

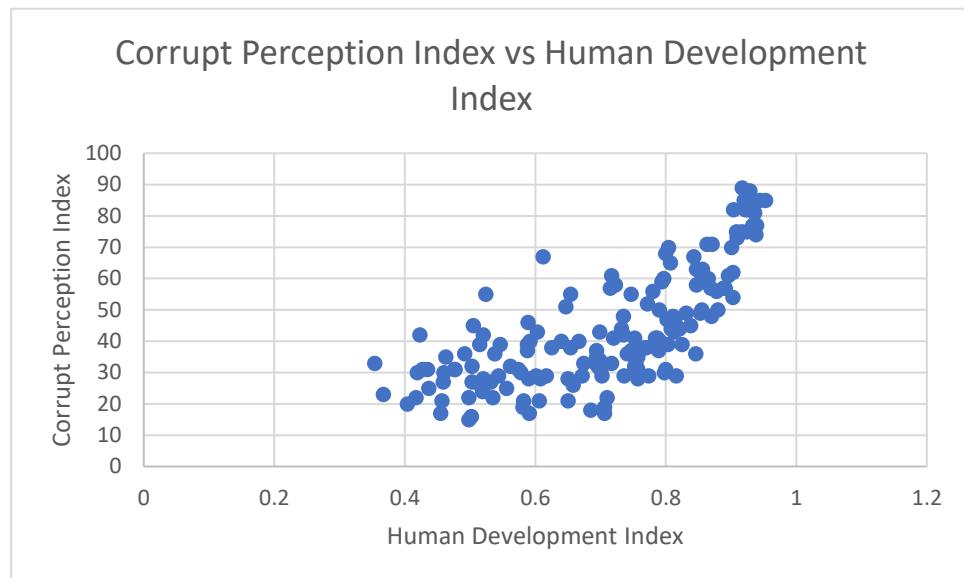
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ETW1001 Assignment 2

1.

a.



- b. As the Human Development Index increases, the Corrupt Perception Index increases as well. This means there is a positive correlation between Corrupt Perception Index and Human Development Index.

c.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.737101388
R Square	0.543318457
Adjusted R Square	0.540600114
Standard Error	12.64424188
Observations	170

ANOVA

	df	SS	MS	F	Significance F
Regression	1	31954.78285	31954.78285	199.8712277	2.1209E-30
Residual	168	26859.31127	159.8768528		
Total	169	58814.09412			

	Coefficients	Standard Error	t Stat	P-value
Intercept	-19.47559502	4.600706051	-4.233175256	3.78385E-05
HDI	89.28802499	6.315650325	14.1375821	2.1209E-30

	Lower 95%	Upper 95%	Lower 99.0%	Upper 99.0%
Intercept	-28.55824077	-10.39294926	-31.46232088	-7.48886916
HDI	76.81976165	101.7562883	72.83316605	105.7428839

- d. The estimated coefficient of the Human Development Index (HDI), $\hat{\beta}_1$, is 89.2880. This means that the regression model predicts that the Corruption Perception Index to increase by 89.2880 when the Human Development Index increases by 1.
- e. The estimated coefficient of the intercept, $\hat{\beta}_0$, is -19.4756. This means that the regression model predicts that the Corruption Perception Index will be -19.4756 when the Human Development Index is 0.
- f. The interpretation in question 1(e) is interesting as it does not make sense. This is because the Corruption Perception Index could not be a negative value. Furthermore, the Human Development Index would unlikely be 0. Therefore, the interpretation does not make sense to the real-world problem.
- g. $H_0: \beta_1 = 0$
Human Development Index is not a significant predictor of Corruption Perception Index.

$$H_1: \beta_1 > 0$$

Human Development Index has a significant positive effect on the Corruption Perception Index.

