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The Complexity of Job Competition between Humans and Robots in the Era of the Industrial Revolution 4.0

Alven Qois Charisteas, Milati Auliyah, M.Sadam Al Jabbar, Ramadani, Rizki Fadilah Ramadhan
Industrial Automation and Robotics Engineering Education Study Program, Universitas Pendidikan Indonesia, Indonesia
Email: charisteas@upi.edu, milatiauliyah28@upi.edu, msadamaljabbar@upi.edu, ramadaniptoir@upi.edu, fadramrizq07@upi.edu

KEYWORDS

Industrial Revolution 4.0; Job Competition; Robot Influence.

ABSTRACT

The current era of the industrial revolution 4.0, has a very varied influence on various fields, one of which is the industrial sector, with the growing automation of machines and robots, coupled with intense job competition, every worker must prepare for the possibilities that will occur. In the future, humans must begin to be aware of the rapid development of current technology, and see several possibilities that will occur, later robots may affect human employment, starting from job competition, to jobs being taken over by robots, this is will cause anxiety for workers or actors in the industrial sector. Competition in the world of work today does not only involve humans but is a result of current technological developments, resulting in robots being involved and starting to enter the scope of human work competition. With the emergence of this phenomenon, humans are required to improve their skills and abilities to be able to keep up with the robots when there is competition later. The method used in this study included multiple linear regression methods with a sample of 50 informants using the formula Slovin's study aims to find out whether these possibilities will occur in the future, and then whether there is an influence from robots and job competition on the future of workers. The results obtained from this study indicate that the influence of robots and job competition has a positive and significant impact on the future of workers and to compensate for robots so that they do not dominate human jobs, these workers should continue to improve their skills, knowledge, and skills.

INTRODUCTION

Currently, humans have begun to enter the era of industrial revolution 4.0 seen from human work which is replaced by automatic machines in the scope of industry(Nurjani, 2018). Industry 4.0 is then said to be a disruption because the rise of machine automation in an industry can have an unstable impact on job competition. With the emergence of this phenomenon, it raises a situation that allows making humans as industrial cogs will be replaced by smart robots later(Nurjani, 2018)

The role of the industrial revolution 4.0 is agreed to change humans, especially in the field of work, the impact of the industrial revolution 4.0 is agreed to change humans, especially in the field of work, the impact of the industrial revolution 4.0 will be felt by manual workers because later it will be replaced by automatic machines that make workers lose their jobs(NatureAntony Hotama, & Kuswandi, 2019)

The results show that in industry 4.0 digitalization opens up many jobs that make digitalization continue to spread widely to various fields depending on the complexity of automation. Judging from the technology that is very rapidly developing today, it does not rule out the possibility that humans will be replaced later, just a matter of time, this happens because the competitiveness of robots will increase.(Rajnai & Kocsis, 2017)

Not a few media say that humans will become obsolete because of the emergence of robots in the world of work. The results obtained from the influence of robots, especially in the industrial field, found that robots have a significant increase in high- and middle-level jobs. Then robots are also considered more advanced and able to work better technologically(Aprilia & Subiyantoro, 2022; Marsudi & Widjaja, 2019; Suwardana, 2018)

The results obtained by Acemoglu confirmed that robots will reduce human employment. It is based on the robotics industry which has many advancements which are then attributed to employment in the local industry. This is interesting because it is true that robots reduce human employment, reinforced by the results of the European Commission through the analysis carried out. Robots are referred to as "killers" in the world of work, but this is inversely proportional when robots have entered the industrial world, in fact companies that use robots get a much higher level of productivity in their manufacturing processes(Alfa, 2019; Dara et al., 2022; Haqqi & Wijayati, 2019; Muaja, Adolfina, & Dotulong, 2017)(Ellitan, 2020; Ghufron, 2018; Kahf, 2017; Partono, Wardhani, Setyowati, Tsalitsa, & Princess, 2021)

There are so many studies on job competition between humans and robots, but each study has different characteristics related to the problem, both from what is researched to the actors involved in the research. Acemoglu's Robots and Jobs: Evidence from Us Labor Markets examines the influence of robots on the U.S. labor market. The results of this study found that one robot is compared to a thousand workers. This led to a reduction in the population of labor ratios by 0.2 percentage points and wages by 0.42. This finding can be attributed to the author because in the world of industry 4.0 it is very necessary to know about job competition against robots. (Kim, 2022; Richard, Goh, &; Margery, 2018)

An article by Lena Ellitan entitled Competing in Era of Industrial Revolution 4.0 And Society 5.0 explains that in the era of the industrial revolution 4.0 there are many challenges that will be faced by industry players such as lack of expertise and even skills from human resources.

