-RESEARCH ARTICLE-

ECONOMIC GROWTH, E-GOVERNMENT, AND ENVIRONMENTAL DEGRADATION DURING COVID-19: A PANEL ANALYSIS OF SELECTED ASIAN ECONOMIES

Thanaporn Sriyakul

Faculty of Business Administration, Mahanakorn
University of Technology, Thailand
E-mail: ajbamut@gmail.com

Thitinan Chankoson

Faculty of Business Administration for Society,
Srinakharinwirot University, Thailand
E-mail: thitinanc@g.swu.ac.th

*Khunanan Sukpasjaroen (Corresponding Author)

Chakrabongse Bhuvanarth International Institute
for Interdisciplinary Studies, Rajamangala University
of Technology Tawan-OK, Thailand
E-mail: khunanan_su@rmutto.ac.th

─**Abstract**─

Covid-19 has brought economic and environmental concerns to ASEAN nations. Thailand and Indonesia's financial difficulties and environmental deterioration worsened due to the deployment of government resources to a medical emergency. This study examines Thailand and Indonesia's economic growth, e-government, and environmental damage during covid-19. In this study, secondary data is employed to determine the findings. The study indicates that Thailand and Indonesia must improve their e-government performance to achieve sustainable economic growth and environmental

conservation. This analysis utilized secondary data sources. During this investigation, the years 2017 to 2020 are considered. The outcomes of this study revealed that it is the responsibility of the government in every country to safeguard the environment since economic freedom ensures economic sustainability. Similarly, the results of this study indicate that e-government practices in ASEAN countries, particularly Indonesia and Thailand, should be improved to reduce environmental degradation in the country. The scope of this study is limited to public sector departments and the governments of Thailand and Indonesia. This study's conclusions have theoretical and practical implications for strengthening the body of knowledge and the effectiveness of government machinery to improve the government sector. This study also shows the next areas of literature research in this field.

Keywords. Economic growth, e-government, environmental degradation, governance issues, covid-19

1.   INTRODUCTION

Covid-19 was hazardous to the population and the environment since it caused a crisis in hospitals and the economy (Stange et al., 2020; Weerasombat et al., 2022). The first and second covid-19 epidemics in the ASEAN nations were hazardous because of the country's lockdown and poor economic conditions (Khamken et al., 2021; Khamsuk et al., 2021; Kitchanapaibul et al., 2022). This struggling economy has harmed the environment in Thailand and Indonesia, as these nations are particularly susceptible to covid-19 (Puntub et al., 2022; Sampantamit et al., 2020; Yohmad et al., 2022). These economic issues prevented the government from focusing on environmental issues since it had to defend the public's life (Charoenwat et al., 2022; Tancho et al., 2020; Thumronglaohapun et al., 2022). Multiple other ministries' budgets were moved to the health department, and economic and medical emergencies were declared in Thailand and Indonesia (Numpong et al., 2022; Paiboonvong et al., 2022; Wattanawong et al., 2021). The harsh economic state failed to protect the environment in these nations because environmental concerns received little attention (Papwijitsil et al., 2021; Pisitsankkhakarn et al., 2020; Thaothampitak et al., 2022). Due to the severity of the lockdown and the ineffectiveness of government machinery, waste management failed miserably to protect the nation (Chanthawong et al., 2020; Pattanakuhar et al., 2022; Sapbamrer et al., 2022). E-government is the most effective method for monitoring governance activities and expanding public services (Barua et al., 2020; Otwong et al., 2021; Suttipun et al., 2020). As a paperless working method, e-government aids in preventing environmental deterioration and is therefore utilized by the United States (Kokkhangplu et al., 2022; Nakasu et al., 2022; Pongsakornrungsilp et al., 2021). In the ASEAN countries, e-government is becoming increasingly prevalent (Chuaypen et al., 2022; Ditta-Apichai et al., 2020; Montes et al., 2020). Multiple governmental entities offer public e-governance services, and the working structure has migrated to online platforms (Moallef et al., 2022; Suwannarong et al., 2022; Tanantong et al., 2022). It is

