



PRO-HUMAN ECONOMIC INDICATORS AND THEIR RELATIONSHIP WITH ENVIRONMENTAL SUSTAINABILITY IN ASEAN COUNTRIES: ANALYZING HUMAN CAPITAL INVESTMENT, BRAIN DRAIN AND IMMIGRATION THROUGH PANEL DATA

**Soheil Kazemian¹, Ahmed Abdullah Saad Al-Dhubaibi², Norlaila Md Zin³, Zuraidah Mohd Sanusi⁴,
Zalina Zainudin^{5*}**

¹*Edith Cowan University, Australia*

²*Prince Sattam Bin Abdulaziz University, Arab Saudi*

³*Universiti Teknologi MARA, Malaysia*

⁴*Accounting Research Institute, Universiti Teknologi MARA, Malaysia*

^{5*}*Business School, Universiti Kuala Lumpur, Malaysia*

Emails: [*zalina@unikl.edu.my](mailto:zalina@unikl.edu.my) (corresponding author)

Received 15 October 2019; accepted 10 July 2020; 30 October 2020

Abstract. The focus on the human development indicators has been increasing. A number of studies focusing on the institutional and economic effects of immigration, brain drain and development of human capital through increased investments has been performed. However, the present study evaluates the effects of these variables on the environmental sustainability of the ASEAN countries for the period ranging 1990-2019. The study evaluates the causal and magnitude of these indicators on the environmental sustainability. The study focuses on the evaluation of the data by means of a unit root test, panel cointegration test, estimation procedure and the causality analysis. The results show that the variables are integrated at the first order and are stationary, also the variables showed cointegration and long run relationships. The FMOLS estimation process using the grouped and pooled estimation technique has been used. The results show that the effects of immigration are insignificant on environmental sustainability, brain drain has an inverse relation and the human capital investments show positive associations with environmental sustainability. Moreover, the causality analysis also shows positive causal associations to be present between the dependent, independent and control variables. The study has important theoretical and practical implications as well.

Keywords: FMOLS; HCI; Brain drain; ASEAN.

Reference to this paper should be made as follows: Kazemian, S., Al-Dhubaibi, A., Md-Zin, N., Mohd-Sanusi, Z., Zainudin, Z. 2020. Pro-human economic indicators and their relationship with environmental sustainability in ASEAN countries: analyzing human capital investment, brain drain and immigration through panel data. *Journal of Security and Sustainability Issues*, 10(Oct), 360-371. [http://doi.org/10.9770/jssi.2020.10.Oct\(29\)](http://doi.org/10.9770/jssi.2020.10.Oct(29))

JEL Codes: Q01

1 Introduction

Environmental sustainability can be described as the protection of the environmental resources for the future. The increased pressure of economic development on the countries worldwide has taken a huge toll on the environmental resources. Many governments are working on sustaining the environmental resources while working hard for the economic growth. Environmental sustainability is very important for the health of the ecosystem in long term. In the recent years many environmental issues have been highlighted which are getting more and more serious with each passing year (Melville, 2010; Vezzoli & Manzini, 2008). Governments have been working together to make the strict decisions required for the preservation of the environmental resources for the future generations. The renewable energy sources are being promoted in order to decrease the use of coal and oil. Research is being done on wind and solar power sources. The issues such as global warming are too large to be handled by a few countries so joint effort is being made by all the countries including the ASEAN countries. The ecological structure is being safeguarded along with the various endangered species. Experts have even suggested that the extension of different species can be a limitation for the future technological development (Ekins, 2000; Moldan, Janoušková, & Hák,

2012). There are many policies that have been implemented across the globe for improved sustainability of the environment. These include carbon tax, government limitations on emission of harmful pollutants, encouraging the use of more sustainable energy sources and environmental cost benefit analysis. ASEAN countries have also recognized this issue and are working on improving the sustainability of the environment (Ismail & Abdullah, 2012; Tilman & Clark, 2014). The following table 1 highlights the number of corporations in the following ASEAN countries that are accountable for their sustainability reporting.

Table 1: Sustainable Reporting

ASEAN country	Number of companies with sustainable reporting
Indonesia	More than 100
Malaysia	100
Singapore	71
Thailand	Greater than 90

According to the ASEAN association, the sustainable development can be described as keeping up with the needs of the present without compromising the resources required for fulfilling the future needs. Various experts have taken different approaches while discussing the environmental sustainability (Elliott, 2012; Vithayasrichareon, MacGill, & Nakawiro, 2012). The main aim is to cater the economic, social and environmental needs of the present without exploiting the environmental resources. The economic development should be balanced with the environmental development. ASEAN community has recognised this risk and continued to make effort to improve the situation. The Agenda for Sustainable Development was started by the ASEAN countries for improving the living standards of their population (Masud, Kari, Banna, & Saifullah, 2018; Roh, Thai, & Wong, 2016). It has been estimated that by conserving the environment in this region the economy can be boosted by approximately 7.1 % till 2025. This will be helpful in generating new jobs and increasing the employment rate while maintaining the sustainability of the environment. The ASEAN region is rich with natural resources and well known across the globe for the climate change and wide range of biodiversity. Like the rest of the world the natural resources in this region are also under pressure due to the increased economic pressure (Corrás-Arias, 2020; Kanchana & Unesaki, 2014; Tongsoptit, Kittner, Chang, Aksornkij, & Wangjiraniran, 2016). The demands of the population are constantly increasing, and it is becoming more and more difficult to meet those demands without exploiting the natural resources. The urbanization of the major cities in the region has resulted in the consumption of many natural resources. Malaysia has one of the largest reserves of natural resources across the globe. The following graph (Figure 2).