METHOD

This research was conducted using a qualitative descriptive approach. With the data used, it is obtained from questionnaires distributed to resource persons through several criteria that must be met beforehand by respondents. The criteria that must be met by respondents are: a) Workers in the industrial field for reasons that are more familiar with their work environment, b) Respondents who are willing to fill out questionnaires. Questionnaires are made using google forms, in the form of questionnaires or closed questionnaires, Later respondents can only answer by sharing a characteristic on the answer choices that are thought to be very suitable and able to describe their thoughts (Sujarweni, 2015; Usman & Akbar, 2008).

Data is collected through main information because the source of information is given directly to the informer through questionnaires distributed to respondents, The data that has been collected is then used for analysis using the form of the Likert scale which serves to determine the perception of the respondents regarding the questions asked. The use of the Likert scale on the riser that is carried out is the deadline of 1 point and a maximum of 5 points, the Likert scale is used because later it will clearly know the answers sent by respondents, whether later respondents will tend to choose to agree or disagree, so that the results will be more relevant,(deep Sugiyono, 2017; Sugiyono, 2010)

No	Answer	Points
1	Strongly Disagree (SS)	1
2	Disagree (TS)	2
3	Neutral (N)	3
4	Agree (S)	4
5	Strongly Agree (SS)	5

The data obtained from the answers of the resource persons will then be described with the aim of explaining the choices chosen by respondents. Then in the final stage, the results of the research conducted by the author are obtained through conclusions drawn from the data obtained after analysis with the aim of finding a solution and facts of a problem being studied by the author while relating the entire research process carried out.

In this study, a qualitative approach method was used which meant that numerical data (numbers) were processed by conducting statistical methods. Through a quantitative approach, the significance of group differences or differences in variables under study will be obtained.(Azwar, n.d.)

RESULTS AND DISCUSSION

The results from table 1 show that all data items are declared valid, this corresponds to a correlation value higher than the validity value of 0.30.

Variable	Indicators	*Corrected Item- Total Correlation*	Minimum Validity Value	Information
Robot Influence (X1)	X1.1	0.716	0,30	VALID
	X1.2	0.653	0,30	VALID
	X1.3	0.597	0,30	VALID
	X1.4	0.36	0,30	VALID
	X1.5	0.492	0,30	VALID
	X1.6	0.617	0,30	VALID
	X1.7	0.718	0,30	VALID
	X1.8	0.71	0,30	VALID
	X1.9	0.728	0,30	VALID
	X1.10	0.609	0,30	VALID
Job Competition (X2)	X2.1	0.516	0,30	VALID
	X2.2	0.347	0,30	VALID
	X2.3	0.415	0,30	VALID
	X2.4	0.552	0,30	VALID
	X2.5	0.674	0,30	VALID
	X2.6	0.645	0,30	VALID
	X2.7	0.576	0,30	VALID
	X2.8	0.587	0,30	VALID
	X2.9	0.658	0,30	VALID
	X2.10	0.398	0,30	VALID
Future of Labour	Y1.1	0.611	0,30	VALID
	Y1.2	0.68	0,30	VALID
	Y1.3	0.735	0,30	VALID
	Y1.4	0.675	0,30	VALID
	Y1.5	0.545	0,30	VALID

Table 2. Reliability Test Results

No	Variable	*Cronbach's Alpha*	Information
1	Robot Influence(X1)	0.884	Reliable
2	Job Competition(X2)	0.835	Reliable
3	Future of Labour(Y)	0.843	Reliable

Source: Processed DataSPSS25, 2023

Based on the test results, it can be seen that the three variables are considered reliable because they have Cronbach's Alpha > 0.6

Table 3. Multicollinearity Test Results

Variable	Tolerance	VIF	Information
Robot Influence	0.716	1,397	No Multicollinearity
Job Competition	0.716	1,397	No Multicollinearity

Source: Processed DataSPSS25, 2023

Based on these results, by looking at the tolerance value model and *Variance Inflation Factor* (VIF), the regression model of the influence of robots and job competition on the future of workers does not occur symptoms of multicollinearity.

