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Impacts of the Renewable-Energy Consumptions on Thailand's Economic Development: Evidence from Cointegration Test

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ABSTRACT

Thailand is one of biggest developing nation in South Asia, which use greater amount of renewable energy. The objective of this study mainly focused on the paradigm of the use of renewable energy and its impact to Thailand economic development. For this purpose, this study used annual data from 1990 to 2018. The famous time series Auto-Regressive-Distributive-Lag (ARDL) methodology used to examine the impact of renewable energy on Thailand's growth. First generation unit root test applied to check the order of integration and it confirms there exits mixed order of integration and further used granger causality to check the association among energy and growth. ARDL results confirms that use of renewable energy boosts Thailand economic development like 0.57 percent increase in economic development by 1% increase in the use of renewable energy. Additionally, a 1 percent boost in capital formation leads towards the rise in economic development by 0.025 percent. While granger causality confirms that there exits uni-directional association among energy and growth. Hence overall conclude that use of renewable energy has significant impact over economic development. The research recommends that solid instruments which will help in prevention renewable energy market failure locally and internationally among others.

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1. Introduction

Energy is vital component for industry as well as human. Thus, the availability and the supply of energy must be accessible, secure, and sufficient is a critical prerequisite of the sustainability of modern-day civilizations and economic wellbeing. Additionally, the energy requirement is a crucial component in increasing and maintaining the economic developments for any country. Consumption of energy at higher levels is one of the fundamental factors for economic growth which is attained by any country (Okyay, Aricioglu, & Yucel, 2014; Rafindadi, 2015a, 2015b; Rafindadi & Ozturk, 2015). Although, it was emphasized that economic growth and its outcome is determined due to the economic development is thoroughly connected to the consumption of the overall energy (Halicioglu, 2009).

Additionally, higher level of economic growth needs more consumption of energy. Resultantly, the higher level of use of efficient energy utilizes higher levels of economic growth. Now a day's numerous energy resources are present in the world. There is very much discussion on the use of renewable energy resources and most of the studies concludes that renewable energy has one of the best and efficient characteristics among all the principal energy sources.

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The researchers confirm that renewable energy is the best, reliable and sustainable aptitude towards to make sustainable economic, environment and social growth in the country. Furthermore, they conclude that it has less effect on environment as compared to all other energy mixes which makes the environment healthy and clean and also give pleasure to the humans. Because of it has an unharmful and immeasurable abundance as well as an available resource of accomplishing absolute green economic development projections. Despite that, the researchers also discussed that renewable energy is the sole source of the all energies that could make available unwavering energy abundance and the supply levels, which cannot be overextended.

According to the literature, researchers recognized the importance of renewable energy and they confirm that it has much effect economic development while minimizing other factors which effects environment and human being. So, Thailand has decided to segment out it is overall nuclear power by 2022. Also, the elections already have shown that over 80 percent of the country's people reinforced the nation's electricity requirements from home available resources like geothermal, the sun also other replacements, and the wind. With that expansion, it is envisioned that renewable energy resources (RES) include interpretation for at-least 35 percent of Thailand's gross needs of the electricity ingesting up to the year 2020 (Yamusa & Ansari, 2014).

According to the past data, the production of electricity from the renewable energy resources will be increased by 6.3% in the year. In 2000's first quarter renewable electricity is 25% of total energy production and in 2012 it will move increase and in first four quarter it will become to27%. Consequently, it provided 40.2 billion kilowatt per-hour of the electricity, as opposing 35.7 billion kilowatts per hour in a similar year. Important predictable goals of the production by the year 2030 than the year 2040 than the year 2050 are the projections to reach surrounding 50 percent 65 percent and 80 percent correspondingly. Additionally, Thailand's renewable energy market was initiated to have already boosted from 0.8 million of the inhabited customers in the year 2006 up to 4.9 million inhabited customers in the year 2012, which has a boost established more than the 12.5 percent of overall private households in-country, Thailand.

