



CAN LIFE QUALITY DIMENSIONS ALTER ECOLOGICAL FOOTPRINT FOR SUSTAINABILITY OF ASEAN COUNTRIES? ROLE OF PER CAPITA INCOME, HAPPINESS AND HUMAN DEVELOPMENT

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Abstract. The role of people or humans is critical for the environment as the various activities by the humans might impact the environment in one way or the other because of pollution and other wastes. The life quality of humans is an important aspect related to this aspect and this is the reason why the researcher has planned this study. The major objective of the study is to find out how the three dimensions of life quality i.e. per capita income, happiness and human development impact the ecological footprint in ASEAN countries. To achieve these objectives, the researcher has collected data about the life quality dimensions and the ecological footprint from the ASEAN countries and the data comprises of 30 years in total. As the researcher intends to provide accurate and authentic results for the literature, the gathered data has come from the most authentic data sources which include World Bank Development Indicators and Global Economy. The results obtained by the analysis of the collected data indicates that the impact of all the independent variables of the study i.e. per capita income, happiness and human development have significant impact on ecological footprint.

Keywords: Per Capita Income; Happiness, Human Development; Ecological Footprint; ASEAN Countries

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1. Introduction

It is important to improve the behavior of human beings on the environment to endure progress in human development (Otto & Pensini, 2017). The happiness of the people of a country leads to the enhancement of the ecological footprints that increase the sustainability of ASEAN countries. The welfare of humanity is completely dependent on the healthy assets of ecology. Capita's income and human development help in increasing the level of ecological footprints with the increase of economic development. Sustainable happiness has a positive impact on the environment and the economy of a country and it also results in decreasing environmental degradation and increasing sustainability in ASEAN countries (Charfeddine, Al-Malk, & Al Korbi, 2018). The given table 1 enlists some significant pillars of human development that directly affect environmental sustainability,

Table 1: Features of sustainable human pillars

Pillars of sustainable development	Features
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Ethical guiding principle	Like social as well as democracy justice.
Global equity	Environmental benefits to be equitably distributed over the current generation.
Physical sustainability	Overall global ecological balance
Anthropocentric	Places individuals and their welfare above concepts of ecology.

The people of ASEAN countries are not living with happiness as there is an increase in environmental degradation because of increased economic values (Shadman, Sadeghipour, Moghavvemi, & Saidur, 2016). The emission of greenhouse gases and carbon dioxide has been increasing day by day due to industrialization that increases air pollution and disturbs the quality of an environment. The ecological footprint is not providing the residents of ASEAN countries with particular goods and services to support a better lifestyle. According to Liu, Zhang, and Bae (2017), people are not being provided with the necessary resources and facilities so that they can enjoy the quality of life. Natural resources are being used in ASEAN countries that negatively impacts on the ecology of a country. The consumption of resources and environmental pollution should be reduced (Vithayasrichareon, Nguyen, & Liu, 2016).

By exploring some past researchers' work, it comes to the knowledge that a lot of efforts have been done in the past concerning ecological footprints (EFs) in different regions. Such as an effort recently by M. Majeed (2020) has investigated the impact of overall income factors that positively affect the level of EFs on several income levels. Nevertheless, an effort has not been done concerning ASEAN states and the impact of the life quality of their individuals on the sustainability level of EFs. Hence, the present research is new as well as remarkable to understand the impact of per capita income on the sustainability of EFs. Besides, in previous years, several other analysts such as (Hashimoto, Oda, & Qi, 2018) have also investigated the influence of human life quality on the EFs level in different perspectives and countries. Though, the findings of the present effort are supportive as well as justified certainly because no other study has investigated the overall significant impact of human development and happiness on EFs. At the same time, the study also investigates the direct relationship of per capita income with EFs for the sustainability of ASEAN nations. None of the studies has evaluated the role of life quality dimensions; hence, the present effort is original as well as positive for ASEAN states in terms of EFs. Following the above justification, the present study has the following objectives,

- The initial purpose is to investigate the direct impact of per capita income and ecological footprints for sustainability in ASEAN states.
- The second aim of the study is to evaluate the direct relationship of happiness with the ecological footprint for sustainability in ASEAN nations.
- The third objective of the research is to identify the impact of human development on the ecological footprint for sustainability in ASEAN countries.

