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## Article

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# Utilization of Energy Sources, Financial Stability and Prosperity in the Economy of Indonesia

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## ABSTRACT

The aim of this study was to explore the relationship between utilization of energy sources, financial stability and prosperity in the economy of Indonesia. For this purpose this study conducted panel data analysis and gathered data from 1990 to 2018. The study explored the relationship of CO<sub>2</sub> emissions and utilization of energy sources per capita as indicators of utilization of energy sources. The indicators for financial stability were real domestic credit to the private sector where the financial information of different financial institutions operating in Indonesia has been collected. The prosperity in the economy indicator for Indonesia was gross domestic product per capita and also the labour force that works within different sectors operating in the country. Using descriptive statistics, Unit root analysis, and the autoregressive distributed lag techniques, a panel data analysis was conducted. The results of showed that there is long term relationship between utilization of energy sources, financial stability and prosperity in the economy indicators of Indonesia.

**Keywords:** Financial Stability, Utilization of Energy Sources, Gross Domestic Product, Autoregressive Distributed Lag

**JEL Classifications:** B26, O13

## 1. INTRODUCTION

The international trend highlights that effective utilization of energy sources leads towards the attainment of the prosperity in the economy within various developing states. The study conducted by Yang and Wang (2018) states that Indonesia is one of those developing countries that focus on the rise of apprehension over increasing the utilization of energy sources in terms of the method of low emission of CO<sub>2</sub> and green growth. Since the independence of Indonesia, the prosperity in the economy of the country has faced various issues in terms of depending upon its exports and also within the energy sector of the country. Based on the study conducted by Hasnisah et al. (2019), Indonesia is one of those countries being rich into natural resources including minerals, coals, oil and gas and also in agricultural products. It has been found in the study conducted by Alam et al. (2016), the energy sector has a dominant contribution in the growth of the GDP based

on both supply and demand sides. When it comes to Indonesia, development in the sector of energy is one of the most significant factors of manufacturing specifically on the supply side. Besides the prosperity in the economy of Indonesia, energy also plays its key role within increasing the living standards of its citizens and also to enhance the capital, labour and materials of the country (Hasnisah et al., 2019).

The study of Bashir et al. (2019) asserted that consumption of energy impacts significantly on the growth of the Indonesian economy in terms of having a causal relationship between these factors. The view of utilization of energy sources depends on the consumption patterns within the country where energy-rich countries and energy-poor countries both rely on the utilization of energy sources and energy conservation policies developed by their assigned authorities (Sasana and Aminata, 2019). Various studies identified significant relationships between utilization of sources of

energy and the fostering economy where the causality runs from the utilization of energy sources to GDP, it shows that the economy is highly dependent on energy (Widyaparaga et al., 2017). Thus, it takes to a certain thought that energy is a stimulus towards the prosperity in the economy (Nawaz et al., 2019). In the light of the study of Kurniawan and Managi (2018), shortage of energy and less utilization of energy sources indicate that there might be an insignificant effect on the enhancement of the economy of a country. Secondly, if the causality runs from the GDP to the utilization of energy sources, it shows that the prosperity in the economy is not dependent on the utilization of energy sources and the country is energy independent (Widyaparaga et al., 2017). When it comes to the fostering of the financial units, the relationship between prosperity in the financial aspects and fostering of the GDP is also considered to be highly significant that primarily depends on the effectiveness and growth of the financial sectors operating in the country. According to the study conducted by Hasan (2018), in Indonesia, financial institutions and the openness of the country towards international trading play a significant role in boosting the economy towards growth. However, there are various studies that argue on the higher effect of fostering of financial strength on the GDP increase of Indonesia as some studies consider it to be the primary factor and some studies consider it to be a secondary factor for making an economy grow rapidly.