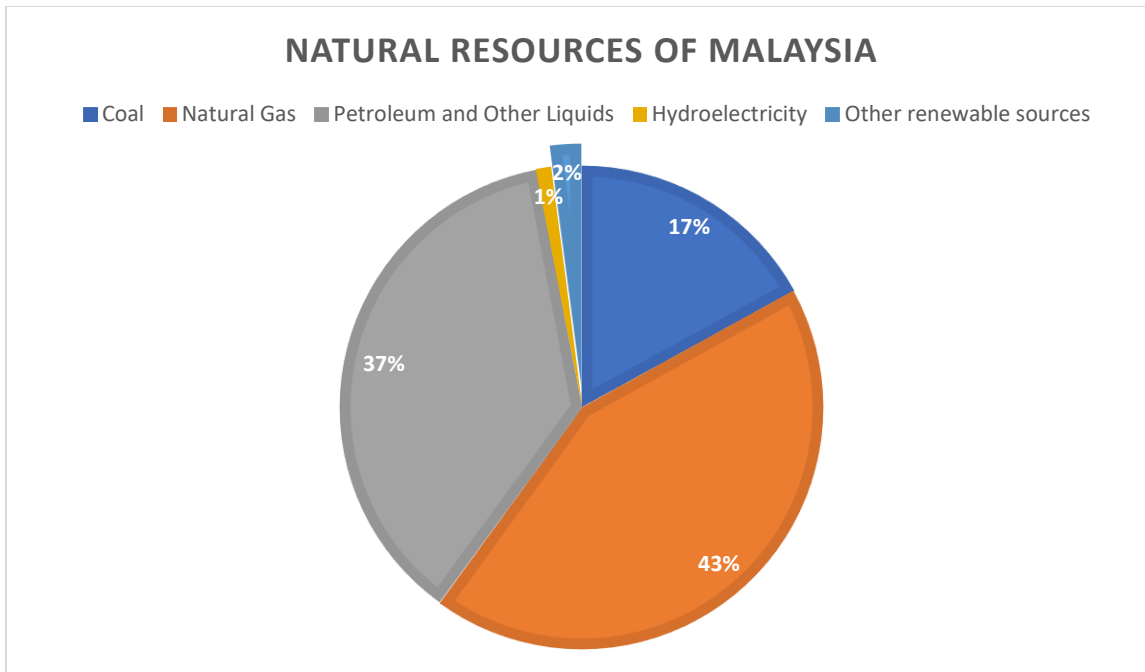


Figure 1: Natural Resources

The exploitation of the natural resources is increasing with every passing year. There is a huge need to stop the environmental degradation so that the environment is preserved for the future generations. In order to preserve the environment effectively it is essential to study and analyse all the factors affecting it (Koh, 2007; Mulqueeny, 2004). There are numerous factors that are linked with the environmental degradation especially in the ASEAN countries. In this paper we will be focusing on the effect of pro human economic indicators on the environmental sustainability in the ASEAN region.

2 Literature Review

In this section we will analyse the relationship of pro human economic indicators with the environmental sustainability. The indicators under study in this paper include human capital investment, brain drain and immigration.

Relationship between Human Capital Investment and Environmental Sustainability in the ASEAN countries

Human capital investment can be described as one of the intangible assets that cannot be recorded on any balance sheets (Karimi, Yusop, & Law, 2010; Thangavelu & Narjoko, 2014). It is the measure of the skills and experience the individuals have. It also includes the health, intelligence, training and education of the individuals. On a larger scale it includes the business opportunities, training and guidance available to the population. Investment in these areas have proven to increase the profitability and productivity on an individual level (Kheng-Lian & Robinson, 2002; Timothy, 2003). It can help maximize the efficiency of all the resources being utilized for development purposes. Many businesses have various methods for calculating the human capital. The most commonly method is dividing the total profits by the amount invested in human capital. Through this the return on investment on human capital can be calculated. Human capital has a major impact on the economic development of any business or country. The depreciation of human capital is occurred due to extended periods of unemployment. It becomes difficult to keep up with the innovation and the latest technology due to increased depreciation of human capital (Hoang & Bui, 2015; Ismail & Abdullah, 2012). The link between the economic growth and the human capital

investment is very strong. The more skills and experience the individuals have the better they perform. The relation between human capital investment and environmental sustainability has been varying through literature. Those individuals trained for the economical skills and knowledge have been shown to promote the economic and industrial development (Ferguson, 2004; Vithayasrichareon et al., 2012). The increase in industrial development has proven to have a negative impact on the environment in the ASEAN countries. The emission of pollutants and increased consumption of natural resources is directly linked with the increase in industrial and economic development (Hussain et al., 2020). The increased economic pressure on ASEAN countries has led to an increase in this trend. However, in the recent years many countries including the ASEAN nations have been investing human capital carefully. The environmental issues have been highlighted and many researchers and institutions have been working on environmental solutions. The waste treatment in industries is being promoted. Proper training and awareness regarding recycling and reuse is becoming more common. Due to the increased economic pressure, research is being conducted on sustainable energy sources like solar and wind energy. Individuals are now being trained according to the future needs of the environment (Lian & Robinson, 2002; Sovacool, 2009). Environmental studies have been added as compulsory subject in schools. Professional level studies are conducted in order to improve the environmental conditions. Such trends are not that common due to the increased economic pressure. It has been evident through literature that there is a relationship between the environmental sustainability and human capital investment.