There is another argument to discuss here: in the year 2011, it was predicted that there was an acquisition of the energy that is by over 10.3 TWh, the levels of the power is renewable in the overall usage of the energy. It boosted up to 20 percent in the year 2011 comparably from 10 percent in the year 2005. This specific research attempts to unfold the aspects that if renewable energy has any economic value to Thailand's economic development panorama in this veneration. This research confirms the critical statistical indicators that demarcate the legislators on the agenda that what factors impact a one percent boost in the consumption of renewable energy in Thailand. Furthermore, its effects over the overall gross domestic product (GDP) of the country. The especially significant contribution of this research is the following:

By taking into consideration, the majority of the previous studies (Büsgen & Dürrschmidt, 2009; Monstadt & Scheiner, 2014; Okyay et al., 2014; Rafindadi, 2015b; Schill, 2014) emphasized only the causal association relationship amongst these factors, which affect the consumption of energy. This specific research is mainly associated with comparing contributors to renewable energy in nature, labor, and capital in adorning the economic development predictors of Thailand's economy. Furthermore, the explain some statistical evidence of the use of renewable energy as compared to total energy consumption and check the statistical relationship among renewable energy and economic development which is explained in table 1 and drawn in figure 1. Table 1 shows the statistical data collected from WDI – World Development Indicators of the period 1990 – 2018.

Table 1: Comparison of CO2, GDP, the Energy consumptions & the renewable Energy Consumptions in Thailand

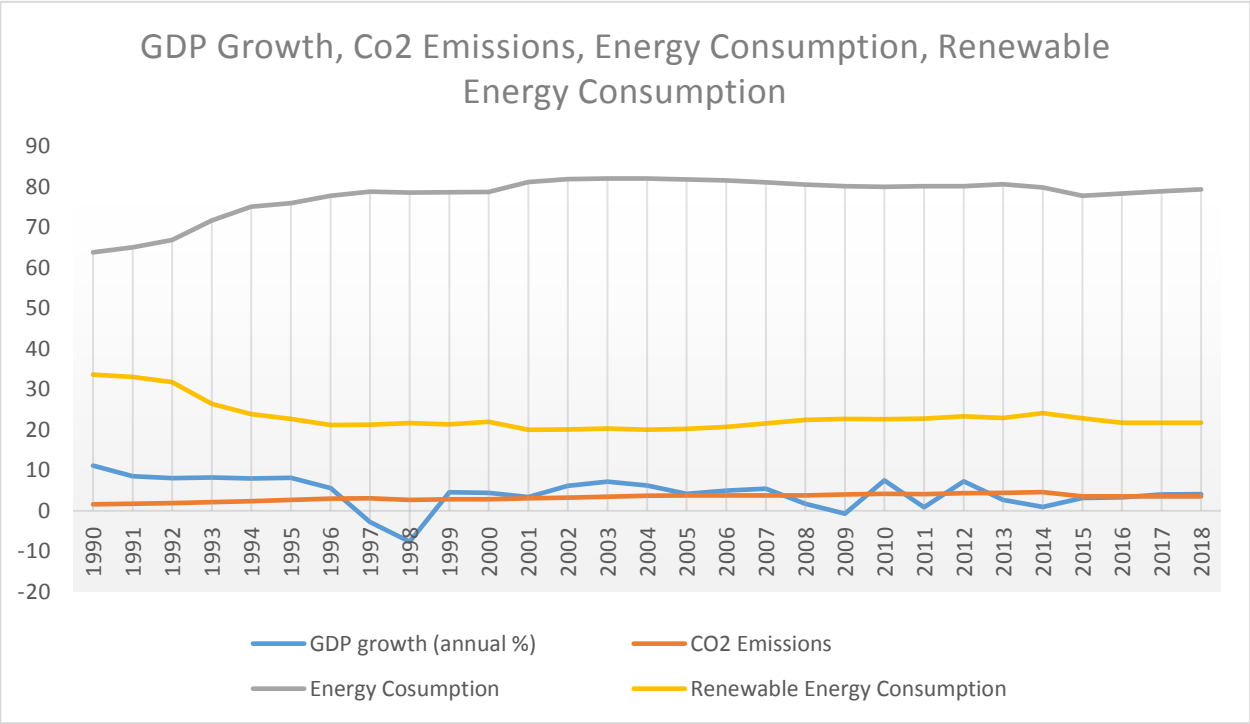
Years	GDP growth (annual %)	CO2 Emissions	Energy Consumption	Renewable Energy Consumption
2000	4.455676031	2.879479006	78.74346474	21.98813771