It is well known that each research study is important and valuable in its context (Saucier, 2018). The given research study is highly significant and important to analyze and ensure the different dimensions of ecological footprints. The researcher, business analysts, and politicians also can analyze the direct impact of per capita income, the role of human development, and happiness on life dimensions sustainability of ASEAN countries. Additionally, the given study has also a wider scope in ASEAN countries and different other countries of the globe as well that explained the extent to which the research areas are explored. The study has covered the different dimensions and it highly impacts on sustainability performance.

As, the basic structure of typical research is the sequence of introduction, literature, the method used, results, and discussion and each section addresses a unique objective (Bell, Bryman, & Harley, 2018). The current research has also consisted of five chapters with the same sequence. In the introduction chapter, the background and

research objectives along significance and scope have discussed. The second foremost chapter consists of the literature of previous studies along with essential theory. The third chapter contains a method for the collection of data and the fourth chapter contains results and its interpretation. Finally, the last chapter of the research includes the overall discussion of the results, limitations of the current study, future implications, and wide conclusions to conclude the study.

2. Literature review

Theory of Sustainable Ecological footprint (SEF)

Ecological development is shorthand mainly for committing to well-being for all individuals and sustainable implies that such significant development must happen within what the earth's ecosystems can absorb year after year (Wu, Wei, Lam, Liu, & Li, 2019). Ecological institutions and sectors need to secure individuals' well-being within the means of nature by improving the life-style of peoples through ecological awareness (Peng, Li, Elahi, & Wei, 2019; Razzaq, Maqbool, & Hameed, 2019). However, this is how this theory proposes the conditions for sustainable ecological development (SED) in their landmark suggestion. According to this theory, one simple way to evaluate ecologically sustainable development types is mainly by using EF and human development (Zhang, Dzakpasu, Chen, & Wang, 2017). This is mainly because these indicators apply to several humans and geographic scales, and this theory can majorly be used to track SED progress at different scales (Wascher, Jeurissen, Jansma, & van Eupen, 2017).

According to this theory ecological footprint is an explanation of the ecological influence a individuals or group of individuals have on the earth (Yue, Shen, & Yuan, 2019), and the bigger the footprint the more the impact. The theory of the SEF can mainly be used as a sustainable development indicator to indicate how individuals and their lifestyles play a crucial role in reducing their in-significant impacts on the environment (LIANG et al., 2017). According to this theory, the basics of sustainable EF need individuals to make EFs as small as possible mainly through effective life-styles dimensions (Amaral, Martins, & Gouveia, 2016).

The relationship between per capita income and ecological footprint

According to Aşıcı and Acar (2016), per capita income (PCI) is an evaluation of the amount of money and wealth earned by individuals in a nation as well as geographic region. A study by Baabou, Grunewald, Ouellet-Plamondon, Gressot, and Galli (2017), manifest that PCI can mainly be used to identify the average per individual income for an area or region and also to analyze the standard of living as well as the quality of life of the population that generally impacts the level of EFs. Moreover, another study by Ulucak and Lin (2017) determines that PCI counts each male, female, and child's as a member of the population that is also part of the ecological footprint. This stands indifference to other basic evaluations of a region's prosperity, mainly such as household income, which consider all individuals residing under one roof as a household, and the family income, which also consider as a family those related by birth or adoption and marriage who live mainly in one house (Destek, Ulucak, & Dogan, 2018). Moreover, the overall impact of income growth on environmental as ecological quality has been evaluated substantially in the past literature, and according to one of the significant theories or hypotheses, known as EKC, there is a direct nexus between income growth and ecological aspects. Ecological footprints increases and better as income increases mainly up to an income approach or threshold. Also, the EKC model, which is one of the significant models of ecological modernization, proposes that the impacts of income growth on the EFs are mainly carried out using some channel known as scale. Research by Szigeti, Toth, and Szabo (2017), asserts that the significant scale impact tend to induce in the premier levels of economic growth (EG), but after some level of growth it should be exceeded by the alteration in the composition of manufacturing and also by the alteration in the technology used (Uddin, Salahuddin, Alam, & Gow, 2017).