Hypothesis one (**H1**) is that the human capital investment has an impact on the environmental sustainability in the ASEAN countries.

Relationship between Brain Drain and Environmental Sustainability in the ASEAN countries

Brain drained can be defined as the migration of professional and skilled people from one nation to the other. They mostly do this in order to get better facilities and have an improved quality of life. The political and social living conditions of the country are the main reasons behind the increasing brain drain (Asgari-Jirhandeh; Bui & Või, 2007). This phenomenon is not only associated with the developing countries rather with the developed ones as well. The policy makers are facing this huge challenge of brain drain. After careful analysis one of the main reasons behind brain drain were found out to be the lack of human capital investment along with the creative work force. Without adequate human capital investment there are less facilities and learning opportunities for the individuals (Kittrakulrat, Jongjatuporn, Jurjai, Jarupanich, & Pongpirul, 2014; Van Minh et al., 2014). The lack of proper job opportunities is caused by this. The individuals are unable to live a comfortable life without proper employment. Research has shown that there is a connection between development opportunities, capital investment and brain drain. Due to the increased brain drain the country loses human resource (Bouchon & Rawat, 2016; Feeny & McGillivray, 2013). The educated, trained and specialized individuals leave from the nation. The government faces the loss of funds spent of the education and training of the individuals that migrate. Research has shown that the human capital has greater value than the other resources like financial capital (Broinowski, 2016; Dahlui & Aziz, 2012). Due to increased brain drain the sustainable development becomes difficult. The economic and environment development of the nation is affected. This trend has been highlighted in the ASEAN countries. Every sector of the country is affected due to it. The research and progress is reduced. The issues are not solved efficiently. A lack of funds and human resource resulted in less contribution to the environmental sustainability (Chen & Su-Yen, 2016; SALLEH & SALLEH, 2017).

Hypothesis two (**H2**) is that the brain drain has an impact on the environmental sustainability in the ASEAN countries.

Relationship between Immigration and Environmental Sustainability in the ASEAN countries

Immigration is the movement of individuals from one country to the other. These individuals leave behind their homes and jobs. There are many reasons behind immigration including the lack of facilities, job opportunities, hunger, unsuitable living conditions, lack of adequate educational facilities, increased oppression many more (Nguitragool, 2010; Timothy, 2003). They move looking for better opportunities for themselves and their families.

Each nation has a limited capacity of individuals that can reside there. The resources are limited, especially the environmental resources. Whether the immigration is legal or illegal it increases the pressure on the resources (Kheng-Lian, Robinson, & Lin-Heng, 2016; Tabucanon, 2013). The balance between the individuals and the resources is disturbed. Over population is directly linked with the changes in the environment. Resources such as fresh water, air and soil are limited. In many cases it has been observed that the economic development is increased due to increased workforce, but the environmental degradation is increased as well. Issues such as congestion, urban sprawl, pollution, water consumption, water generation and land conversion arise (Cruz, 2003; Nazeer & Furuoka, 2017). The basic human needs cannot be fulfilled such as clean drinking water and fresh air. Due to the increased individuals the traffic increases which is linked with the increase in the emission of pollutants. Many environmental changes are visible. The increased population leads to an increased amount of waste. More industries are set up in order to provide the employment opportunities. Forests are cut down to make room for more houses essential construction (Cruz, 2005; Koh, 2013). This increased deforestation has a negative impact on the environment as well. Increased number of populations requires more essential products and facilities. The production of the industries has to be increased. If these industries do not treat the waste than they cause more water and air pollution. The governments and authorities have made policies regarding the treatment of this waste but in such circumstances it becomes difficult to enforce these policies (Lian, 2009; Nonthasoot, 2017). Due to the increased human population and deforestation the animal species get extinct. Such circumstances lead to an imbalance in the environmental conditions. The resources are exploited. This is how the immigration has a direct impact on the environmental sustainability.

Such trends have been prominent in the ASEAN countries.

Hypothesis three (**H3**) is that the immigration has an impact on the environmental sustainability in the ASEAN countries.

3 Materials and Methods

On the basis of existing literature, the study has used the neoclassical production function for the analyses of the relationship between environmental sustainability, human capital investment, brain drain, population and literacy. The independent and control variables, HCI, BRD, IMM, POP and LIT have been used as individual inputs for the study whereas ENS is the output. The production function is defined as follows.

$$ENS_{it} = f(HCI_{it}, BRD_{it}, IMM_{it}, POP_{it}, LIT_{it}) \quad (1)$$

The functional relationship is transformed into a linear model as follows.

$$ENS_{it} = \alpha_{it} + \beta_{1i}HCI_{it} + \beta_{2i}BRD_{it} + \beta_{3i}IMM_{it} + \beta_{4i}POP_{it} + \beta_{5i}LIT_{it} + \varepsilon_{it} \quad (2)$$

In equation 2 α stands for the slope and β 's is used as the intercepts or the coefficient of each explanatory or control variables and ε_{it} is used to represent the error term.