The economy of Indonesia has had a history of suffering from the economic downfall specifically due to the Asian Financial Crisis that impacted its economy in a negative manner (Ghosh et al., 2017). Moreover, lack of the effective utilization of its resources and its resistance towards the openness in trade also had a negative impact on its economy as the financial institutions had not been capable enough to attain sustainable growth. In the economic perspective, the linkage within the financial fostering and the stability of the economy is divided into two distinct categories that include supply-leading effect on the economy, demand-following fostering of the economy (Sari et al., 2018). Nasreen et al. (2017) found that financial stability improves environmental quality; while the increase in economic growth, energy consumption and population density are detrimental for environment quality in the long-run for South Asian countries. The results also support the environmental Kuznets curve (EKC) hypothesis which assumes an inverted U-shaped path between income and environmental quality. The study conducted by Dewi et al. (2018) explained these categories stating that supply leading is related to the financial stability leading towards the prosperity in the economy and demand following is related to the prosperity in the economy leading towards the financial stability. However, the argument still remains within various studies in terms of the effect of stability in terms of financial aspects that lead towards the stability of the economy (Ghosh et al., 2017). Despite all this, it becomes evident that the prosperity in the economy requires the effectiveness within the financial institutions that lead towards financial stability.

## 2. LITERATURE REVIEW

There have been various studies conducted related to the connection between the consumption of energy and the fostering in the economic conditions and also the stability based on the

financial aspects leading towards the progress of a nation. In accordance with the study conducted by Erahman et al. (2016), the prosperity in the economy of Indonesia is dependent on the energy sector as it is one of the countries that are rich in natural resources specifically in Asia. This study shows the unidirectional link within fostering of the economy and stability in financial aspects in Indonesia. As the trade openness in Indonesia has increased, the country has become more efficient in terms of exporting its energy resources that have been impacting its GDP in a positive manner (Bakirtas and Akpolat, 2018). According to the study conducted by Farabi et al. (2019), developing countries that are rich in energy resources, their economies are boosting rapidly in terms of the increased demand of oil and gas globally. When it comes to the consumption of energy, there are various studies such as Bakhtyar et al. (2017) that have shown mixed results in terms of the effect of utilizing energy on fostering the economy and making it stable. The use of energy within the prosperity in the economy as it could lead towards the short term prosperity in the economy but can bring various hindrances in the long term growth of the Indonesian economy.

$H_1$ : Utilization of energy sources has a significant impact on the prosperity in the economy of Indonesia.

The study conducted by Nugraha and Osman (2019) states that the effective governmental policies regarding the consumption of energy are highly essential in terms of attaining prosperity in the economy that also depends on the efficient allocation of resources. This study focuses on that the government of Indonesia should discourage energy reduction policies and various new sources of energy must be discovered in order to boost prosperity in the economy. The study conducted by Kristjanpoller et al. (2018) states that the rise in the prosperity in the economy leads towards the demand of energy within the country in terms of exports and also in terms of consumption. However, there has been a debate on utilization of energy sources in different studies in terms of the types of energy that are renewable and non-renewable energies. It has been found in the study conducted by Isik et al. (2018) that renewable energy can lead towards a long term prosperity in the economy and non-renewable energy sources cannot lead the Indonesian economy towards fostering the economy for a long period of time. The reason behind this is the consumption patterns of the non-renewable energy sources in the country as these energy sources might end after a certain period of time and its ineffective usage. Moreover, a unidirectional strong relationship between the utilization of energy sources leading towards stability in the economy of the developing countries where the government is focused on making price ceiling policies in order to facilitate the economy towards sustainable growth.

$H_2$ : Prosperity in the economy of Indonesia is highly dependent on the non-renewable energy sources.

When it comes to the stability in financial aspects and prosperity in economy of Indonesia, the relationship between financial stability and prosperity in the economy implies positive impacts on the growth of the GDP of Indonesia. According to the study conducted by Durusu-Ciftci et al. (2017), there is a long-term impact of the financial stability and prosperity in the economy of Indonesia as it is dependent on the capabilities of financial institutions operating

