the Asymp. Sig. (2-tailed) value is 0.084. Since this significance value is greater than the specified significance level ($\alpha = 0.05$, or $0.084 > 0.05$), it can be concluded that the unstandardized residual data are normally distributed.

This test is supported by the results of a Monte Carlo simulation, which yielded a Monte Carlo Sig. value of 0.086 (>0.05) at a 99% confidence interval (Lower Bound 0.079 and Upper Bound 0.093). Since it has been proven that the regression model residuals are normally distributed, the assumption of normality for analyzing the “Effect of Artificial Intelligence (AI) Adoption on Employment Rates in Palopo City” has been met.

Simple linear regression test

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	3.930	1.315		2.988	.005
TotalX	.604	.033	.949	18.574	.000

Dependent Variable: totally

Based on the table above, the following simple linear regression equation is obtained:

$$\hat{Y} = 3.930 + 0.604X$$

This regression equation can be explained as follows:

The constant (a) of 3.930 indicates that if the Artificial Intelligence (AI) Adoption variable (X) is held constant or equal to zero, then the value of the Labor Absorption Rate in Palopo City (Y) is 3.930. The regression coefficient (b) of 0.604 indicates a positive (direct) relationship between the AI Adoption variable and the Labor Absorption Rate. This means that for every 1-unit increase in the AI Adoption variable, the Labor Absorption Rate in Palopo City is predicted to increase by 0.604 units.

Hypothesis Testing (t-Test)

A t-test was conducted to partially test whether there is a significant effect of the variable “Adoption of Artificial Intelligence (AI)” (X) on the “Labor Absorption Rate in Palopo City” (Y). Based on the analysis results in Table 4

Significance Value: The significance value obtained is 0.000, which is smaller than the set significance level of 0.05 ($0.000 < 0.05$). Calculated t-value vs. Table t-value: With a sample size of $N = 40$, the degrees of freedom (df) are calculated using the formula $df = N - 2 = 40 - 2 = 38$. At a significance level of $\alpha = 0.05$, the “table” t-value is 2.024. From the test results, the “calculated” t-value is 18.574, so the ‘calculated’ t-value is greater than the “table” t-value ($18.574 > 2.024$).

Conclusion: Based on the decision criteria above, H_0 is rejected and H_1 is accepted. This indicates that the adoption of Artificial Intelligence (AI) has a positive and significant effect on the employment rate in Palopo City.

Test of the Coefficient of Determination

		TotalX	TotalY
TotalX	Pearson Correlation	1	.949**
	Sig. (2-tailed)		.000

	N	40	40
TotalY	Pearson Correlation	.949**	1
	Sig. (2-tailed)	.000	
	N	40	40

Based on the analysis results in the table above, the following points can be drawn:

Correlation Coefficient / Relationship (R):

A Pearson correlation coefficient (R) of 0.949 was obtained, with a significance level of $0.000 < 0.05$. The value of 0.949 indicates a very strong, positive (direct) relationship between the Adoption of Artificial Intelligence (AI) and the Labor Absorption Rate in Palopo City. This means that higher levels of AI adoption are significantly and directly associated with an increase in labor absorption.

Coefficient of Determination (R^2)

Based on the correlation value ($R = 0.949$), the Coefficient of Determination (R^2) is 0.901 (or 90.1%). This value indicates that 90.1% of the changes or variations in the Labor Absorption Rate in Palopo City can be directly explained by the Artificial Intelligence (AI) Adoption variable.

Influence of Other Variables:

The remaining 9.9% ($100\% - 90.1\%$) is influenced by other factors outside the scope of this study that were not measured, such as regional economic growth, minimum wage policies, educational qualifications, and the investment climate in Palopo City. Based on the results of data analysis and hypothesis testing regarding "The Effect of Artificial Intelligence (AI) Adoption on Employment Rates in Palopo City," the following key conclusions can be drawn:

1. AI Adoption Has a Positive and Significant Effect on Employment

The results of the simple linear regression test yielded the equation $\hat{Y} = 3.930 + 0.604X$. The positive regression coefficient ($b = 0.604$) indicates that AI adoption and the employment rate have a positive relationship. A one-unit increase in the AI Adoption variable (X) is predicted to increase the employment rate (Y) by 0.604 units in Palopo City. A partial hypothesis test (t-test) yielded a calculated t-value of $18.574 >$ the critical t-value of 2.024, with a significance level of $p = 0.000 < 0.05$. These statistical results firmly reject H_0 and accept H_1 , confirming the research objective that AI adoption has a positive and statistically significant effect on employment in Palopo City.

2. Correlation and Contribution of AI Adoption Variables Are Highly Significant

The coefficient of determination test revealed a Pearson correlation coefficient (R) of 0.949, indicating a very strong relationship between AI adoption and employment. Furthermore, the R^2 (R-Square) value of 0.901 implies that 90.1% of the variation in labor absorption rates in Palopo City is directly explained by the AI Adoption variable. The remaining 9.9% is influenced by other factors outside the scope of this study, such as regional economic growth, minimum wage policies, educational qualifications, and the local investment climate.

3. Interpretation of the Phenomenon, Scientific Implications, and Theoretical Consistency

The results of this study empirically confirm the Task-Based Framework and the reinstatement effect theory. In developing urban areas such as Palopo City, the adoption of AI does not act as a displacement or replacement mechanism that triggers mass unemployment; rather, it functions as a complementary tool that enhances business productivity and operational efficiency. This efficiency drives business expansion and the growth of new business units, which in turn creates new technology- and analytics-based job positions (reinstatement effect). These findings also support the research by (Ferdinand*, 2024) and (Mujtahidin, 2025), which affirm that digital transformation has the potential to open up new job opportunities as long as it is accompanied by upskilling processes.

6. Conclusion

This study contributes to the literature on labor economics and technology management, particularly in the context of secondary cities in developing countries. The findings demonstrate that the impact of AI automation is not disruptive or destructive, but rather can be augmentative and expand labor absorption capacity in local markets. For the Palopo City Government, the labor department, and local businesses, these findings provide grounds for optimism that the adoption of AI should be encouraged, not hindered. However, to ensure the sustainability of this positive trend, strategic policies are needed such as providing digital training resources, upskilling programs, and strengthening technology literacy so that the local workforce can remain highly competitive when interacting with AI technology.

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