Data

The study used annual data and focused upon the pro-human economic indicators for completing this study. The study is focused on the ASEAN region that includes a total of ten countries: Cambodia, Brunei, Indonesia, Thailand, the Philippines, Laos, Myanmar, Malaysia, Vietnam and Singapore. The data has been collected from the period ranging 1990-2019. The study focuses on the outcome variable environmental sustainability, independent variables brain drains, human capital investments and immigration and the control variables population and literacy rates. The environmental sustainability is defined in terms of emissions of the Co2 and is measured in kt, the control variables are taken from the ILO estimates and are defined as the total number of human individuals present in an economy and the number of educated individuals from the total population. Brain drain is defined as the immigration

of skilled or qualified workers from an economy to another, it is measured through human capital flight, the immigrations are evaluated in terms of country estimates of the people that have immigrated from their home country to another, human capital investments are measured in terms of the value of the efforts put for developing the human capital of an economy. The data regarding these parameters has been collected from the OECD library, WDI, ILO and country specific governmental websites.

Unit Root Test

The unit root test is performed on the data in order to evaluate the integrating relationship among the variables (Im, Pesaran, & Shin, 2003). And also, to find out the stochastic properties or stationary properties of the variables. The tests that are usually used for the above-mentioned purposes include Levin Lin Chu LLC and Im Pesaran Shin IPS unit root tests. The main point of differentiation of these tests is that LLC provides same or homogeneous autoregressive process while IPS provides heterogeneous autoregressive process (Pesaran, Shin, & Smith, 2001). Both tests are derived from the augmented Dickey Fuller tests and these are more useful as compared to the traditional unit root tests. The null hypothesis for the test is that the unit root is present in the data whereas the alternate hypothesis contends that the unit roots isn't present in the variables.

These hypotheses can be evaluated, and the required results can be drawn in accordance with the equation given below:

$$\Delta y_{i,t} = a_i + \rho y_{i,t} - 1 + \sum_{j=1}^{pi} a_j \Delta y_{i,t-j} + \varepsilon_{i,t}$$

Here $\Delta y_{i,t}$ is the difference that $\Delta y_{i,t}$ shows for ith country for the specific time period of t

Panel Co-integration Test

The cointegration test is the next evaluative measure performed after discovering the order of integration and stationary properties from the unit root test. The co-integration tests are used for evaluating the cointegrating relationships among the variables and also to find out the prevalence of long run relationships among the variables. For this purpose, the Kao and Pedroni (Kao, 1999; Pedroni, 1999) cointegration test is applied. The null hypothesis in this case indicates that there is no cointegration existing among the variables while the alternate hypothesis in this particular case shows that cointegrated relationships exist among the variables (Engle & Granger, 1987). The tests are performed on the basis of within dimension and across the dimension approaches. The within dimension statistics are divided or evaluated on the basis of v-statistic, rho-statistic, PP-statistic and ADF statistic and in the same manner the between dimension approach consists of just three test statistic values rho-statistic, PP-statistic and ADF statistic. The null hypothesis is accepted or rejected on the basis of the significance of the coefficients of these statistics (Enders, 2008). The following equation has been used to estimate the cointegration test.

$$y_{i,t} = \alpha_i + \delta_{i,t} + \beta_1 X_{1,i,t} + \beta_2 X_{2,i,t} + \dots + \beta_n X_{n,i,t} + \varepsilon_{i,t}$$

DOLS Tests

DOLS estimation techniques are used for long run estimations of the variables. The methods of evaluation are based on the OLS estimation procedure, however these tests account for endogeneity and serial correlation among the variables. If there is a cointegrating vector present in the variables and their order of integration is also one, these tests are more suitable for providing authentic results. The researcher has used FMOLS technique in this study which can be given in the form of an equation as follows:

$$\hat{\beta}_{FM} = \left(\sum_{i=1}^N \sum_{t=1}^T (x_{i,t} - \bar{x}_i)^2 \right)^{-1} \sum_{i=1}^N \left(\sum_{t=1}^T (x_{i,t} - \bar{x}_i) \widehat{ENS}_{i,t} - T \hat{\delta}_{\varepsilon u} \right)$$

In this equation, $\widehat{ENS}_{i,t}$ is the transformed variable of environmental sustainability due to endogeneity correction while $\hat{\delta}_{\epsilon u}$ represents the serial correlation correction by DOLS.

4 Empirical Findings

Unit Root Tests

The unit root tests developed by IM, Pesaran and Shin has been used in the study. The main purpose of the application of the unit root tests are the to evaluate the order of integration and the stationary properties of the data. The results of the analysis are presented in table 1. The variables present with different values at both the constant and constant trend columns. The results show that the variables economic sustainability, human capital investment, population and literacy rate are significant at level. However, on the shift to fist difference all variables are significant and devoid of the unit root properties. The results show that upon the first difference the order of integration becomes one and the variables become stationary. The stars or the * show that the significance level at which the null hypothesis are rejected. * represents 1 percent significance, ** is an indication of 5 percent significance and *** is an indication of 10 percent significance. At the first difference the null hypothesis is rejected on the 5 and 10 percent levels of significance.