An increase in EF after a specific level of income, at home, can significantly be attained without changing the insignificant consumption designs and processes. Destek and Sarkodie (2019) in a research list some different processes of how income may positively affect ecological practices such as significant allocative impact which improves EFs as income rises of the individuals of the country. Therefore, the given research propose the below hypotheses,

H1: There is a significant relationship between per capita income and ecological footprints.

The nexus between happiness and ecological footprint

The happier people are willing to work for the development of their ecological footprint to increase the sustainability of their country. The researchers such as Yangka and Newman (2019) elaborates that people can be happier if they are being provided with their desired resources and facilities that can help them in leading a good lifestyle. The theory of ecological footprint states that the types of ecologically sustainable development can be evaluated with the help of human development and EF. The research conducted by Yangka (2019) explains that the happiness of people nourishes the relationship between ecological resilience and human flourishing. Udemba (2020) also in a study elaborates that the people should be provided with the positive discussions related to happiness and a healthier lifestyle that will result in increasing the efforts among the people to increase sustainability and alter the ecological footprint. The happiness of people within a country is highly concerned with their well-being and sustainability. People should be provided by innovative resources instead of present natural resources to increase the economy of a country (Lv, 2017). Different policies and strategies interrelated with environmental and physical aspects should be made to develop a better future for upcoming generations (M. T. Majeed & Mazhar, 2019). EF plays a vital role in developing a clearer and effective picture of sustainability correlated with an ecological footprint as well as outsourcing the pollution and the waste (Baabou et al., 2017). The countries with low-income results in an increase in sustainable development and countries with high income lead to a decrease in sustainable development. According to the Biswas (2020), the countries which are richer and provide all the resources to their residents to keep them happy so that the ecological footprint can be altered to increase sustainability. Consequently, the study proposes the following hypotheses,

H2: There is a significant relationship between happiness and ecological footprints.

The relationship between human development and ecological footprint

Human development according to (Destek & Sarkodie, 2019), is referred to as the mechanism of enlarging individual's opportunities and freedoms and also enhancing they're well being. According to Long et al. (2020), human development (HD) is mainly about the actual freedom normal individual have to decide who to be, what to do, and also how to live according to ecological rules. HD grew out of global debates on the associations between EFs and development during the late 1980s, by the early 1990s there were significantly loud calls to dethrone development, economic development had emerged as both a significant goal and indicator, of regional development in several states, even though GDP was never used as an evaluation of well-being (Ali, Naveed, ul Hameed, & Rizvi, 2018; Charfeddine & Mrabet, 2017; Hamid, Shahid, Hameed, Amin, & Mehmood, 2019). In the early 2000 development debate initiates mainly using alternative focuses to go beyond the gross domestic product, mainly including putting significant emphasis on the level of employment and then whether individuals had their basic requirements met (Mrabet & Alsamara, 2017). These concepts helped pave the way for the HD concept and its impact on ecological regulations, and according to (Ulucak & Bilgili, 2018), HD is about expanding the well-being of individual life, rather than the significance of the economic growth in which individuals live. HD is a process that is mainly focused on developing fair as well as equal opportunities and choices for all individuals which, positively impact the level of EFs. The HD process focuses on enhancing the lifestyles of individuals which leads to greater as well as equal opportunities for all and which further automatically leads to better EFs (Baloch, Zhang, Iqbal, & Iqbal, 2019). According to Lin et al. (2018) HD is all

about giving individual more freedom and chances to live lives they want for which directly influence the overall process of EFs significantly. Hence, the present research recommends the following hypotheses,

H3: There is a favorable relationship between human development and ecological footprints.