within the country. On the other hand, the study conducted by Aginta et al. (2018) found the causality from the financial stability to the prosperity in the economy where there is a co-integration between financial stability and prosperity in the economy in Indonesia. The role of financial institutions operating in Indonesia is also dependent on the openness within the international trade of the country internationally that increases the effectiveness of these financial institutions within these countries leading towards the prosperity in the economy of Indonesia. According to the study conducted by Lenee and Oki (2017), the link on the domestic credit to the private sector and the economic stability is significant than the broad money and prosperity in the economy. Indonesia is one of those countries that have been impacted negatively specifically after the Asian Financial Crisis in terms of the downfall of its economy. Moreover, the lack of effective allocation of resources and lack of skilled human capital has also had an impact on its prosperity in the economy. In the light of the study conducted by Saud et al. (2019), market capitalization also plays a vital role in the financial stability in Indonesia that could lead the Indonesian economy towards rapid growth. This particular study has found the bi-directional causality between the prosperity in the economy and the capital market where the market capitalization ratio, broad money and the financial rate system drive the stability of the economic aspects for the country.

H<sub>3</sub>: Financial stability boosts the prosperity in the economy significantly in Indonesia.

There has also been a huge argument in previous studies conducted on the financial capabilities and the stability in the economy of Malaysia that led into two different concepts regarding the prosperity in the economy and the financial stability. The first concept built was based on the prosperity in the economy driving towards financial stability and the second concept was based on the financial stability driving the prosperity in the economy in Indonesia. However, the debate still remains within the available literature that requires the need of conducting a specific study on the Indonesian capital market for assessing the effect of financial growth on the growth of the Indonesian economy (Ajija and Rizal, 2019). Therefore, it would be evident that financial stability has a drastic significant impact on the economy of Indonesia. Moreover, when the utilization of energy sources and financial stability are concerned in terms of having an integrated impact on the Indonesian economy, previous studies highlight both of these aspects to be essential for the prosperity in the economy of the country. However, the need is to make utilization of energy sources and conservation policies effective and also to make financial institutions work effectively based on the openness within the trade of the country globally.

H<sub>4</sub>: Effectiveness of financial institutions are highly significant for the prosperity in the economy of Indonesia.

### 3. DATA AND METHOD

#### 3.1. Unit Root Test

The main objective of the study was to evaluate the association between the utilization of energy sources, financial stability and prosperity in the economy of Indonesia. The source of data reflects on the collection of secondary data which are from Federal

Reserve economic data, World Bank and trading economies. The variables identified for reflecting the energy sources, financial stability and prosperity are the labour forces, energy consumption, CO<sub>2</sub> emission and real domestic credit to the private sector. With respect to the economic growth, it is measured by the GDP per capita of Indonesia. The time period on which the data is collected is from 1990 till 2018. On this basis, the annual time series data is collected where the assumption of the classical time series model is required to conduct testing for identifying whether the data is stationary and the error containing the data has zero mean and finite variance. Hence, the most appropriate technique for measuring the stationary and non-stationary of data is through the unit root. Similarly, Paparoditis and Politis (2018) has pointed out in conducting the unit root test among the dataset as non-stationary data can result in causing invalid empirical results of the standard regression model. The technique adopted for conducting the unit root test is through the Augmented Dickey Fuller (ADF) where its model is expressed below:

$$\Delta c_t = \tau_0 + \tau_1 t + \tau_2 c_{t-1} + \sum_{i=1}^n \tau_{i+1} \Delta c_{t-i} + \mu_t$$

In the model,  $\Delta$  is identified as a difference operator while the component  $n$  represents the lag and  $\mu_t$  is reflected in the random error of the stationary. With respect to the unit root test, the null hypothesis is that  $c_t$  is the non-stationary series.

#### 3.2. Autoregressive Distributed Lag (ARDL)

The standard linear function for measuring the long term association between the utilization of energy sources, financial stability and prosperity in the economy of Indonesia is expressed below:

$$C_t = \beta + \theta LF_t + \theta EC_t + \theta RDC_t + \theta CO_{2t} + \mu_t$$