2005	4.187834924	3.782970222	81.81330376	20.25239594
2010	7.513590658	4.195642184	79.99305669	22.65487764
2015	3.133896962	3.580553511	77.78516234	22.86307013
2016	3.356488872	3.580553511	78.3430512	21.75412045
2017	4.024085781	3.580553511	78.87308486	21.75412045
2018	4.129226103	3.580553511	79.35337036	21.75412045

Table 1 and figure 1 explain the statistical relationship among the use of renewable energy, economic development and overall energy consumption. And it can be easily seen that if there is increase in the use of renewable energy consumption then economic development boosts and overall energy consumption is minimized. Figure 1 shows the association between energy consumption and the Co2-Emission in response and consumption of energy in the proportion of renewable-energy consumption.

Consequences of the policy implication, according to the market failure of renewable energy and the mixtures to the effect are also available in this specific research. Thailand is chosen as the case study in this specific research to study considerations of the high levels of renewable energy and compare the levels achieved by the overall world. To make sure of the health outcomes, annual time series data utilized in this research. Additionally, this study uses the appropriate econometrics technique, which comprises the stationarity test and ARDL-bound test used to estimate the model's cointegration. Those mentioned techniques were seldom utilizing in a majority of the researches on renewable energy.

Figure 1:GDP Growths, Co2-Emissions, Overall Energy Consumption, the Renewable Energy Consumptions



2. Review of Literature

Mostly research is done on examining the association amongst economic developments and consumptions of the energies, and it is a crucial factor of the estimation in the focus substance of the legislative matters and the economics of the energy (Zhang, 2011). Findings of the research revealed that in the recent years, Russia is known as, third-biggest consumer of energy in the entire world. The state-space technique was utilized in the research. Results of this research revealed that there exists cointegration among consumption of energy in Russia and the country's economic growth. To unfold the hidden factors in arrears, the involvement of energy consumption, and to achieve the sustainable developments of Russia's economy. The research revealed that Russia's energy efficiency levels, the levels of its development in the

industrial sector, adjustment of the energy structure, and the advancement in the technological sector employing the highest factors of the success obtained.

Another research found the same results (Bakhtyar, Kacemi, & Nawaz, 2017; Mahmoodi & Mahmoodi, 2011; Zhang, 2011), in which the researchers review the association amongst the consumption of energy which is measured by renewable and the income growth level. The researchers utilized the panel data for seven Asian-Countries, Pakistan, Bangladesh, India, Iran, Syria, Jordan, and Sri Lanka, from 1985 up to 2007. Results of the study showed that there exits the uni-directional causality in Pakistan, India, Iran, and Syria. In contradiction to the past development, the two-directional causality was found in Jordan and Bangladesh, and there were existed no causality in the circumstance of Sri Lanka (Apergis & Payne, 2011). The main focus of research of the use of renewable energy for this purpose they used panel data of 80 countries. Objective of the study was to examined the impact of consumption of energy, non-renewable energy, gross fix capital formation, real gross income and overall labor force. Results confirmed the presence of response assumption and also confirmed that there exits the bi-directional association among renewable and nonrenewable energy consumption to economic development (Magnani & Vaona, 2013).

Renewable energy has significant impact to country economic development, this empirical study examined the relationship between energy which is in the form of renewable and economic growth, for this purpose they used panel data of six Central American nations of the time period of 1980 to 2006. And concluded two directional relationship among renewable energy and economic growth in both short and long run (Apergis, Payne, Menyah, & Wolde-Rufael, 2010). More similar research concludes the bi-directional association between energy consumption and economic development (Tugcu, Ozturk, & Aslan, 2012). The researchers strained to determine the presence of any existed association that might survive amongst economic development and the energy that is renewable by utilizing some of Italy's domestic economies. The researcher utilized the time-series data collected from the year 1997 up to the year 2007. Results indicates renewable energy generation has substantial influences in decreasing the previously existing stability of payment restraints. Another argument established in supporting the outcomes of the (Magnani & Vaona, 2013), these researchers also examined the associations amongst the non-renewable and the renewable consumptions of the energy and economic development on data collected from 154 countries (Tugcu et al., 2012) and for ASEAN (Nawaz, Azam, & Bhatti, 2019).

