

Logistic Regression Analysis on the Characteristics of Post-Pandemic Unemployment in Bintan Regency

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Abstract:

Employment is still the most frequently discussed topic lately, especially during and after a pandemic. When talking about the topic of employment, the indicator most frequently discussed is unemployment. The unemployment rate in post-pandemic Indonesia (August 2021) is 6.49%. The province with the highest unemployment rate is the Riau Islands Province, which is 9.91%. and if broken down the 7 regencies/cities in Riau Islands Province, Batam City and Bintan Regency have the highest unemployment rates, namely 11.64% and 8.62%. Bintan Regency has quite different characteristics from Batam City. Even though Bintan Regency also has industrial zones, there are still fewer in number compared to Batam City, whose economy is mostly supported by the industrial sector. In this study, we want to know the characteristics of the unemployed in Bintan Regency uses binary logistic regression analysis. By using National Labor Force Survey raw data for 2021, we find that the tendency to become unemployed in Bintan Regency is 1.18 times greater in the female labor force, 2.02 times greater in the labor force that has not attend school/only graduated from elementary school (compared to college), 1.63 times greater in the labor force that has never attending training, 3.22 times greater in the labor force who live in urban areas and 3.05 times greater in the labor force who have no previous work experience. In addition, when viewed by age group, the labor force in the 15-24 years old age group has a greater tendency to be unemployed than the 25-34 years old, 35-44 years old, 45-54 years old and 55-64 years old age group. However, when compared with the age group of 65 years old and over, the labor force in the group of 15-24 years old has a smaller tendency to become unemployed. Based on these results, it can be seen that there is a tendency to become unemployed for certain labour force characteristics. Therefore, the results of this study should be used by the government to anticipate the high unemployment rate in Bintan Regency, so that the government programs that will be made, can be more focused on the characteristics of the labor force with a greater tendency to become unemployed.

Keywords:

Indonesia; Labor; Labor Market; Logistic-regression; Unemployment

1. Introduction:

Employment is still the most frequently discussed topic lately, especially during and after a pandemic. In almost all countries there have been massive layoffs. Since 2020, several giant companies have done layoffs, such as Google, Meta, Amazon, Microsoft and many more (Koop, 2023). Indonesia as a developing country also feels the impact of the Covid 19 pandemic. Based on Statistics Indonesia data, the unemployment rate before the pandemic (2019) was 5.23%. but when there was a pandemic (2020), the unemployment rate increased to 7.07%. then experienced a decline again after the pandemic (2021) to 6.49% (BPS, 2023).

If it is break down by province, at the time after pandemic (2021), the province with the highest unemployment rate is Riau Islands Province, which was 9.91%. From the seven regencies/cities in the Riau Islands Province, Batam City occupies the top position with the highest unemployment rate, which is 11.79%. This condition is caused by the unfinished effects of the Covid 19 pandemic and the large number of job seekers who come from outside the Batam City, but have not met the criteria required by the companies there (Kompas.com, 2021) (Kriaa, Bouhari, & Mathlouthi, 2020). Then, Bintan Regency has the second highest unemployment rates in 2021, which is 8.62%. Bintan Regency has quite different characteristics from Batam City. Even though Bintan Regency also has industrial

zones, there are still fewer in number compared to Batam City, whose economy is mostly supported by the industrial sector. Besides that, the economy of Bintan Regency is also more likely to be supported by the tourism sector which also suffered greatly during the Covid 19 pandemic. So, this study aims to determine the characteristics of the post-pandemic unemployment in Bintan Regency.

Several studies have also examined the characteristics of unemployment. Kriaa, Bouhari, & Mathlouthi (2020) learn about the labor force in Tunisia and conclude that gender, education level, region, age group and marital status effect on a person's unemployment condition. Shakur, Sa'at, Aziz, Abdullah, & Rasid (2020) states that there are factor affecting youth unemployment in the three states of East Coast, Malaysia. They are age, work experience, work mobility, marital status, gender and job training. Study from Aulia & Yuliana (2022) and Alharis & Yuniasih (2022) also concluded that work experience and job training are variables that influences the unemployment rates. And study from Naraswati & Jatmiko (2022) stated that unemployed status of young NEETs (Not in Employment Education, or Training) is influenced by gender, age, marital status, highest education completed, disability status, classification of the area of residence and recent migrant status.

2. Methodology:

This study used two analytical methods, namely descriptive (display of graphs and tables) and inferential (binary logistic regression) analysis methods. Furthermore, the variables used are status as unemployed or not as the dependent variable and gender, age, education, recent migrant status, region, job training and work experience as the independent variables. In addition, this study used raw data from National Labor Force Survey (SAKERNAS) August 2021. The main purpose of SAKERNAS is to collect basic data on employment, like employment, unemployment and underemployment and working age population not in the labor force who are in schools, doing housekeeping, others, exclude personal activity. The sample selected for this survey in Riau Islands Province, namely 3,417 households with a response rate of 94.68 percent (BPS, Keadaan Angkatan Kerja Provinsi Kepulauan Riau Agustus 2021, 2022).