an appealing method that has grown in popularity since the covid-19 outbreak because it allows individuals to avoid physically visiting state facilities (Kitchanapaibul et al., 2022; Pholphirul et al., 2022). In Thailand and Indonesia, the structure of e-government is emerging, and the public is pleased (Khamken et al., 2021; Khamsuk et al., 2021; Stange et al., 2020). Online service delivery reduces the government's administrative expenses. Hence the public will only accept quality services (Stange et al., 2020; Weerasombat et al., 2022). In this regard, the Indonesian public questions the government's working style throughout the period of covid-19 to obtain better amenities (Khamken et al., 2021; Khamsuk et al., 2021; Kitchanapaibul et al., 2022; Pholphirul et al., 2022).

Environmental deterioration begins when a government fails to address environmental issues (Kitchanapaibul et al., 2022; Mohd Nawawi et al., 2020; Pholphirul et al., 2022; Suwannarong et al., 2022). Similarly, the government's lack of concern for environmental issues is also one of the primary causes of environmental concerns (Chuaypen et al., 2022; Moallef et al., 2022; Montes et al., 2020; Tanantong et al., 2022). During the period of covid-19, it was also seen that a country's ecology is affected not only by political failure but also by economic failure (Kokkhangplu et al., 2022; Nakasu et al., 2022; Pongsakornrungsilp et al., 2021). Indeed, environmental problems are worsening in Thailand and Indonesia than in other ASEAN nations (Barua et al., 2020; Chanthawong et al., 2020; Otwong et al., 2021; Suttipun et al., 2020). The government machinery was focused on the public health sector and economic stability, but environmental degradation received less attention (Papwijitsil et al., 2021; Pattanakuhar et al., 2022; Pisitsankkhakarn et al., 2020; Sapbamrer et al., 2022). In this aspect, the government sector and non-government organizations failed to address environmental concerns in a meaningful manner (Papwijitsil et al., 2021; Pisitsankkhakarn et al., 2020; Thaothampitak et al., 2022). Therefore, waste and deforestation-related environmental concerns have increased (Charoenwat et al., 2022; Numpong et al., 2022; Paiboonvong et al., 2022; Wattanawong et al., 2021). There is a big vacuum in this research because of previous studies (Charoenwat et al., 2022; Numpong et al., 2022; Paiboonvong et al., 2022; Sampantamit et al., 2020; Tancho et al., 2020; Thumronglaohapun et al., 2022; Wattanawong et al., 2021) neglected this particular field of research Indeed, environmental issues must be considered in the study because environmental deterioration is expanding globally, including in ASEAN countries (Papwijitsil et al., 2021; Pattanakuhar et al., 2022; Pisitsankkhakarn et al., 2020; Thaothampitak et al., 2022). Consequently, this study aims to examine economic growth, e-government, and environmental damage in Thailand and Indonesia during covid-19. Therefore, this study would contribute to the body of knowledge because there is an obvious research void. In addition, the study results lead to extremely significant theoretical and practical implications for the literature and the practice of e-government performance improvement for economic growth and environmental sustainability.