Heterokedasticity Test Graph

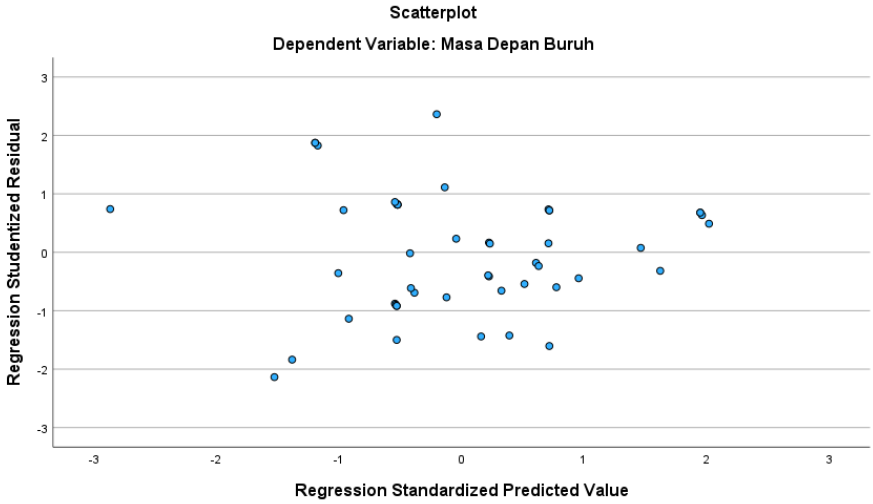

Figure 1 Heterokedasticity Test Graph

Source: Processed DataSPSS25, 2023

Based on the Scatterplot graph above, it was found that the heterokedasticity test displays points that spread between 0 on the Y axis, so In the regression model the influence of robots in job competition on the Future of Labor there is no problem of heterokedasticity

Normality Test Graph

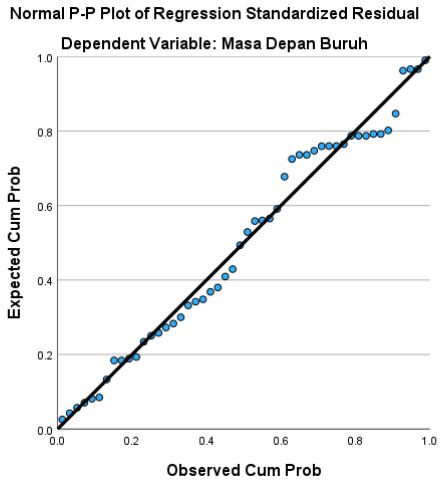

Figure 2 Normality Test Graph

Source: Processed DataSPSS25, 2023

From the test results above, it shows that the data is distributed normally because the data or points spread out and follow the direction of the diagonal line so that it can proceed to regression.

Table 4. F and T Test Results

ANOVA[a]

Type		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1130.793	2	565.397	38.092	.001[b]
	Residuals	697.627	47	14.843		
	Total	1828.420	49			

a. Dependent Variable: The Future of Labour

b. Predictors: (Constant), Job Competition, Robot Influence

Source: Processed DataSPSS25, 2023

The regression model of all variables shows Fcalculate = 42.649 with a sig of 0.001 < 0.05 this is equal to less than 5%. With a significant usage limit of 0.05. From these results, a GIS value smaller than 0.05 positive coefficient was obtained, so it was concluded that the influence of robots and job competition on the future of workers was significantly accepted.