3. Methodology

Data and Sample

Once the background of the study and problem as well as the literature review has been discussed by the researcher in the study, the next most crucial step is to explain the methods that have been applied by the researcher to collected data and to analyze the collected data. In this regard, the purpose of the study is very critical as the data collection is based upon that purpose. As far as the purpose of this study is concerned, it is to find the influence that is caused by the dimensions of life quality i.e. per capita income, happiness and human development on the ecological footprint of ASEAN countries. Thus based on it, the researcher has collected data about the life quality dimensions and the ecological footprint from the ASEAN countries and the data comprises of 30 years in total. As the researcher intends to provide accurate and authentic results for the literature, the gathered data has come from the most authentic data sources which include World Bank Development Indicators and Global Economy. The measurement units and indexes through which the variables of the study have been measured are discussed as follows.

Model Specification

As in the current study, the three dimensions of life quality i.e. per capita income, happiness and human development have been taken as the independent variables, the first dimension, per capita income has been measured through US dollars. The second dimension, happiness has been measured in context of an index named as happiness index and finally the last dimension, human development has also been measured through an index named as human development index. Moreover, the only dependent variable of the study, ecological foot print has been measured through the units of global acres per person. Furthermore, the researcher has also taken two control variables i.e. education and gross capital formation. Among these, education has been taken as the percentage of literate people in the country while the gross capital formation has been taken as the percentage of GDP of the country. In this way all the variables have been measured and their data has been employed. The researcher has generated the following regression equation for the study;

$$EFP_{it} = \alpha + \beta_1 PCI_{it} + \beta_2 HAI_{it} + \beta_3 HUD_{it} + \beta_4 EDU_{it} + \beta_5 GCF_{it} + \sum_{j=1}^4 \alpha_j CFE_{dumj} + \varepsilon_{it}$$

In this equation, α is a constant, I represents the country, t is the time of the year, β shows the coefficient of the variable, CFE_{dum} means the dummy of country fixed effect. Moreover, EFP represents ecological footprint, PCI shows per capita income, HAI indicates happiness index, HUD represents human development, EDU shows education, GCF indicates gross capital formation and ε is the error term.

Empirical Procedure

As given in the regression model, country and time fixed effect dummies have been used so that the time series impact on the cross country results can be reduced to get better results. The trends associated with panel data can also be controlled through these dummies. The collected time series data might have the structural breaks that can be effectively identified through the time fixed effect dummy (Medina, Caceres, & Corbacho, 2010). The first test that has been applied by the researcher in the current study is panel unit root test so that the order of integration of the variables and the stationarity of the data can be estimated. Among various types of unit root test, the

researcher has used LLC unit root test to fulfill the purpose. The null hypothesis of this test refers to the non stationarity of the data (Levin, Lin, & Chu, 2002). Once the order of integration of the variables has been identified, the next step is to apply certain diagnostic checks such as autocorrelation, heteroscedasticity and cross sectional dependence tests along with multicollinearity test. In case, these tests are ignored, it might have impact on the results of the study therefore modified Wald and Breusch-Pagan/Cook-Weisberg heteroscedasticity test, Wooldridge autocorrelation test, VIF test of multicollinearity and Pesaran correlation test have been applied (Pesaran, 2004).

As per diagnostic checks, if there is any issue identified in the collected data, then the counter techniques must be used to get the accurate and authentic results (Arellano & Bover, 1995; Blundell & Bond, 1998). In such a case, the researcher has applied two types of estimation i.e. PCSE estimation as well as GMM estimation techniques to provide highly accurate results in the study. The time and country fixed effects can be used to control the heterogeneity in the data and in the same way endogeneity can be addressed by using the lagged values in GMM estimation if the sample size is large enough and the data is stationary (Bond, 2002). The following model has been used by the researcher for GMM estimation;

$$\vartheta_{it} = \alpha_i + \gamma\vartheta_{i,t-1} + \sum_{p=1}^p \beta_p Z^p_{it} + \sum_{q=1}^q \beta_q Z^q_{it} + \sum_{r=1}^r \beta_r Z^r_{it} + \epsilon_{it}$$