With respect to the model,  $C_t$  is reflected the GDP per capita of Indonesia, LF variable is reflected to the labour force, EC is denoted as the energy consumption, RDC is indicated as the real domestic credit to a private institution and CO<sub>2</sub> is reflected to the emissions of carbon dioxide and lastly,  $\mu_t$  is defined as the usual error. The existence of the long-term cointegration among the variables identified has been measured through the ARDL. The use of ARDL reflects on mainly two rationales in which the first reason for the approach is that it is applicable regardless of the variables consisting of stationary or non-stationary data. The second reason is that the approach determines the cointegration association regardless of low power. Furthermore, the error correlation model (ECM) is applied to the dataset which is expressed below:

$$\begin{aligned} \Delta C_t = & \beta_1 + \sum_{i=1}^{m1} \theta_{1i} \Delta C_{t-i} + \sum_{j=0}^{n1} \theta_{1j} \Delta LF_{t-j} + \sum_{j=0}^{n1} \theta_{1j} \Delta EC_{t-j} \\ & + \sum_{j=0}^{n1} \theta_{1j} \Delta GRDC_{t-j} + \sum_{j=0}^{n1} \theta_{1j} \Delta CO_{2t-j} + \gamma_1 c_{t-1} + \gamma_2 LF_{t-1} \\ & + \gamma_3 EC_{t-1} + \gamma_4 RDC_{t-1} + \gamma_5 CO_{2t-1} + \mu_t \end{aligned}$$



The model above indicates that the null hypothesis is that the cointegration among the variables  $C_t$  and regressor variables which can be detected by the F-statistics. The null hypothesis model is  $H_0: \gamma_1=\gamma_2=\gamma_3=\gamma_4=\gamma_5=0$  on which if the value of F-statistics is below the critical value, then it cannot be rejected. If the cointegration among the variables is determined then the next step is required in conducting long-run and short-run model which are provided below respectively.

$$\Delta C_t = \beta_2 + \sum_{i=1}^{m2} \vartheta_{2i} \Delta C_{t-i} + \sum_{j=0}^{n2} \vartheta_{2j} \Delta LF_{t-j} + \sum_{j=0}^{n2} \vartheta_{2j} \Delta EC_{t-j} + \sum_{j=0}^{n2} \vartheta_{2j} \Delta GRDC_{t-j} + \sum_{j=0}^{n2} \vartheta_{2j} \Delta CO_{2t-j} + \mu_{2t}$$

$$\Delta C_t = \beta_3 + \sum_{i=1}^{m3} \vartheta_{3i} \Delta C_{t-i} + \sum_{j=0}^{n3} \vartheta_{3j} \Delta LF_{t-j} + \sum_{j=0}^{n3} \vartheta_{3j} \Delta EC_{t-j} + \sum_{j=0}^{n3} \vartheta_{3j} \Delta GRDC_{t-j} + \sum_{j=0}^{n3} \vartheta_{3j} \Delta CO_{2t-j} + \phi \varepsilon_{t-1} + \mu_{3t}$$

Where  $\phi$  is denoted as the statistically significant coefficient error and is the negative sign which reveals as to how speedily the variables are converging.

## 4. RESULTS

### 4.1. Descriptive

This section analyses the data and its characteristics using descriptive statistics. The basic purpose of descriptive analysis is to make inferences about the data and how the value exist with respect to various measures.

The average of mean of the GDP per capita is 1139.72 with a standard deviation of 1208.97. From these statistics this study infers that a smaller standard deviation shows high level of consistency in the values of the GDP per capital variable. The maximum and minimum values are 3893.59 and 42.60 which implies that during the period on average the GDP per capita increased by 1139.72. Furthermore, the value of skewness shows that the data have normal distribution and the Kurtosis of 3.18 indicates that in the distribution majority of the values are higher

than average value. Based on the significance value of Jarque-Bera it can be inferred that the null hypotheses that GDP per capita has normal distribution cannot be rejected.

Similarly in case of the mean of labour force the value is 7.83 and the standard deviation indicates that the values lie within 7.88 of the mean value. Since the standard deviation is relatively small therefore it can be opined that there is high level of consistency in the values of the labour force variable. The maximum and minimum values are 8.12 and 7.31 which implies that during the period on average the value of labour force increased by 7.83 on average. In case of the coefficient of skewness the results indicate that the data dos not follow normal distribution and supplementary evidence to this assertion is that the value of Kurtosis of 2.37 from which it can be inferred that majority of the values in the series are less than average value. Finally the significance value of Jarque-Bera is  $0.088 > 0.05$  and indicates that the null hypotheses that labour force follows a normal distribution has to be rejected.