Table 1. Categories of each independent and dependent variables

Variables	Categories
Unemployment Status (UEMP)	0 = Working 1 = Unemployment
Gender (GEN)	0 = Female 1 = Male
Age (AGE)	0 = 15 – 24 years old 1 = 25 – 34 years old 2 = 35 – 44 years old 3 = 45 – 54 years old 4 = 55 – 64 years old 5 = 65 + years old
Education (EDU)	0 = Elementary level or lower 1 = Junior high level 2 = Senior high level 3 = College level
Work Experience (EXP)	0 = None 1 = Have work experience
Job Training (TRN)	0 = None 1 = Have attended training
Recent Migrant Status (MIG)	0 = Non-recent migrant 1 = Recent migrant
Region (REG)	0 = Rural 1 = Urban

After that, equation of the binary logistic regression model used in this study is:

$$g(x) = \ln \left[\frac{\pi(x)}{1 - \pi(x)} \right]$$

$$= \beta_0 + \beta_i x_i \dots \dots \dots (1)$$

with

$g(x)$ = logit $n(x)$,

$\pi(x)$ = probability to unemployed,

β_0 = constant,

β_i = parameters to be estimated,

i = number of independent variables,

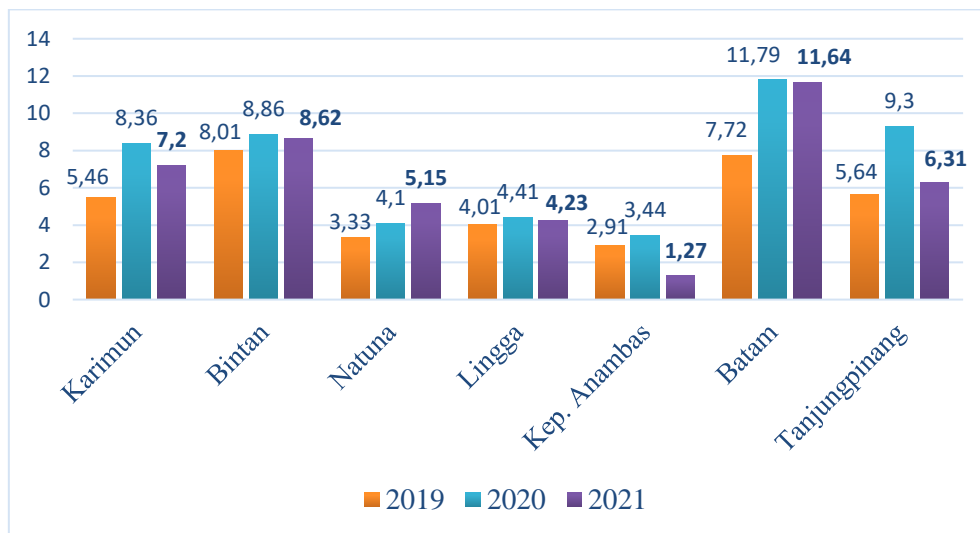
x = independent variables.

The estimation method used in the binary logistic regression model is maximum likelihood estimation which produces values for unknown parameters by maximizing the probability of a set of observed data (Hosmer & Lemeshow, 2000).

3. Result:

Before processing raw data, researcher use weighting on raw data to obtain analysis results in population coverage. Graph 1 illustrates the trend in unemployment rates of regencies/cities in Riau Islands Province (pre until post pandemic). In general, the unemployment rates is at its highest point, namely in 2020 (pandemic), then decreases in 2021 (post pandemic). The regencies/cities in Riau Islands Province with the highest unemployment rate in 2021 is Batam City (11,64%), while Bintan Regency has the second highest unemployment rate in 2021 (8,62%). In addition, the unemployment rate in Bintan Regency tends to be stagnant at around 8% from pre until post pandemic.

Graph 1. The trends in unemployment rates of regencies/cities in Riau Islands Province (pre until post pandemic)



Source: <https://bps.go.id/> (Statistics Indonesia)

Next, the raw data is processed using binary logistic regression analysis and the output is obtained as shown in Table 2.