2. LITERATURE REVIEW

The ecosystem and climate of the universe are being challenged by environmental degradation (Jermsittiparsert, 2021; Phrakhruopatnontakitti, 2020; Puntub et al., 2022; Suki et al., 2022). Governments must protect the environment with effective plans and cooperate with the nation's industry (Yohmad et al., 2022). Diverse nations have different environmental protection methods, but the covid-19 epidemic has threatened the ecology of ASEAN nations (Sampantamit et al., 2020). The economic expansion of every nation directly affects the environment, as the industry has a substantial effect on these two aspects (Tancho et al., 2020). Because eradicating covid-19 was the ultimate objective, the Thai government worked strategically to protect the ecosystem and regulate the climate (Thumronglaohapun et al., 2022). In this regard, government machinery was utilized to control the environment during the lockdown by eliminating waste (Charoenwat et al., 2022). According to the survey, waste climbed by 10% during the shutdown in Thailand and Indonesia (Numpong et al., 2022). Officials from Thailand assert that climate control during the covid-19 pandemic posed a challenge comparable to those of medical facilities (Paiboonvong et al., 2022). During covid-19, the government apparatus was active in the medical sector to safeguard the people, whereas the environment received little consideration (Wattanawong et al., 2021). At the same time, the government faced a significant challenge from the country's economic expansion (Pisitsankkhakarn et al., 2020). The lockdown in the country prevented the logistics from providing the people with the necessary products and services (Papwijitsil et al., 2021). Due to constraints on trade on a local and global scale, any crisis poses a threat to both the people and the economy (Sapbamrer et al., 2022). However, the e-government facility in Thailand is appropriate for the public because it improves communication with government departments and makes work more efficient for the people (Weerasombat et al., 2022). During the covid-19 outbreak in Thailand and Indonesia, both economies were struggling due to a lack of food and inadequate healthcare infrastructure (Stange et al., 2020). The government's priority was to enable people in the health industry and increase their knowledge (Stange et al., 2020). One of the key characteristics of e-government is the widespread dissemination of information via the Internet (Khamken et al., 2021; Khamsuk et al., 2021; Kitchanapaibul et al., 2022). Similarly, e-government enabled the health sector agency to monitor covid-19-related actions (Suwannarong et al., 2022). Similarly, the government monitored the economic activities in each city in Thailand (Tanantong et al., 2022). Due to less emphasis on the environmental sector, the industrial and government did not accurately manage operating industries and industrial waste (Moallef et al., 2022). Similarly, the federal government failed to regulate waste disposal during the pandemic outbreak (Chuaypen et al., 2022). 32% of garbage in Jakarta was not handled, contributing to environmental degradation (Ditta-Apichai et al., 2020). Protecting the environment is not simple because its underlying philosophy requires environmental sustainability (Nakasu et al., 2022). Along with the government, these non-governmental

organizations also failed to effectively safeguard the environment (Puntub et al., 2022). All of these factors contributed to the environmental degradation in Jakarta (Suwannarong et al., 2022). On the other hand, the unsustainable economic position posed a challenge for Jakarta and Indonesia's governments (Chuaypen et al., 2022). Due to the shutdown, imports were halted in several nations, and a similar situation existed in Thailand (Barua et al., 2020). The trade restrictions during the lockdown threatened the economy, and even the local market was saturated (Otwong et al., 2021). The Indonesian government also paid little attention to the economy (Tangcharoensathien et al., 2019; Tevapitak et al., 2019; Yoelao et al., 2019; Zhang et al., 2019). Even after the conclusion of the country's lockdown, Indonesia's economic growth remained stagnant for a long period (Wattanawong et al., 2021). It is essential to recognize that a country's imports and exports must increase in volume and productivity for economic stability (Mohd Nawawi et al., 2020; Sangchumnong, 2019). As a result, the governments of Thailand and Indonesia, as well as those of other ASEAN nations, faced a serious task in addressing the poor economic conditions and environmental deterioration (Rajbhandari et al., 2019). In this sense, it has become crucial for any nation to embrace the economic sustainability model of the developed nations to attain sustainability in an attractive manner (Rajbhandari et al., 2019). Moreover, e-government is not only suited for expanding the economy and environmental sustainability in any nation, but the role of effective strategies and specialists in the public sector departments is more challenging when addressing the economic condition in any nation (Rajbhandari et al., 2019; Tevapitak et al., 2019; Zhang et al., 2019). Due to the COVID-19 epidemic, Thailand's business activity halted (Rajbhandari et al., 2019; Tangcharoensathien et al., 2019; Tevapitak et al., 2019; Zhang et al., 2019). The COVID-19 outbreak has also severely impacted Thailand's tourism business (Khamken et al., 2021; Khamsuk et al., 2021; Kitchanapaibul et al., 2022; Stange et al., 2020). This passage states that the damage to the economy has been evident (Moallef et al., 2022; Tanantong et al., 2022). The hospitality industry, which was already struggling before the ban on international flights, has been severely impacted by the ban (Puntub et al., 2022; Yohmad et al., 2022). (Chanthawong et al., 2020; Papwijitsil et al., 2021; Pattanakuhar et al., 2022; Pisitsankkhakarn et al., 2020; Sapbamrer et al., 2022). Environment Minister Varawut Silpaarcha stated that the wildfires in Bangkok were "flames were intentionally started, by grazers and by many to create chaos" (Sampantamit et al., 2020).