4. Results and Analysis

The results of the first test applied by the researcher i.e. LLC panel unit root test have been given in the table 2 with different values of level and first difference series for all the variables of the study. As far as the level series is concerned, it is quite clear from the table that only three variables have rejected the null hypotheses of non stationary data. These variables include environmental sustainability, human development and gross capital formation; all the remaining variables have accepted the null hypothesis. This shows that at level series the collected data is non stationary because there is unit root in it. On the other hand, if the variables are subjected to first difference, it comes out that all the variables of the study have rejected the null hypotheses of non stationary data. This rejection of null hypothesis leads towards the fact that in first difference, the data has become stationary and is eligible to be used in the study. In a nutshell, it can be stated that the data has been found as non stationary at level series but has been found as stationary at first difference series. The detailed results can be viewed in the table 2.

Table 2: LLC unit root

Constructs	EFP	PCI	HAI	HUD	EDU	GCF
Level	-2.299*	-1.317	-0.287	-3.997*	-0.398	-4.422*
1 st difference	-4.283**	-4.387**	-4.398**	-6.399**	-4.388**	-9.299**

The results obtained by the application of different diagnostic checks such as heteroskedasticity, autocorrelation, cross sectional dependence and multicollinearity have been given in the table 3 along with the information about the null hypothesis rejection and acceptance. In this regard, the first test i.e. heteroskedasticity test results indicate that there is significant heteroskedasticity in the collected data. Moreover, it is also clear from the table that there is no autocorrelation among the variables of the study. As far as cross sectional dependence test is concerned, the null hypothesis rejection shows that there is cross sectional dependence between the variables. In the last, the multicollinearity aspect has not been found among the variables as per the results. In short, it can be stated that the

variables are having heteroskedasticity and cross sectional dependence among them but do not have autocorrelation and multicollinearity among them. The results of each of these diagnostic checks can be viewed in the table 3.

Table 3: Diagnostic checks

Heteroskedasticity	Autocorrelation	Cross-section dependence	Multicollinearity
Modified wald Breusch-Pagan/Cook-Weisberg χ^2 -value: 10.388** χ^2 -value: 4.203*	Wooldridge F-statistic: 3.29	Pesaran Test statistic: 4.392*	VIF Mean VIF: 1.03

The correlation matrix indicates whether there is any correlation present among the variables or not. In this regard, the results have been reported in the correlation matrix in table 4 of the study. The table has made it quite clear that there is no correlation among the variables and the impacts of these variables can also be viewed in the correlation matrix.

Table 4: Correlation Matrix

Variables	EFP	PCI	HAI	HUD	EDU	GCF
ENS	1					
PCI	.366	1				
HAI	.288	.289	1			
HUD	.493	.294	.323	1		
EDU	.299	.344	.299	.288	1	
GCF	.394	.289	.200	.299	.233	1

In the last, the researcher had applied two important estimation techniques so that the impact casted by the independent and dependent variables can be analyzed in context of magnitude as well as direction i.e. positive or negative. Starting from the first independent variable, per capita income, its impact on ecological footprint has been found as significant and positive for both types of estimations. In other words, it can be stated that with one percent increase in per capita income, ecological footprint will enhance by 20.3% as per PCSE estimation while this increase will be 20% in case of GMM estimation. In the similar way, the second independent variable, happiness index is also found to have significant and positive impact on ecological footprint in case of both PCSE and GMM estimation. In this case, as the happiness index is increased by one percent, the ecological footprint will be enhanced by 29.4% for PCSE estimation while it will enhance by 19.3% for GMM estimation. In the exact same way, the last independent variable, human development also has found to have significant and positive impact on ecological footprint in case of both PCSE and GMM estimation. In this case, as human development is increased by one percent, the ecological footprint will be enhanced by 19.3% for PCSE estimation while it will enhance by 22.1% for GMM estimation. Similarly, the impact of the first control variable, education is also found to have significant and positive impact on ecological footprint in case of both PCSE and GMM estimation. In this case, as education level is increased by one percent, the ecological footprint will be enhanced by 22.8% for PCSE estimation while it will enhance by 20.2% for GMM estimation. However, the impact of the other control variable, gross capital formation has insignificant impact on ecological footprint. In short, all the independent variables have significant impact on ecological footprint. See Table 5.