Table 2. Output of Partial Test (Wald)

Independent Variables	β Coefficient	S.E.	Wald	d.f.	Sig.
GEN*	-0.613	0.029	32.367	1	0.000
AGE (15 – 24 years old)*			1,658.435	5	0.000
AGE (25 – 34 years old)*	-0.652	0.039	282.986	1	0.000
AGE (35 – 44 years old)*	-1.292	0.044	858.156	1	0.000
AGE (45 – 54 years old)*	-1.549	0.049	992.254	1	0.000
AGE (55 – 64 years old)*	-0.564	0.051	120.871	1	0.000
AGE (65+ years old)*	0.159	0.067	5.648	1	0.017
EDU (Elementary level or lower)*			159.222	3	0.000
EDU (Junior high level)	0.015	0.045	0.108	1	0.742
EDU (Senior high level)	-0.061	0.037	2.771	1	0.096
EDU (College level)*	-0.701	0.060	137.866	1	0.000
EXP*	-1.114	0.029	1,467.324	1	0.000
TRN*	-0.488	0.051	91.745	1	0.000
MIG	-18.722	967.209	0.000	1	0.985
REG*	1.170	0.046	633.960	1	0.000

* = significant variables at $\alpha = 5\%$

Source: SAKERNAS August 2021 (processed)

Based on Table 2, it can be concluded that with an alpha level of 5%, most of independent variables have a significant effect on the dependent variable. They are gender, age group, education (elementary level or lower and college level), work experience, job training and regional. After knowing the independent variables that have an effect, then an interpretation of the odds ratio of each of these variables is carried out.

Table 3. Output of Odds Ratio and Confidence Interval

Significant Independent Variables	Odds Ratio/Exp(β)	Confidence Interval 95%	
		Lower	Upper
GEN	0.850	0.803	0.899
AGE (25 – 34 years old)	0.521	0.483	0.562
AGE (35 – 44 years old)	0.275	0.252	0.299
AGE (45 – 54 years old)	0.213	0.193	0.234
AGE (55 – 64 years old)	0.569	0.515	0.629
AGE (65+ years old)	1.172	1.028	1.336
EDU (College level)	0.496	0.441	0.558
EXP	0.328	0.310	0.348
TRN	0.614	0.556	0.679
REG	3.221	2.941	3.528

Source: SAKERNAS August 2021 (processed)

Table 3 shows the output of odds ratio and confidence interval of the independent variables that have a significant effect. From the odds ratio it can be concluded that the tendency to become unemployed in female labor force is 1.18 times greater than male labor force. This result is in line with research from Kriaa, Bouhari, & Mathlouthi (2020) that female/women have relatively longer duration of unemployment. Alawad, Kreishan, & Selim (2020) also concluded in their research that male youth stand a better chance of being employed than the female counterpart. After that, when viewed by age group variable, the labor force in the 15 – 24 years old has a greater tendency to be unemployed than the 25 – 34 years old, 35 – 44 years old, 45 – 54 years old and 55 – 64 years old. This is because the majority of the labor force aged 15 – 24 years old still do not have work

experience and skills, making it difficult to enter the labor market. But when compared with the labor force aged 65 years old and over, the labor force in the age group 15 – 24 years old has a smaller tendency to become unemployed. This condition indicates that although it is difficult for group 15 – 24 years old to enter the labor market, it will be even more difficult for group 65 years old and over because most of them have entered retirement age and have limitations in using their bodies and minds.

Next, labor force that has not attend school/only graduated from elementary school has a greater tendency to be unemployed than graduated from college. This condition is in accordance with research from Berhe (2021) which states that youth with vocational training or university education have higher escape rates from unemployment than secondary school graduates. Youth who have certificate, diploma and above also have a good opportunity in obtaining job (Batu, 2016). Then, labor force who has no previous work experience and never attending job training also has a greater tendency to be unemployed. Study from Lechner & Wunsch (2009), Biavaschi, et al., (2012), Ketema, Yadesa, Hordofa, & Senbeta (2021) and Kamau & Wamuthenya (2021) also concluded similar results.

Last, labor force who live in urban areas has a tendency to be unemployed 3.22 times greater than rural areas. This is because the labor force in rural areas is more adapted to the jobs available in their areas, compared to the labor force in urban areas who already have many considerations in choosing available jobs. This result are also consistent with research from Khouli (2015) on the demography of unemployment in Egypt which states that the unemployment rate is higher in urban areas. Research from Aun (2020) and Jamatia & Gurumoorthy (2023) also conclude that unemployment rate is higher in urban areas, especially in the younger age group and higher education.

4. Discussion and Conclusion:

Based on th results of the research conducted, it was concluded that the characteristics of post pandemic unemployment in Bintan Regency tend to be in the female, has not attend school or only graduated from elementary school, never attending job training, live in urban areas and have no previous work experience. Labor force in young age group (15 – 24 years old) and old age group (65 years and over) also tend to be unemployed than the other age group.

So, if when we see these characteristics, the relevant stakeholders should be able to take policies that are more targeted. From the government side, especially Bintan Regency Government, can make specific policies in the field of employment. The proportion of providing job training to women must be even more enlarged, ensuring that every youth can complete their education at least until the senior high level, increasing the job training for various age groups and seeking economic equality between urban and rural areas. In addition, from the side of the Bintan Regency people, there must also be increased awareness of the importance of the education so that later it can be used as a basis for getting decent jobs so as to improve the economy level.

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