3. METHODOLOGY

3.1 Regression Models

This paper examines the effects of economic growth and e-government on environmental degradation during covid-19.

$$Y_{it} = \alpha_0 + \alpha_1 X1_{it} + \alpha_2 X2_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots..(1)$$

Model 1-3: Impact of economic growth, e-government on environmental degradation

$$CO2_{it} = \alpha_0 + \alpha_1 EGov_{it} + \alpha_2 EG_{it} + \alpha_3 INd_{it} + \alpha_4 EP_{it} + \varepsilon_{it} \dots\dots\dots\dots\dots\dots\dots\dots (2)$$

Where CO2 represents environmental degradation, EGov indicates e-government, EG represents economic growth and represents the degree of industrialization, and EP represents the environmental policy of each country

The moderator hypothesis is accepted or rejected based on whether the outcome of the interaction term is significant or insignificant. The linear model of moderated relationship defined by Hair et al. (2007) is as follows:

$$Y=Y_{it} = \alpha_0 + \alpha_1 X1_{it} + \alpha_2 X2_{it} + \alpha_3 X1_{it} X2_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

Where:

α_0	=	Intercept
$\alpha_1 X1$	=	Linear effect of X1
$\alpha_2 X2$	=	Linear effect of X2
$\alpha_3 X1\ X2$	=	Moderating effect of X2 on X1

Moderating effect of EGov in the relationship between EG and the funding CO2

$$CO2_{it} = \alpha_0 + \alpha_1 EGov_{it} + \alpha_2 EG_{it} + \alpha_3 Egov_{it} \times EG_{it} + \varepsilon_{it} \dots\dots\dots\dots\dots\dots\dots\dots (4)$$

4. FINDINGS AND DISCUSSION

This analysis utilized secondary data sources. During this investigation, the years 2017 to 2020 are considered. One of the first things we performed when we began our inquiry was to determine whether or not the variables were stationary. We analyzed each of our variables using the panel Fisher type unit root test and the Philipps perron technique to verify if they were stationary and to rule out the potential of employing improper regressions. The study's findings reveal that the determinants stay constant throughout all levels (Choi, 2001). The Fisher-type unit root test applies the Augmented Ducky Fuller (ADF) test to each cross-section and returns integrated p-values from four of Choi's unit-root tests for panel data. In addition, the Fisher-type unit root test investigates the relationship between cross-sectional and panel data. This allowed us to assess whether or not the data contained the unit root 2001. To change p-values, there are four different techniques: Three of these utilize inverse-normal, inverse-2, or inverse-logit transformations, while the fourth is a version of the inverse-2 transformation that is frequently used as N approaches infinity. The sixth approach for modifying p-values is a transformation in the opposite direction, often known as an inverse transformation. The default assumption for this test is that each panel has a unit root. Due to the distribution of the variables, the results do not support the null hypothesis, and the data show that the variables are stable at each level. As a direct result, the test's null hypothesis concludes that each panel contains a unit root. In the test specification, we

experiment with several different lag durations, although the significant results are mostly unaffected by our selection.