In addition to this, change of real GDP of the Philippines is 29.12%; where minimum and maximum values were 28.61% and 29.85%. This indicates that on average the real GDP of Philippines has increased by 29.12% on average, and in same period it has went highest growth rate of 29.85%, and minimum growth during the period was 28.61%. This indicates that real GDP change of the Philippines is exceptionally high, making the country one of fastest growing country in terms of real GDP. Meanwhile, the standard deviation of the real GDP is 0.38% which is significantly lower, and implies that real GDP has been increasing almost at constant rate, and that is the reason behind lower standard deviation.

Furthermore, the mean of utilization of energy sources is 57.02 and standard deviation is 57.32 which is relatively high and thus implies that the values are far spread from the mean value. The maximum and minimum values are 85.72 and 35.94 respectively from which this study infers that on average the value in the given period decreased from 85.72 to 35.94 by 57.02%. The coefficient of skewness is 0.23 which indicates that it is closer to zero and thus follows normal distribution. In addition, the Kurtosis value of 1.67 indicates that majority of the values are lower than the average value. Based on significance value of Jarque-Bera  $0.107 > 0.05$  this study infers that the null hypothesis that consumption follows normal distribution cannot be rejected.

	GDP_PER_CAPITA_USD	LABOUR_FORCE	ENERGY_CONSUMPTION	RDCPS	CO <sub>2</sub> _EMISSION
Mean	1139.722	7.834933	57.02786	23.97410	232731.5
Median	608.4297	7.889321	57.32476	24.10451	191153.4
Maximum	3893.596	8.120452	85.71972	60.84890	637772.8
Minimum	42.60210	7.314386	35.94235	2.034623	23395.46
SD	1208.977	0.223191	16.06377	17.97300	186417.0
Skewness	1.278730	-0.663926	0.236267	0.281368	0.809230
Kurtosis	3.184799	2.374229	1.672805	1.992224	2.536585
Jarque-Bera	14.79318	4.848250	4.465652	2.997639	6.376880
Probability	0.000613	0.088556	0.107225	0.223394	0.041236
Sum	61545.01	423.0864	3079.505	1294.602	12567499
Sum Sq. Dev.	77466205	2.640153	13676.37	17120.53	1.84E+12
Observations	54	54	54	54	54

Furthermore, the mean of RDCPS is 23.97 and standard deviation is 24.10 which is relatively high and thus implies that the values are far spread from the mean value. The maximum and minimum values are 60.84 and 2.034 respectively from which this study infers that on average the value in the given period increased from 2.034 to 60.84 by 23.97%. The coefficient of skewness is 0.281 which indicates that it is closer to zero and thus follows normal distribution. In addition, the Kurtosis value of 1.99 indicates that majority of the values are lower than the average value. Based on significance value of Jarque-Bera  $0.22 > 0.05$  this study infers that the null hypothesis that consumption follows normal distribution cannot be rejected.

Finally, the mean of CO<sub>2</sub>\_EMISSION is 232731.5 and standard deviation is 191153.4 which is relatively high and thus implies that the values are far spread from the mean value. The maximum and minimum values are 637772.8 and 23395.46 respectively from which this study infers that on average the value in the given period increased from 23395.46 to 637772.8. The coefficient of skewness is 0.809 which indicates that it is close to zero and thus follows normal distribution. In addition, the Kurtosis value of 2.53 indicates that majority of the values are lower than the average value. Based on significance value of Jarque-Bera  $0.04 > 0.05$  this study infers that the null hypothesis that consumption follows normal distribution must be rejected.