Some studies results revealed that both renewable and nonrenewable energy has significant impact to economic development. So, the researcher focused the manufacturing industry to examined the impact of both renewable and nonrenewable energy. Study concludes that the production of electricity from renewable energy resources boosts economic growth for 154 nations (Kazar & Kazar, 2014). Further the results confirm that there exits long run economic growth leads towards renewable energy manufacturing. Moreover, this study examined the bidirectional relationship between economic development, energy utilization and political perception. Results confirms bidirectional relationship between political sustainability and economic growth and also between the political and capital sustainability (Menegaki & Ozturk, 2013).

Ucan, Aricioglu, and Yucel (2014) examined the impact of renewable and nonrenewable energy consumption on economic growth for this purpose they used the panel of 15 European nations from 1990 to 2011. And results indicate that renewable energy consumption leads to increase economic development of European nations and there is also positive association among greenhouse gases and real GDP growth. While nonrenewable energy has significant and adverse on economic development in those continents. Furthermore, results conclude that nonrenewable energy is separated from the overall study. In addition of the study was, petroleum energy consumption boosts the level of real GDP. This study concludes that use of solid fuel energy has not significant impact to economic growth while petroleum energy has significant impact to economic development with increase in carbon emission level. With the reference of this study Shaaban and Petinrin studied the impact of renewable energy in Nigeria and concludes that, renewable energy not only improved the well being of the people it boosts energy and economic prospective which attracts global investment level.

According to recent studies, that linked the presence of causal bidirectional relationship among renewable energy and economic growth includes (Apergis & Payne, 2011; Sari, Ewing, & Soytas, 2008) and more recently studies like (Ben Jebli, Ben Youssef, & Ozturk, 2015; Kaplan, 2015; Komal & Abbas, 2015; Radomes Jr & Arango, 2015; Tigas et al., 2015; Zhang, Bian, Tan, & Song, 2017). In a comparable way, Sari et al. (2008) examined the bidirectional interlinkages between renewable energy and industrial output with the help of ARDL for USA. And found the existence of conservation hypothesis. In case of panel studies different authors concludes different results from different econometrics models like (Apergis & Payne, 2011; Inglesi-Lotz, 2016; Omri & Chaibi, 2014; Woo, Chung, Chun, Seo, & Hong, 2015). For example, Woo et al. (2015) examined to identify the environmental significance from renewable energy for 31 OECD nations on the other hand Apergis and Payne (2011) studied the energy hypothesis in six Central American nations. Inglesi-Lotz (2016) also found that renewable energy boosts economic growth. The rest of study concludes on threes sections. Data and methodology is discussed in section 3, while empirical results are explained in section 4 and finally the conclusion and policy recommendation are discussed in section 5.

3. The Methodological Framework

The current study's primary purpose is to study the comprehensive impact of renewable energies on a country's economic development prospect while managing renewable energies systems in its energy structure, further use capital and labor force participation to energy demand function in the case of Thailand. The time interval for this study is from 1990 to 2018, and the functional forms of energy demand functions are as follows:

$$Y_t = f(RENG, K_t, L_{t)} \quad (1)$$

The mentioned series were transformed in-to logarithm, and the model is developed as follow:

$$\ln Y_t = \gamma_o + \gamma_1 \ln(RENG)_t + \gamma_2 \ln(K)_t + \gamma_3 \ln(L)_t + \epsilon_t \quad (2)$$