Table 2: Unit Root Test

Constructs	Level		1 st Difference	
	Constant	Constant+ Trend	Constant	Constant+ Trend
ENS	-2.2003*	-2.3004*	-7.4577**	-7.2395***
HCI	-2.9393*	-2.2433*	-6.3399***	-6.3005***
BRD	-0.1330	-0.2044	-5.2994**	-5.2395**
IMM	-2.1933	-2.2203**	-5.6294**	-5.4995**
POP	-3.2030*	-3.2477	-6.2884**	-6.3334***
LIT	-2.3293*	-2.2294*	-6.6374**	-6.3994***

Panel Cointegration Results

In order to evaluate the presence of cointegration between the time series as well as the long run relations between the variables the researcher has used the Pedroni cointegration method. The results of the analysis are depicted in table 2. The variables have been evaluated on the basis of within dimension and across dimensions approaches. The * represents the rejection on 1 percent level of significance, ** shows rejection on the 5 percent level of significance and *** shows rejection on the 10 percent level of significance. It can be seen from the results that PP, rho and v statistics of the within dimension statistics have rejected the null hypothesis of no cointegration. Whereas the between dimension also rejects the null hypothesis on the basis of the group rho statistic. The Kao test also rejects the null hypothesis, therefore a total of five out of eight statistics have rejected the null hypothesis of no cointegration, thus the alternate hypothesis of presence of integration and a long run relationship is accepted.

Table 3: Panel Cointegration Test

“Alternative hypothesis: common AR coefs. (within-dimension)				
	Statistic	Prob.	Weighted	
			Statistic	Prob.

Panel v-Statistic	-4.43339*	0.0002	8.3387	0.0003
Panel rho-Statistic	3.73124*	0.0000	4.3982	0.0000
Panel PP-Statistic	-4.29444**	0.0304	-5.0938	0.0000
Panel ADF-Statistic	0.48853	0.2999	-0.4399	0.3387

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	5.4092*	.00000
Group PP-Statistic	-6.1447	0.0000
Group ADF-Statistic	-0.4999	0.3044
Kao test.	Statistic	Prob.
ADF	-2.6397*	0.0399

Coefficient Estimation Results

The estimation of the regressors is performed after the absence of unit roots and presence of cointegration among the variables has been confirmed. The methods of FMOLS estimation is used in order to evaluate the magnitude and direction of the independent and control variables on the outcome variable. The results of the estimation have been presented in table 3. The table presents the results of the pooled and grouped estimations. According to the pooled effect human capital investment is significant and produces a magnitude of 28.3 (pooled) and 29 percent (grouped) in the outcome variable environmental sustainability. The change in brain drain is negative i.e. if brain drain increases the environmental sustainability decreases. The pooled estimate has a magnitude of 21 percent and grouped estimate is 22.2 percent. The effect of immigration is insignificant for both pooled and grouped statistics. The control variables population and literacy are also evaluated. Literacy has a positive and significant effect on the environmental sustainability whereas the population is insignificant. The adjusted R squared value for both estimations shows that the model is responsible for evaluating 66 and 67 percent of the variation that occurs in the dependent variable.

Table 4: Coefficient Estimation Test

Variable	Value	Pooled	Grouped
HCI	Beta	0.283**	0.290**
	SE.	0.663	0.388
BRD	Beta	-0.210*	-0.222**
	SE	0.673	0.744
IMM	Beta	0.032	0.054
	SE	0.833	0.122*
POP	Beta	0.022	0.033
	SE	0.788	0.788
LIT	Beta	0.122**	0.122*
	SE	0.637	0.378
Adj. R Square	Beta	0.669***	0.677**
	SE	0.777	0.898

Granger Causality

The granger causality has test has also been used in order to evaluate the causal associations among the variables. The results from the analysis are presented in table 4. The stars present the significance i.e. the indication of causality among the variables. There is an observed causal association between the control variables literacy and population, however the association is unidirectional, the variables human capital investment, brain drain, Immigration,

environmental sustainability and literacy and population all are found to have causal associations with one another. ENS causes HCI, BRD, IMM and LIT, HCI does not cause BRD, IMM, LIT it only has significant association with POP. Whereas BRD has causal associations with IMM, POP and LIT.

Table 5: Granger Casualty Test

Variables	ENS	HCI	BRD	IMM	POP	LIT
ENS	0.736					
HCI	0.548*	0.683				
BRD	0.320*	0.473	0.721			
IMM	0.399*	0.229	0.388*	0.710		
POP	0.233	0.399*	0.122*	0.467*	0.656	
LIT	0.433*	0.299	0.233*	0.382*	0.288*	0.799

5 Discussion and Conclusion

The present study evaluates the effect of brain drain i.e. the movement of skilled and qualified personnel from their home country to another, human capital investments i.e. the investments made for the development of the human capital like education, training etc. and immigration i.e. the movement of the residents from their country of origin to another. These effects have been evaluated and analyzed for their implications on the environmental sustainability. The environmental resources of the world are slowly depleting as a result of increasing population and demands and scarce resources to defend these requirements. The effects of the focused variables can be detrimental for the environmental sustainability, for instance if a country reports that people in quantities of thousands have been immigrating to that area, then it becomes difficult to facilitate all these individuals and the consequence is often the deterioration of environment and economy. Moreover, the movement of qualified individuals to another area also poses deflecting consequences for the environment and economic growth, if a share of the skilled and talented personnel and workforce moves from the country then there are lesser options available for leveraging these resources for the development of a sustainable environment (SHARIFF, KRISHNASWAMY, ABDULLAH, & CHAU, 2018; Zafar & Kantola, 2019). The present study used the FMOLS method and the causality analysis to evaluate the relations between these indicators and found positive relationships.