Table 5: Results from PCSE estimation

Dependent Variable = EFP	PCSE estimation	Sys-GMM estimation
PCI	0.203** (0.390)	0.200** (0.390)
HAI	0.294* (0.300)	0.193** (0.395)
HUD	0.193* (0.305)	0.221* (0.384)
EDU	0.228* (0.384)	0.202* (0.388)
GCF	0.044 (0.488)	0.036 (0.399)
Constant	2.884** (0.345)	0.847* (0.288)
R ²	0.701** (0.388)	-
<i>Arellano-Bond test for AR (1) (Pr W z)</i>	-	0.288
<i>Arellano-Bond test for AR (2) (Pr W z)</i>	-	0.299
<i>Hansen test of overid restrictions</i>	-	0.204

Discussion and Conclusion

Discussion

The researcher intended to study the impact of three dimensions of life quality i.e. per capita income, happiness and human development index on the ecological footprint and in this context; three hypotheses were made by the researcher based on the review of the literature from the past. When the first hypothesis that per capita income has significant impact on ecological footprint was tested, the results indicated that this impact is significant and thus the hypothesis has been accepted. When the per capita income of the people increases, it increases the demands of the people regarding land and water and thus the ecological footprint is increased. This result is inconsistency with the past literature (Khan, Qianli, SongBo, Zaman, & Zhang, 2017). When the second hypothesis that happiness index has significant impact on ecological footprint was tested, the results also proved that this impact is significant and thus the hypothesis came as accepted. When the happiness index is increased, the people's requirements for natural resources are increased and thus the ecological footprint is increased. This result is completely in accordance with the studies conducted by the other researchers in the past (M. T. Majeed & Mumtaz, 2017). The last hypothesis was that human development has significant impact on ecological footprint. This hypothesis was also accepted as the impact was found as significant based on the results. When the human development index is increased, the natural resources required by the humans also increase and thus the ecological footprint per human is also supposed to increase. This result is in line with the results obtained from the past similar studies (Goudie, 2018). Moreover, the impact of the control variable, education is also found as significant but that of the other control variable i.e. gross capital formation is found as insignificant. These results have been found in the similar studies from the past literature (Fu & Liu, 2017).

Conclusion

As the current study was designed with the motive to find out how the three dimensions of life quality i.e. per capita income, happiness and human development impact the ecological footprint in ASEAN countries, the researcher collected the relevant data from the ASEAN countries for 30 years and analyzed it using unit root test, diagnostic checks, PCSE estimation and GMM estimation and the results were obtained. The results have clearly indicated that the impact of all the independent variables of the study i.e. per capita income, happiness and human development have significant impact on ecological footprint. It can be concluded on the basis of these results that the countries must improve the quality of life of the people in such a way that the impact on ecological footprint can be minimized to attain environmental sustainability.

Implications and Limitations

The theoretical benefit of the study is that it contains the literature and knowledge about the relevant aspects as given in the topic and discussed earlier. This is especially beneficial to the other researchers and authors for their studies because they can use it for further research. Moreover, the governments may get guidance from the study to improve the quality of life of the people in such a way that the impact on ecological footprint can be minimized to attain environmental sustainability.

The variables other than the dimensions of life quality may also be considered by the other researchers so that more literature can be obtained. The researchers must consider other regions of the world too to find out what perspective they have about the same topic. By following these recommendations, this study can be further improved and contribution can be made in the literature.

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