Level of significance = 0.05

t-stat = 14.1376

t-crit = 1.6540 (Using T.INV)

Decision rule is to reject H_0 if t-stat is greater than t-crit. T-stat is 14.138 and t-crit is 1.6540. Since t-stat is greater than t-crit, we reject H_0 . Therefore, we will reject H_0 and Human Development Index has a significant positive effect on the Corruption Perception Index when there is a 5% level of significance.

- h. t-crit = 2.6054 (Using T.INV.2T)
Standard Error (β_1) = 6.3157

$$\text{Confidence Interval} = \beta_1 \pm \text{t-crit} \times \text{Standard Error} (\beta_1)$$

$$\text{Confidence Interval} = 89.2880 \pm 2.6054 \times 6.3157$$

$$\text{Confidence Interval} = 89.2880 \pm 16.4549$$

We have 99% confidence that the true effect to Corruption Perception Index is between 72.8332 to 105.7429 for each increase of Human Development Index.

2.

a.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.810508113
R Square	0.656923401
Adjusted R Square	0.650723221
Standard Error	11.0250917
Observations	170

ANOVA

	df	SS	MS	F	Significance F
Regression	3	38636.35473	12878.78491	105.9523197	2.29885E-38
Residual	166	20177.73939	121.5526469		
Total	169	58814.09412			

	Coefficients	Standard Error	t Stat	P-value
Intercept	-5.953665661	11.45091096	-0.519929435	0.603805413
LIFE	0.484499814	0.191254347	2.533274783	0.012226924
GNI	0.564122546	0.065916838	8.558094737	7.38269E-15
EDU	0.438678987	0.458607807	0.95654496	0.340187961

	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-28.56186061	16.65452928	-28.56186061	16.65452928
LIFE	0.106895309	0.862104319	0.106895309	0.862104319
GNI	0.433979125	0.694265967	0.433979125	0.694265967
EDU	-0.466776898	1.344134872	-0.466776898	1.344134872

- b. The estimated coefficient of the Life Expectancy, $\hat{\beta}_1$, is 0.4845. This means that the regression model predicts that the Corrupt Perception Index to increase by 0.4845 when the Life Expectancy increase by 1 year.

The estimated coefficient of the Gross National Income (GNI) per capita, $\hat{\beta}_2$, is 0.5641. This means that the regression model predicts that the Corrupt Perception Index to increase by 0.5641 when the Gross Nation Income(GNI) per capita increase by \$ 1000.

The estimated coefficient of the Average Education Years , $\hat{\beta}_3$, is 0.4387. This means that the regression model predicts that the Corrupt Perception Index to increase by 0.4387 when the Average Education Years increase by 1 year

- c. The coefficient of determination is the R square value which is 0.6569. This indicates that 65.69% of the variation of Corruption Perception Index is explained by the model. As the R square value could be between 0 to 1 and 0.6569 is greater than 0.5, therefore, the model fairly accurate to represent the correlation between the variables.

d. $H_0: \beta_1 = 0$

Life Expectancy has no significant positive linear effect on the Corruption Perception Index.

$H_1: \beta_1 > 0$

Life Expectancy has a significant positive linear effect on the Corruption Perception Index.

Level of significance = 0.05

p-value = $0.0122 \div 2$

p-value = 0.0061

Decision rule is to reject H_0 if p-value is lesser than level of significance. P-value is 0.0061. Since p-value is smaller than a, we reject H_0 . Therefore, we will reject H_0 and Life Expectancy has a significant positive linear effect on the Corruption Perception Index when there is a 5% level of significance.

e. $H_0: \beta_1 = 0$

Average Education Years is not a significant predictor of Corruption Perception Index.

$H_1: \beta_1 \neq 0$

Average Education Years is a significant predictor of Corruption Perception Index.