In this regard the study by Acar (2017) focuses on the environment in Turkey. The study focuses on immigrants and the development in the human capital. The study uses panel estimation to find out that the immigrants and the development in the human capital is gradually fading away over time. The study used education and the degree of immigrants received by the country, the long run effects in such a scenario can be detrimental for the economy and the environment. The environmental sustainability also accounts for the mobility and development of the surroundings or the area in which an individual life. The effect of development in human capital was found to be effective and significant in the present study as well, an individual with knowledge and capacity has the skills to develop sustainable environment. Other studies (Ha, Yi, & Zhang, 2016; Ngoma & Ismail, 2013) have also found the relations between immigrants, education, skilled worker movement (brain drain), human capital developments and economic growth in the long run. The present study evaluates these effects from the standpoint of environmental effects and sustainability, although long term economic benefits can be translated and modelled into environmental benefits as well.

Implications and limitations

The present study focuses on the effects of human capital investment, immigration and brain drain on the environmental sustainability of the ASEAN economies. The focus on these indicators has been developing in recent times and several studies have been conducted on their effects on the economic growth of countries, however the focus on environmental benefits or detrimental effects is scarce therefore the study makes important theoretical contributions. Moreover, the policy makers and the managers can focus on the results of this study and devise

policies for retaining their skilled workers and on the development of their workforce so that the environmental sustainability can be increased.

Like all research studies, along with contributions the present study also faces some limitations. The researcher has only focused upon three indicators of post human indicators, other variables like schooling, education, reasons for immigration etc. can give a rationale and offer more understanding on the topic. Also, the dataset needs to be more diverse so that the effects of these indicators can be evaluated in countries other than the ASEAN region as well.

References

- Acar, E. Ö. (2017). An Outline of Skilled Emigration from Turkey to OECD Countries: A Panel Data Analysis. *International Journal of Economics and Innovation*, 3(1), 1-16.
- Asgari-Jirhandeh, N. SDGs and ASEAN Vision 2025 Examples of enabling environment.
- Bouchon, F., & Rawat, K. (2016). Rural areas of ASEAN and tourism services, a field for innovative solutions. *Procedia-Social and Behavioral Sciences*, 224, 44-51.
- Broinowski, A. (2016). *ASEAN into the 1990s*: Springer.
- Bui, T. G., & Võ, T. T. (2007). Approach to Development Gaps in ASEAN: A Vietnamese Perspective. *ASEAN Economic Bulletin*, 24(1), 164-180.
<https://muse.jhu.edu/article/216144/summary>
- Chen, D., & Su-Yen, W. (2016). ASEAN and the AEC: Challenges and opportunities for human resource management *Asia Pacific Human Resource Management And Organisational Effectiveness* (pp. 17-37): Elsevier.
<https://www.sciencedirect.com/science/article/pii/B9780081006436000026>
- Corrás-Arias, M. Á. (2020). Determinantes de la banca extranjera en España. Un análisis por país de origen. *Cuadernos de Economía*, 43(121).
- Cruz, R. G. (2003). Towards sustainable tourism development in the Philippines and other Asean countries: an examination of programs and practices of national tourism organizations. *Philippine Institute for Development Studies*.
- Cruz, R. G. (2005). Toward the Development of Sustainable Tourism Indicators: An Analysis of Sustain-able Tourism Programs and Practices Among ASEAN National Tourism Organizations. *Sustainable Tourism*, 81.
- Dahlu, M., & Aziz, N. A. (2012). Developing health service hub in ASEAN and Asia region country report on healthcare service industry in Malaysia. *DEVELOPINGASEAN ECONOMIC COMMUNITY (AEC) INTO A GLOBAL SERVICES HUB*, 65.
- Ekins, P. (2000). *Economic growth and environmental sustainability: the prospects for green growth*: Psychology Press.
- Elliott, L. (2012). ASEAN and environmental governance: Strategies of regionalism in Southeast Asia. *Global Environmental Politics*, 12(3), 38-57.
https://www.mitpressjournals.org/doi/abs/10.1162/GLEP_a_00122
- Enders, W. (2008). *Applied econometric time series*: John Wiley & Sons.
- Engle, R. F., & Granger, C. W. (1987). Co-integration and error correction: representation, estimation, and testing. *Econometrica: journal of the Econometric Society*, 251-276.
- Feeny, S., & McGillivray, M. (2013). *The role of ASEAN connectivity in reducing the development gap*: Routledge.
- Ferguson, R. J. (2004). ASEAN Concord II: policy prospects for participant regional" development". *Contemporary Southeast Asia*, 393-415.
<https://www.jstor.org/stable/25798701?seq=1>
- Ha, W., Yi, J., & Zhang, J. (2016). Brain drain, brain gain, and economic growth in China. *China Economic Review*, 38, 322-337.
<https://www.sciencedirect.com/science/article/abs/pii/S1043951X15000292>
- Hoang, H., & Bui, D. (2015). Determinants of foreign direct investment in ASEAN: A panel approach. *Management Science Letters*, 5(2), 213-222.
<http://growing-science.com/beta/msl/1843-determinants-of-foreign-direct-investment-in-asean-a-panel-approach.html>
- Hussain, H., I., Kot, S., Kamarudin, F., & Mun, W., C. (2020). The Nexus of Competition Freedom and the Efficiency of Microfinance Institutions. *Journal of Competitiveness*, 12(2), 67–89. <https://doi.org/10.7441/joc.2020.02.05>
- Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of econometrics*, 115(1), 53-74.
<https://www.sciencedirect.com/science/article/abs/pii/S0304407603000927>
- Ismail, W. K. W., & Abdullah, L. (2012). A new Environmental Performance Index using analytic hierarchy process: A case of ASEAN countries. *Environmental Skeptics and Critics*, 1(3), 39.
- Kanchana, K., & Unesaki, H. (2014). ASEAN Energy Security: An indicator-based assessment. *Energy Procedia*, 56, 163-171.
<https://www.sciencedirect.com/science/article/pii/S1876610214010078>
- Kao, C. (1999). Spurious regression and residual-based tests for cointegration in panel data. *Journal of econometrics*, 90(1), 1-44.
- Karimi, M. S., Yusop, Z., & Law, S. H. (2010). Location decision for foreign direct investment in ASEAN countries: A TOPSIS approach. *International Research Journal of Finance and Economics*, 36(1), 196-207.