Where 'Y' is the natural-logarithm of USD per-capita GDP representing economic development, RENG is the natural-logarithm of the renewable-energy consumptions (% of final energy consumption), and K is the natural-logarithm of the gross fixed capital formation. The Natural logarithm of the labor force participation rate % of the total labor force. γ_o shows the intercept of the equation and $\gamma_1 to \gamma_3$shows the slope of renewable energy, gross fix capital formation, and labor force participation rate to economic growth and ϵ_t is the residual-term. Concerning this development, research continues to employ (M. H. Pesaran, Shin, & Smith, 2001) ARDL bound experimental methods. This method has many advantages and could be compared with Johansen's s-Cointegration technique (Johansen & Juselius, 1990). Firstly, a small sample is needed to compare this with the Johansen's-Cointegration method (Ghatak & Siddiki, 2001; Omri & Chaibi, 2014). See also (Rafindadi & Yusof, 2013a, 2013b, 2015). Second, the ARDL bound test method does not need to integrate variables in a similar order. The ARDL-method could be applied regardless of whether the constructs are simple I (0) or I (1) or mix integration. To implement the ARDL bound test method, an equation can be used. Convert (1) to (UECM) Unconditional-Error Correction Model, which looks like this:

$$\log(ENVI)_t = \pi_o + \sum_{i=1}^{p} \pi_1 \Delta\log(ENVI)_{t-1} + \sum_{i=0}^{p} \pi_2 \Delta\log(FDEV)_{t-1} + \sum_{i=0}^{p} \pi_3 \Delta\log(GDPPCG)_{t-1} + \sum_{i=0}^{p} \pi_4 \Delta\log(ECON)_{t-1} + \sum_{i=0}^{p} \pi_5 \Delta\log(TRADE)_{t-1} + \pi_6 \log(ENIV)_{t-1} + \pi_7 \log(FDEV)_{t-1} + \pi_8 \log(GDPPCG)_{t-1} + \pi_9 \log(ECON)_{t-1} + \pi_{10} \Delta\log(TRADE)_{t-1} + \varepsilon_t \quad (3)$$

Estimations of the long-term and the short-term parameter using an (ECM) error-correction model. To ensure dynamic convergences under long-term equilibrium, the sign of coefficients of the lagged (ECM-1) error-correction terms must be statistically significant and negative. The diagnostic test includes functional form, sequence correlation, heteroscedasticity, and normality (B. Pesaran & Pesaran, 2009). Once the indicators are cointegrated on long term relationships, long term (Rafindadi, 2016; Rafindadi, Yusof, Zaman, Kyophilavong, & Akhmat, 2014) short-term causality can be studied. See also (Rafindadi & Yusof, 2013a, 2014). Annual data of Thailand of the time span of 1990 to 2018 have been taken from World Development Indicators-WDI (World Bank, 2020).

4. Empirical Results

Table 2: The Summary Statistics

Indicators	GDPPC	RE	GFCF	LF
Mean	8.090631	3.138374	3.318964	4.284989
Median	7.970416	3.120485	3.2341	4.292785
Maximum	8.892002	3.51569	3.72942	4.32695
Minimum	7.319165	2.996965	3.016027	4.212142
Std. Dev.	0.487549	0.138	0.239527	0.031655
Skewness	0.174735	1.654856	0.77586	-0.96378
Kurtosis	1.588542	5.090157	2.018479	3.033027
Jarque-Bera	2.554833	18.51524	4.073553	4.490878
Probability	0.278757	0.000095	0.130449	0.105881
Observations	29	29	29	29

4.1 Unit Root Test

The first step is to test the variable's unit-root characteristic to check the cointegration association of the long-term. Further, we applied the Augmented Dickey-Fuller unit-root test (ADF) to estimate the factors' unit-root characteristics. Table 3 shows the outcomes of ADF unit-root tests. That indicates that all indicators have an order of integration of I(1) instead of RE, which has I(0). Hence, it is concluded that there is a mixed order of integration to move the ARDL methodology.

Table-3: The Augmented Dickey-Fuller (ADF) unit-root test

Variable	Levels		First Diff.	
GDP	-2.68025	0.252	-3.31687	0.0849
GFCF	-2.53817	0.3088	-3.48768	0.061
RE	-3.45715	0.0172		
LF	-1.75909	0.6972	-5.59174	0.0005

4.2 ARDL Estimation

The ARDL bond test cointegration approach is utilized to inspect the cointegration amongst the factors. The AIC-Criteria are utilized for the lag-selections also maximum lag-length.