## 4.2. Unit Root Test

The purpose of conducting unit root test is to evaluate whether the data is stationary or otherwise. In other words, provided that there is a systematic pattern in the data there is a problem in the data itself. If there are systematic patterns then it is almost impossible to have forecasts for future values because there is a unit root in the data. In addition, the unit root results are also used to evaluate the trends in terms of random walk, assuming that there is the prediction of future values will again be impossible. Overall the test shows that if there is unit root in the data it implies that it is non-stationary and there are systematic patterns and random walk due to which the data cannot be used for prediction purposes. Using the Augmented Dickey-Fuller (ADF) test unit root results are summarized in following table for each variable:

## 4.3. ADF Unit Root Test

Augmented Dickey-Fuller test statistic	t-Statistic	Prob.
GDP_PER_CAPITA_USD	0.593	0.988
LABOUR_FORCE	-3.86	0.004
ENERGY_CONSUMPTION	-2.429	0.138
CO <sub>2</sub> _EMISSION	1.885	0.999

As per the null hypotheses of ADF test it is assumed that there is unit root in the data. Using the statistics reported above it can be inferred that the significance value of GDP\_PER\_CAPITA\_USD is  $.988 > 0.05$  and thus it can be inferred that the null hypotheses cannot be rejected and thus there is unit root in the data. Similarly, in case of LABOUR\_FORCE using the statistics reported above it can be inferred that the significance value of LABOUR\_FORCE is  $0.004 < 0.05$  and thus it can be inferred that the null hypothesis is rejected and thus the unit root does not exist in this variable. Similarly, in case of ENERGY\_CONSUMPTION using the

statistics reported above it can be inferred that the significance value of ENERGY\_CONSUMPTION is  $0.138 > 0.05$  and thus it can be inferred that the null hypothesis is rejected and thus the unit root does not exist in this variable. Similarly, in case of CO<sub>2</sub>\_EMISSION using the statistics reported above it can be inferred that the significance value of CO<sub>2</sub>\_EMISSION is  $0.999 > 0.05$  and thus it can be inferred that the null hypothesis is rejected and thus the unit root does not exist in this variable.

Based on the inferences above it can be concluded that none of the variables can be used to apply of regression or VAR except LABOUR\_FORCE, therefore there is a need to use co-integration testing and for this purpose this study conducted ARDL bounds testing.

## 4.4. ARDL Models

The ARDL models are standardly regressed equations which use both independent and dependent variables as regressors. Although ARDL models have been employed in econometrics for many decades, lately they have gained increasing popularity as a method that explain dynamic long run and co-integrated relationships between variables. Following table presents results of ARDL bounds testing using GDP\_PER\_CAPITA\_USD as independent variable and LABOUR\_FORCE, ENERGY\_CONSUMPTION, RDCPS, and CO<sub>2</sub>\_EMISSION as Dynamic regressors (with 4 lags, automatic expansion through reviews).

The ARDL can only be applied when there are lagged values in the dependent, the current, and lagged values of the independent variable(s). Furthermore, ARDL uses both exogenous and endogenous variables as regressors with the condition that no variable be integrated of Order I(2) while some series may show I(0) and I(1) order or if all variables show I(1) order. The ARDL shows both short and long term relationship models provided that there is co-integration and if there is no co-integration, the ARDL model provide only short term models. The results below show that there is long term relationship between utilization of energy sources, financial stability and prosperity in the economy in case of Indonesia.

F-Bounds test		Null hypothesis: No levels relationship		
Test statistic	Value	Sig.	I(0)	I(1)
Asymptotic: n=1000				
F-statistic	5.950777	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37
Finite sample: n=55				
Actual sample size	53	10%	2.345	3.28
		5%	2.763	3.813
		1%	3.738	4.947
		Finite sample: n=50		
		10%	2.372	3.32
		5%	2.823	3.872
		1%	3.845	5.15

The results above indicate that f-statistics  $5.95 > I(1)$  at 10%, 5%, 2.5%, and 1% from which this study concludes that we have to

reject the null hypotheses which is no relationship at all levels and hence, it can be concluded that there is a long term relationship with utilization of energy sources and financial stability as independent variable and prosperity in the economy as dependent variable in case of Indonesia.