Level of significance = 0.05

t-crit = 1.9744 (Using T.INV.2T)

Standard Error (β_1) = 0.4586

Confidence Interval = $\beta_3 \pm t\text{-crit} \times \text{Standard Error}(\beta_1)$

Confidence Interval = $0.4387 \pm 1.9744 \times 0.4586$

Confidence Interval = 0.4387 ± 0.9055

The 95% Confidence Interval is -0.4668 to 1.3442. Since β_3 , which is 0.4387, is between the Confidence Interval, we do not reject H_0 . Therefore, Average Education Years is not a significant predictor of Corruption Perception Index when there is a 5% level of significance.

f. $H_0: \beta_1 = \beta_2 = \beta_3 = 0$

No significant relationship between the Corruption Perception Index and the entire set of independent variables.

$$H_1: \beta_1, \beta_2, \beta_3 \neq 0$$

Exists a significant relationship between Corruption Perception Index and the entire set of independent variables.

Level of significance = 0.05

$$\text{p-value} = 2.29885 \times 10^{-38}$$

Decision rule is to reject H_0 if p-value is lesser than level of significance. P-value is 2.29885×10^{-38} . Since p-value is smaller than level of significance, we reject H_0 . Therefore, we will reject H_0 and there exists a significant relationship between Corruption Perception Index and the entire set of independent variables when there is a 5% level of significance.

g. Predicted Corruption Perception Index of Malaysia:

$$\begin{aligned} &= \beta_0 + \text{Life Expectancy} \times \beta_1 + \text{GNI per Capita (\$'000)} \times \beta_2 \\ &\quad + \text{Average Education Years} \times \beta_3 \\ &= -5.9537 + 75.828 \times 0.4845 + 25.9105 \times 0.5641 + 10.2 \times 49.8762 \\ &= 49.8762 \end{aligned}$$

Actual Corruption Perception Index of Malaysia = 47

The predicted Corruption Perception Index of Malaysia is 49.8762 while the actual Corruption Perception index is 47. The predicted value is 2.8762 off the actual value and is a rather accurate prediction by the model with very limited data sample. The value might be slightly off to the actual value due to various reasons such as there are more independent variables that will affect the Corruption Perception Index that is not included in this regression model.

h.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.540650815
R Square	0.292303304
Adjusted R Square	0.270727185
Standard Error	15.93097537
Observations	170

ANOVA

	df	SS	MS	F	Significance F
Regression	5	17191.554	3438.310801	13.54753866	4.5921E-11
Residual	164	41622.54011	253.7959763		
Total	169	58814.09412			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%
Intercept	41.81818182	4.803369805	8.706009222	3.22725E-15	32.33376206
Asia	-1.113636364	5.370330702	-0.207368303	0.835979501	-11.71754002
Africa	-8.64171123	5.296107361	-1.631709979	0.104659344	-19.09905833
Europe	17.90681818	5.423768145	3.30154566	0.001180063	7.197400448
North America	4.971291866	6.035730647	0.823643757	0.411338156	-6.946466987
Oceania	13.58181818	8.592529124	1.580654309	0.115883826	-3.384427667

	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	51.30260158	32.33376206	51.30260158
Asia	9.490267292	-11.71754002	9.490267292
Africa	1.815635871	-19.09905833	1.815635871
Europe	28.61623592	7.197400448	28.61623592
North America	16.88905072	-6.946466987	16.88905072
Oceania	30.54806403	-3.384427667	30.54806403

South America is set as base variable and Asia, Africa, Europe, North America and Oceania is set as dummy variables.

i. $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$

Continents are not jointly significant in explaining the variation in the Corruption Perception Index.

$$H_1: \beta_1, \beta_2, \beta_3, \beta_4, \beta_5 \neq 0$$

Continents are jointly significant in explaining the variation in the Corruption Perception Index.

Level of significance = 0.05

Significance F = p-value = 4.5921×10^{-11}

Decision rule is to reject H_0 if p-value is lesser than level of significance. P-value is 4.5921×10^{-11} . Since p-value is smaller than level of significance, we reject H_0 . Therefore, we will reject H_0 and continents are jointly significant in explaining the variation in the Corruption Perception Index when there is a 5% level of significance.