<https://mpr.ub.uni-muenchen.de/15000/>

Kheng-Lian, K., & Robinson, N. A. (2002). Strengthening Sustainable Development in Regional Inter-Governmental Governance: Lessons from the ASEAN Way. *Sing. J. Int'l & Comp. L.*, 6, 640.

<https://heinonline.org/HOL/LandingPage?handle=hein.journals/singa6&div=22&id=&page=>

Kheng-Lian, K., Robinson, N. A., & Lin-Heng, L. (2016). *ASEAN Environmental Legal Integration: Sustainable Goals?* (Vol. 13): Cambridge University Press.

Kittrakulrat, J., Jongjatuporn, W., Jurjai, R., Jarupanich, N., & Pongpirul, K. (2014). The ASEAN economic community and medical qualification. *Global health action*, 7(1), 24535.

<https://www.tandfonline.com/doi/full/10.3402/gha.v7.24535%40zgha20.2015.8.issue-s3>

Koh, K.-L. (2007). Asean environmental protection in natural resources and sustainable development: convergence versus divergence. *Macquarie J. Int'l & Comp. Envtl. L.*, 4, 43.

Kim, A., Zvezdin, A., Rogaleva, L., Fitina, L., & Bannikov, S. (2020). Research of personality preparedness for sports performance in young footballers. *Revista de Psicología del Deporte*, 29(2), 185-192

<https://heinonline.org/HOL/LandingPage?handle=hein.journals/macqjice4&div=6&id=&page=>

Koh, K.-L. (2013). A survey of ASEAN instruments relating to peatlands, mangroves and other wetlands: The REDD+ context. *International Journal of Rural Law and Policy*(1), 1-10.

<https://epress.lib.uts.edu.au/index.php/ijrlp/article/view/3349>

Lian, K. K. (2009). *Asean Environmental Law, Policy And Governance: Selected Documents* (Vol. 1): World Scientific.

Lian, K. K., & Robinson, N. A. (2002). Regional Environmental Governance: Examining the Association of Southeast Asian Nations (ASEAN) Model. *Global Environmental Governance: Options and Opportunities*, 101-121.

Masud, M. M., Kari, F. B., Banna, H., & Saifullah, M. K. (2018). Does income inequality affect environmental sustainability? Evidence from the ASEAN-5. *Journal of the Asia Pacific Economy*, 23(2), 213-228.

<https://www.tandfonline.com/doi/abs/10.1080/13547860.2018.1442146>

Melville, N. P. (2010). Information systems innovation for environmental sustainability. *MIS quarterly*, 34(1), 1-21.

Moldan, B., Janoušková, S., & Hák, T. (2012). How to understand and measure environmental sustainability: Indicators and targets. *Ecological Indicators*, 17, 4-13.

<https://www.sciencedirect.com/science/article/abs/pii/S1470160X11001282>

Mulqueeny, K. K. (2004). Regionalism, economic integration and legalisation in ASEAN: what space for environmental sustainability. *Asia Pac. J. Envtl. L.*, 8, 5.

Nazeer, N., & Furuoka, F. (2017). Overview of ASEAN environment, transboundary haze pollution agreement and public health. *International Journal of Asia Pacific Studies*, 13(1), 73-94.

Ngoma, A. L., & Ismail, N. W. (2013). The impact of brain drain on human capital in developing countries. *South African Journal of Economics*, 81(2), 211-224.

<https://onlinelibrary.wiley.com/doi/abs/10.1111/saje.12014>

Nguitragool, P. (2010). *Environmental Cooperation in Southeast Asia: ASEAN's Regime for Trans-boundary Haze Pollution*: Routledge.

Nonthasoot, S. (2017). Humane Aspects of the People-Centred, People-Oriented ASEAN Economic Community. *Tay, S. Tijaja, J.(Ed.) In Global Megatrends: Implications for the ASEAN Economic Community. Singapore: Singapore Institute of International Affairs.*

Pedroni, P. (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and statistics*, 61(S1), 653-670.