Table 5. Test result t (partial)

Coefficients[a]

Type		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	7.681	3.618		2.123	0.039
	Robot Influence	0.007	0.083	0.009	0.082	0.935
	Job Competition	0.815	0.111	0.782	7.341	0.001

a. Dependent Variable: The Future of Labour

Source: Processed DataSPSS25, 2023

Tests were conducted to determine whether there is an influence of robots and job competition in the industry on the future of workers. This test is carried out by comparing the profit of the calculation with a significant level of 0.05 (5%) as follows:

Based on the results:

1. The variable of the influence of the robot, the influence of the sig for the variable of the influence of the robot on the future of workers is 0.935 > 0.05 and the value of t is calculated 0.082 < 2.012, so that the results are obtained that the hypothesis stating the influence of the robot is rejected and has no effect on Y
2. The variable of job competition, the influence of GIS for the variable of job competition on the future of workers is 0.001 < 0.05 and the value of t is calculated 7.341> 2.012, so that it is found that the hypothesis that states the influence of robots is accepted and there is an influence on Y

Results of Multiple Linear Regression Equations

Table 6. Multiple Regression

Coefficients[a]

Type		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	7.681	3.618		2.123	0.039
	Robot Influence	0.007	0.083	0.009	0.082	0.935
	Job Competition	0.815	0.111	0.782	7.341	0.001

Source: Processed DataSPSS25, 2023

Judging from the table above, there are results from the multiple linear regression equation, namely: Y = 7.681 + 0.007X1 + 0.815X2 from this multiple linear regression equation, it can be concluded as follows:

1. The constant 7.681 means that if the Effect of Robots (X1) and also Job Competition (X2) both have not changed or can be said to be equal to zero (0), then it can be known the magnitude of the Future of Labor (Y) of 7.681
2. The X1 coefficient of 0.007 means that every time there is an increase in the variable X1 (Robot Influence) by 1%, the Future of Workers (Y) increases by 0.007, or vice versa, every time there is a decrease in the variable X1 (Robot Influence) by 1%, the Future of Workers (Y) decreases by 0.007
3. The X2 coefficient of 0.815 means that every time there is an increase in the variable X2 (Job Competition) by 1%, the Job Competition (Y) increases by 0.815 or vice versa, every time there is a decrease in the variable X2 (Job Competition) by 1%, the Future of Workers (Y) decreases by 0.815

Table 7. Coefficient of Determination (R^2)

Model Summary

Type	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.786a	0.618	0.602	3.853

a. Predictors: (Constant), Job Competition, Influence of Robots

Source: Processed DataSPSS25, 2023

The results obtained from the correlation coefficient or R of 0.786 mean that the relationship of the Influence of Robots (X1) and also on Job Competition (x2) on the Future of Workers (Y) has a positive relationship with a value of 78.6%. And

The results obtained from R Square (R^2) worth 0.618 can be interpreted that the Future of Workers with variable (Y) is influenced by the variable Influence of Robots and the variable Job Competition simultaneously on the variable Future of Labor (Y) is 61.8%

Discussion

The Influence of Robots on the Future of Labor

The Influence of Robots on the Future of Workers through regression testing turned out to be a positive influence between the Influence of Robots and the Future of Workers, with this showing that there is an influence of robots on the front mass of workers in job competition but this is not too significant considering that jobs will be given to human workers if in accordance with their abilities and expertise.

The Effect of Job Competition on the Future of Workers

The Effect of Job Competition on the Future of Workers has a significant positive influence between job competition and the future of workers, this means that the competition in question is when robots begin to compete with workers

The Influence of Robots and Job Competition on the Future of Workers

From the results of the F Test Statistical Test data, it was found that the Influence of Robots and Job Competition on the Future of Workers has the same influence on the future of workers with a significant coefficient value. Based on the Correlation Test, a value of 78.6% was obtained, while for the deterimination test, 61.8% of models of the influence of robots and job competition were found.

CONCLUSION

Based on the results of previous analyses and reviews, it will be partially concluded that the Influence of Robots and Job Competition with the Future of Workers has been tested to have a significant positive influence between the model of the influence of robots and job competition on the future of workers. It was found that the variable that is very dominant in influencing the future of workers is job competition which has a coefficient value greater than the variable of influence of robots.

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