Table 4: The Short-run & Long-run estimates

Dependent Variables: GDP per capita				
Short-run estimates				
Variable	**Coefficient**	**Std. Error**	**t-Statistics**	**Prob.**
D(GDPPC(-1))	0.0043	0.2540	0.0169	0.9868
D(GDPPC(-2))	0.0039	0.2341	0.0168	0.9869
D(GDPPC(-3))	0.0037	0.2146	0.0170	0.9867
D(RE)	2.2116*	0.8005	2.7629	0.0172
D(RE(-1))	1.0022*	0.5334	1.8788	0.0848
D(GFCF)	0.9350**	0.2442	3.8288	0.0024
D(LF)	-1.1198	1.7704	-0.6326	0.5389
D(LF(-1))	2.9435	1.8093	1.6269	0.1297
CointEq(-1)	-2.1512***	0.1206	-17.8425	0.0000
Long run Estimates				
RE	0.5707**	0.2303	2.4783	0.0291
GFCF	0.0250	0.0809	0.3084	0.7630
LF	1.7090**	0.5547	3.0808	0.0095
C	6.8475**	2.3057	2.9698	0.0117
Model Diagnostic				
R- squared				0.9897
Adjusted R- squared				0.9793
Durbin- Watson stat				1.9248
Serial Correlation LM Test:				0.9151

Breusch-Pagan-Godfrey	0.8013
Ramsey RESET Test	0.7860

Note: ***, ** and * show 1%, 5% & 10% levels of significance correspondingly.

Table 4 shows the long-term result, which displayed that renewable energies consumption positively influences Thailand's economic development and is significant at a 1% level. The research found that, for every 1% rise in renewable energy consumptions, Thailand's economic development rate will increase by 0.5707%, while other aspects will remain unchanged. Strategic marketing systems need to be developed for smaller and smarter, also the integrated-renewable energy. That is because of effective market integration. It would lead to greater competition between markets, which reduces the overall cost of renewable energy production for suppliers and consumers, thereby establishing a synergistic balance between them.

The results confirmed the process of integrating of renewable products would be designed to include the more effective inclusions and also use of greenhouse energy which could be attained through ongoing publicizing efforts of green energy. While defining-value priorities for customers, providing cost-effectiveness to the individual consumer, and ensuring continued quality of the customer services would be the effective social-marketing approaches to apply. Correspondingly important is the need to adopt innovative services differentiation by assessing consumers' information based on their needs and priorities. These strategies can be used to capture market segments in the local market and also be designed with their qualifications to attract international consumers based on their high reputation in terms of the image and reputation recognized as any user of Thai green-energy goods. Those opinions would similarly help to avoid negatively post-purchasing discord, especially for international consumers.

The impact of the capital on economic development is statistically insignificant and positive. This labor force has also positive and has a significant influence on Thailand's economic development. Keeping other things remains constant; it was found that the economic development of 1.709% was due to a 1% rise in the labor force. The result of short-term examinations is shown in Table-7 (above paragraph). The outcomes show that renewable energy consumptions have had an insignificant and positive impact on economic development. There is a positive and significant link between capital and economic developments. The impact of the labor force on renewable energy consumption is statistically insignificant and positive. The ECM value is negative and statistically significant. The lagged ECM is estimated at 2.15%. That shows that the model will come to an equilibrium condition less than a year with a speed of 2.15% annually. So, the long-run association between the exogenous and endogenous indicators is also confirmed from the bound test in table 5.

Table 5: Bond Test

Critical Value	**5.00984**	
Significance	**I0 Bound**	**I1 Bound**
10%	3.03	4.06
5%	3.47	4.57
2.50%	3.89	5.07
1%	4.4	5.72

The result of the diagnostic test indicates no indication of heteroscedasticity, serial-correlations, besides the ARCH problem. The coefficient of the Ramsey-reset tests shows that the functional form for the short-run model is well-specified.