<https://onlinelibrary.wiley.com/doi/abs/10.1111/1468-0084.0610s1653>

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of applied Econometrics*, 16(3), 289-326.

Roh, S., Thai, V. V., & Wong, Y. D. (2016). Towards sustainable ASEAN port development: challenges and opportunities for Vietnamese ports. *The Asian Journal of Shipping and Logistics*, 32(2), 107-118.

<https://www.sciencedirect.com/science/article/pii/S2092521216300281>

SALLEH, M. F. M., & SALLEH, A. S. M. (2017). THE RULE OF LAW AND SUSTAINABLE ECONOMIC DEVELOPMENT IN THE ASEAN REGION: MALAYSIA, SINGAPORE, AND THAILAND. *Management & Marketing Journal*, 15(2).

SHARIFF, N., KRISHNASWAMY, J., ABDULLAH, D., & CHAU, A. W. (2018). The influence of new economic model on intention to work abroad: An empirical study to address brain drain issue in Malaysia. *EDITORIAL BOARD*, 101.

Sovacool, B. K. (2009). Reassessing energy security and the Trans-ASEAN natural gas pipeline network in Southeast Asia. *Pacific Affairs*, 82(3), 467-486.

Tabucanon, G. M. P. (2013). An alternative home?: ASEAN and pacific environmental migration. *Cosmopolitan Civil Societies: An Interdisciplinary Journal*, 5(1), 19.

Thangavelu, S. M., & Narjoko, D. (2014). Human capital, FTAs and foreign direct investment flows into ASEAN. *Journal of Asian Economics*, 35, 65-76.

Tilman, D., & Clark, M. (2014). Global diets link environmental sustainability and human health. *Nature*, 515(7528), 518-522.

Timothy, D. J. (2003). Supranationalist alliances and tourism: Insights from ASEAN and SAARC. *Current Issues in Tourism*, 6(3), 250-266.

Tongsopit, S., Kittner, N., Chang, Y., Aksornkij, A., & Wangjiraniran, W. (2016). Energy security in ASEAN: A quantitative approach for sustainable energy policy. *Energy Policy*, 90, 60-72.

- Van Minh, H., Pocock, N. S., Chaiyakunapruk, N., Chhorvann, C., Duc, H. A., Hanvoravongchai, P., . . . Phaholyothin, N. (2014). Progress toward universal health coverage in ASEAN. *Global health action*, 7(1), 25856.
- Vezzoli, C., & Manzini, E. (2008). *Design for environmental sustainability*: Springer.
- Vithayasrichareon, P., MacGill, I. F., & Nakawiro, T. (2012). Assessing the sustainability challenges for electricity industries in ASEAN newly industrialising countries. *Renewable and Sustainable Energy Reviews*, 16(4), 2217-2233.
- Zafar, A., & Kantola, J. (2019). Brain drain in Finland; A real threat or a myth and its impact on Finland's R&D Capabilities. *Zeszyty Naukowe Politechniki Poznańskiej. Organizacja i Zarządzanie*.

Dr **Soheil KAZEMIAN** is a Lecturer in Accounting at Edith Cowan University, Australia and Research Fellow at Accounting Research University (ARI), Universiti Teknologi MARA (UiTM). Before these appointments, he was a Senior Lecturer at Universiti Sains Malaysia (USM). Dr Soheil started his academic career as a postdoctoral research fellow at the Accounting Research Institute (ARI), right after finishing his PhD in Accounting in the same Universiti and institution.

ORCID ID: 0000-0002-3993-7381

Dr. **Ahmed Abdullah Saad AL-DHUBAIBI** is an assistant professor at Prince Sattam Bin Abdulaziz University. He has obtained his Ph.D. in Accounting from the Faculty of Accountancy, MARA University of Technology, Malaysia. Besides his academic career and research interests, he has valuable professional experience in the industry. Further, he has been an audit partner for an audit firm that is a member of one of the top ten global accounting networks.

ORCID ID: 0000-0003-0151-2852

Dr Norlaila MD-ZIN is a lecturer at Universiti Teknologi MARA. She has obtained her Ph.D. in Accounting from the Faculty of Accountancy, Universiti Teknologi MARA, Malaysia. Her research interest include Management Accounting, Performance Management and Sustainability

Orcid ID: 0000-0003-3919-5725

Prof Dr. **Zuraidah MOHD-SANUSI** is a professor at the Faculty of Accountancy and senior research fellow at the Accounting Research Institute. She is currently the director of Centre of Leadership, ILD UiTM. Her main research interest is social business, auditing, forensic accounting, corporate reporting, corporate governance, management accounting and management.

ORCID ID: 0000-0002-8047-4219

Dr. **Zalina ZAINUDIN** is a senior lecturer at Business School, Universiti Kuala Lumpur. Currently, she is the Head of Section, Finance/ Islamic Finance, Business School, Universiti Kuala Lumpur. She is a Certified Financial Planner and a certified member of Financial Planning Association of Malaysia (FPAM). Her research interest includes financial management, corporate finance, debt cost-benefit analysis, determining optimal financing, financial market, financial literacy and financial planning.

ORCID ID: 0000-0003-4343-5613

This work is licensed under the Creative Commons Attribution International License (CC BY).

<http://creativecommons.org/licenses/by/4.0/>



Open Access