## 5. CONCLUSIONS

The aim of this study was to explore the relationship between utilization of energy sources, financial stability and prosperity in the economy of Indonesia. For this purpose this study conducted panel data analysis and gathered data from 1990 to 2018. The study explored the relationship of CO<sub>2</sub> emissions and utilization of energy sources per capita as indicators of utilization of energy sources. The indicators for financial stability were real domestic credit to the private sector where the financial information of different financial institutions operating in Indonesia has been collected. The prosperity in the economy indicator for Indonesia was GDP per capita and also the labour force that works within different sectors operating in the country. The results of showed that there is co-integration between utilization of energy sources, financial stability and prosperity in the economy indicators of Indonesia.

The results above are consistent with past studies. Consider for example, Erahman et al. (2016) who posited that the prosperity in the economy in Indonesian economy shows dependence on its energy sector because this country has rich natural resources as compared to other countries in Asia. The relationship between prosperity in the economy and utilization of energy sources was reflected by unidirectional causality between with income and utilization of energy sources as indicators. Furthermore, it was also shown that with increase in the trade openness in Indonesia the efficiency of its exports of energy resources also showed improvement with a positive impact on the GDP of the economy. These results were matching those provided in Bakirtas and Akpolat (2018).

Considering the broader prospective of developing countries and not specifically Indonesia Farabi et al. (2019) showed that the developing countries with rich energy resources show positive prosperity in the economy with high pace as they increase their exports of oil and gas across the globe. However, there are also studies that show mixed results in terms of relationship between utilization of energy sources and prosperity in the economy. For instance, although there was a positive impact of utilization of energy sources on prosperity in the economy in short run, in the long run the results showed that there were different obstacles facing prosperity in the economy of Indonesia.

Throughout this study, there have been some limitations that restricted the study towards limited data collection and also towards findings that could be more detailed. Firstly, there was the limitation of the time span on the basis of which the data collection and data analysis became restricted due to the short time span. Moreover, this study has only been focused on the energy growth of Indonesia that only provided the data based on the energy sector and financial institutions operating in Indonesia.

However, this study could have been conducted in other Asian countries that are growing at a rapid pace. Furthermore, this study could have also focused on other sectors other than energy and financial sectors that could have given more detailed findings in terms of the impact of these other sectors on the prosperity in the economy of Indonesia.

## REFERENCES

- Aginta, H., Soraya, D., Santoso, W. (2018), Financial stability and income inequality in Indonesia: A sub-national level analysis. *Economics and Finance in Indonesia*, 64(2), 111-130.
- Ajija, S.R., Rizal, R.M. (2019), Financial deepening and prosperity in the economy in Indonesia. *Media Trend*, 14(1), 24-32.
- Alam, M.M., Murad, M.W., Noman, A.H.M., Ozturk, I. (2016), Relationships among carbon emissions, prosperity in the economy, consumption of energy sources and population growth: Testing environmental Kuznets curve hypothesis for Brazil, China, India and Indonesia. *Ecological Indicators*, 70, 466-479.
- Bakhtyar, B., Kacemi, T., Nawaz, M.A. (2017), A review on carbon emissions in Malaysian cement industry. *International Journal of Energy Economics and Policy*, 7(3), 282-286.
- Bakirtas, T., Akpolat, A.G. (2018), The relationship between consumption energy sources, urbanization, and prosperity in the economy in new emerging-market countries. *Energy*, 147, 110-121.
- Bashir, A., Thamrin, K.H., Farhan, M., Mukhlis, M., Darta, P.A. (2019), The causality between human capital, consumption energy sources, CO<sub>2</sub> emissions, and prosperity in the economy: Empirical evidence from Indonesia. *International Journal of Energy Economics and Policy*, 9(2), 98-105.
- Dewi, S., Majid, M.S.A., Kassim, S. (2018), Dynamics of financial stability, prosperity in the economy, and poverty alleviation: The Indonesian experience. *South East European Journal of Economics and Business*, 13(1), 17-30.
- Durusu-Ciftci, D., Ispir, M.S., Yetkiner, H. (2017), Financial stability and prosperity in the economy: Some theory and more evidence. *Journal of Policy Modeling*, 39(2), 290-306.
- Erahman, Q.F., Purwanto, W.W., Sudibandriyo, M., Hidayatno, A. (2016), An assessment of Indonesia's energy security index and comparison with seventy countries. *Energy*, 111, 364-376.
- Farabi, A., Abdullah, A., Setianto, R.H. (2019), Consumption energy sources, carbon emissions and prosperity in the economy in Indonesia and Malaysia. *International Journal of Energy Economics and Policy*, 9(3), 338-345.
- Ghosh, V., Verma, S., Mitra, N., Ariadno, A., Agarwal, S., Padala, S., Singh, M. (2017), The relationship between prosperity in the economy and financial sector development in Indonesia. *International Journal of Emerging Trends in Social Sciences*, 1(2), 61-67.
- Hasan, H. (2018), Relationship between financial stability and prosperity in the economy: Empirical evidence in Indonesia. *International Journal of Economics and Finance*, 10(12), 1-37.
- Hasnisah, A., Azlina, A.A., Che, C.M.I. (2019), The impact of renewable consumption energy sources on carbon dioxide emissions: Empirical evidence from developing countries in Asia. *International Journal of Energy Economics and Policy*, 9(3), 135-139.
- Isik, C., Dogru, T., Turk, E.S. (2018), A nexus of linear and non-linear relationships between tourism demand, renewable consumption energy sources, and prosperity in the economy: Theory and evidence. *International Journal of Tourism Research*, 20(1), 38-49.
- Kristjanpoller, W., Sierra, A., Scavia, J. (2018), Dynamic co-movements between consumption of energy sources and prosperity in the economy. A panel data and wavelet perspective. *Energy Economics*,