To determining the causality between variables, Granger's-causality applied. The test would enable us to test directions of causality between model variables. The direction of the underlying association among variables is useful for designing Thailand's global policy on renewable energy, capital, and labor, which would greatly help control energy demands to consolidate its economic development prospects. The result is shown in Table-6. The results display long-term and short-term causal results. In this analysis, long-term research findings have found that there is a two-way causal association amongst the consumptions of the renewable-energy with economic growth in the case of Thailand.

Table6: The Granger Causality

Null Hypothesis	Obs.	F-Statistics	Prob.
RE cannot Granger effect GDPPC	27	0.14296	0.8676
GDPPC cannot Granger Effect RE		2.03465	0.1546
GFCF cannot Granger Effect GDPPC	27	1.94763	0.1664
GDPPC cannot Granger Effect GFCF		6.70885	0.0053
LF cannot Granger Effect GDPPC	27	0.67359	0.5201
GDPPC cannot Granger Effect LF		11.5303	0.0004
GFCF cannot Granger Effect RE	27	0.04592	0.9552
RE cannot Granger Effect GFCF		3.1538	0.0625
LF cannot Granger Effect RE	27	0.7737	0.4735
RE cannot Granger Effect LF		0.13906	0.8709
LF cannot Granger Effect GFCF	27	0.29705	0.7459
GFCF cannot Granger Effect LF		1.69364	0.207

Additionally, there exists a unidirectional relationship between energy consumption and gross investment level. Furthermore, economic development attracts the capital level, but investment does not boost economic development in Thailand. Like economic development and labor force, economic development attracts the labor force, but the labor force does not cause economic development. It concludes that economic expansion is the key indicator to help economic intervention.

5. Conclusion

This study investigates the combined economic benefits of renewable-energy consumptions and how they affect Thailand's economic development prospects. To make sure, this research incorporates the capital and the labor into enhanced in neo-classical production functions. This study continued from 1990 to 2018, take the data from the World Bank. The research applied first generation Augmented dickey Fuller Unit-Root (ADF) test to check the variable order of integration and it confirmed that there exits mixed order of integration. For long and short run estimates model is examined by ARDL methodology. Further this study checks the causal relationship amongst them for this purpose this study utilizing Granger-causality framework and it confirm there exits uni-directional relationship among them. Renewable energy consumption boosts economic development and on the other hand capital stimulates economic development. While labor also have significant and positive effect over economic development.

Moreover, it needs to be emphasized that the company's propensity for renewable energy would depend on technological improvements, efficiency, reliability, economic, and general acceptance within the given social network. After that, one careful investigation of those factors is often referred to as green-power consumerism, which requires a concentrated effort to address these issues and should focus on commercial and social marketing strategies and be a strong candidate. Hence it helps to eliminate those factors which create barriers to the green energy product. The research also pointed out that, the comprehensive economic benefits of Thai renewable-energy markets, social marketing would be the prerequisite aimed at all business-life-cycle stages, as that is the best mechanism that could help. To evade the failure of the renewable-energy market in Thailand also the world where those products penetrate to other places. After that, the role of commercial marketing cannot be overlooked. Though, it would be applied at the same time as social marketing activities. We believe that the demand for social marketing of renewable energy products helps stimulate consumers to buy back products.

This development is expected to contribute to avoiding the disappointment of the specific and cooperative renewable-energy product markets. Internationally, the marketing of renewable-energy products would address society's population's needs and assume that consumers are buying clean energy to ensure resource economy, physical compatibility, technological progress, and political signs of progress socio-cultural and legal relevance's. Optimized the personal wellbeing by reducing carbon dioxide emissions. Those would be emphasized as the main advantage of a distinctive feature of Thai renewable-energy internationally.

Furthermore, for finding of the international customers of renewable-energy products, those would be the basic positioning aspect of products. To confirm sustainable development in that area, international social-marketing must be combined with the commercial-marketing to outward the systems for important product acceptability with-out harming any other stage of product-life-cycle. Lastly, this study concludes that Thailand's fading incentives (FIT) problem, which is currently disappearing, would be treated with attention, as this argument may open up trends in renewable-energy-production market-trends. To avoid that, the research emphasizes that in Thailand, there should be more obvious policy choices than effective energy policies.

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