72, 640-649.

- Kurniawan, R., Managi, S. (2018), Coal consumption, urbanization, and trade openness linkage in Indonesia. *Energy Policy*, 121, 576-583.
- Lenée, T.L., Oki, J. (2017), Capital market development and prosperity in the economy: Evidence from the MINT countries. *Journal of Economics and Sustainable Development*, 8(2), 68-107.
- Nasreen, S., Anwar, S., Ozturk, I. (2017), Financial stability, energy consumption and environmental quality: Evidence from South Asian economies. *Renewable and Sustainable Energy Reviews*, 67, 1105-1122.
- Nawaz, M.A., Azam, M.A., Bhatti, M.A. (2019), Are natural resources, mineral and energy depletions damaging economic growth? Evidence from ASEAN countries. *Pakistan Journal of Economic Studies*, 2(2), 145-153.
- Nugraha, A.T., Osman, N.H. (2019), CO<sub>2</sub> emissions, prosperity in the economy, consumption of energy sources, and household expenditure for Indonesia: Evidence from cointegration and vector error correction model. *International Journal of Energy Economics and Policy*, 9(1), 291-298.
- Papadimitis, E., Politis, D.N. (2018), The asymptotic size and power of the augmented Dickey-fuller test for a unit root. *Econometric Reviews*, 37(9), 955-973.
- Sari, N., Syamsurijal, A.K., Widiyanti, M. (2018), The impact of Islamic capital market development on prosperity in the economy: The case of Indonesia. *Journal of Smart Prosperity in the Economy*, 3(2), 21-30.
- Sasana, H., Aminata, J. (2019), Energy subsidy, consumption of energy sources, prosperity in the economy, and carbon dioxide emission: Indonesian case studies. *International Journal of Energy Economics and Policy*, 9(2), 117-122.
- Saud, S., Chen, S., Haseeb, A. (2019), Impact of financial stability and prosperity in the economy on environmental quality: An empirical analysis from belt and road initiative (BRI) countries. *Environmental Science and Pollution Research*, 26(3), 2253-2269.
- Widyaparaga, A., Sopha, B.M., Budiman, A., Muthohar, I., Setiawan, I.C., Lindasista, A., Oka, K. (2017), Scenarios analysis of energy mix for road transportation sector in Indonesia. *Renewable and Sustainable Energy Reviews*, 70, 13-23.
- Yang, S., Wang, T. (2018), Analysis of electricity consumption elasticity coefficient of some countries in ASEAN. *Tourism Management*, 1, 18-24.