Table 1. Pearson Correlation Coefficients

Variables		1	2	3	4	5
CO	1	1				
EGov	2	0.1471	1.00			
EG	3	0.1319	0.3238	1.00		
INd	4	0.1639	0.1224	0.4013	1.00	
EP	5	0.1339	0.4197	0.2105	0.1264	1.00

Using the calculated Pearson's correlation coefficients, the strength of the association between each group of independent variables was established (see Table 1). According to the data presented in Table 1, none of the correlation coefficients between the independent variables exceed 0.80. In their work on multicollinearity, Gujarati et al. (2009) propose using a correlation threshold of 0.8 to establish whether multicollinearity exists.

After completing a series of diagnostic tests, the most accurate estimates were developed (see Table 3). To begin, we conducted the White Heteroscedasticity test to determine if any portions of the aggregate model were erroneous due to heteroscedasticity. Our combined model will reject the null hypothesis at the 5% significance level if the p-value falls between 0.0000 and 0.0020. This demonstrates that heteroscedasticity is an issue with the aggregate pooled model and supports using random effect estimates.

Table 2. Results of the Diagnostic test

Statistics	Hausman test	Breusch and Pagan test/ autocorrelation test	Arrelano-Bond Test	White Heteroscedasticity test
Prob>chi2 Prob>z	0.0027**	0.0000	0.421	0.0000**

The Bresuch Pagan LM test is utilized to choose between the pooled OLS estimates and the random effect estimates (Breusch et al., 1979). This method is used to determine if the specified term has a value of zero for cross-sections and if the pooled OLS method has been demonstrated to be an estimator free of autocorrelation. Additionally, we determine if the specified term has a value of zero for cross-sections. LM selected a one-degree-of-freedom chi-square distribution to determine whether or not the null hypothesis is true. The researchers determined that the null hypothesis should not be

accepted after discovering that the estimated value exceeded the chi-square value. This indicated the presence of individual cross-sectional effects, indicating that the random effects model was the most appropriate method for the given case. The LM test results are presented in Table 1. Based on these results, it is suggested that the random effects model be applied to the combined OLS data. Next, you must determine whether you desire a model with random or fixed effects. The Hausman specification test demonstrates that the fixed effect estimate 1 and the random effect estimator 2 are distinct. We have evidence demonstrating that Estimator 2 reasonably approximates the actual parameters, supporting the null hypothesis. In this scenario, there should be no visible distinction between the two estimators. Table 4's hypotheses suggest that the null hypothesis lacks adequate support and that the fixed effects model is the superior option. The results of the Arellano-Bond test are displayed in the table that follows. This test was used to guarantee that the GMM analysis of the article did not contain instances of autocorrelation. The Pearson test measured the level of cross-sectional dependence shared by the various models. The cross-sections rely on the cross-sections of the other variables, according to the conclusions of the statistical investigation. In cases involving balanced panel data, the panel corrected the standard error (PCSE), and feasible generalized least squares (FGLS) procedures are relevant (PCSE). After executing each model and discovering that the panel datasets we utilized did not have a consistent distribution across all categories, we chose the robust and clustering option. Several financial organizations' information was compiled into a single comprehensive database (De Hoyos et al., 2006).

Table 3. Projection

	2	4
$CO2_{t-1}$	0.326*	0.341**
$EGov$	-0.314***	-0.322***
EG	0.421***	0.277***
INd	0.249***	
EP	-0.330**	
$EGov * EG$		-0.281**

A single instrument must accompany each endogenous variable to distinguish our GMM model from competitors. Because our model is identifiable with a single instrument for all endogenous variables, we cannot conduct an over-identification test. GMM estimation, which utilizes autocorrelation tests to determine the instrument's validity, follows the reporting of diagnostic tests; thus, this is the case (Arrelano-Bond Test). Autocorrelation was not seen when the data were analyzed using the Arrelano-Bond method. Thus, the estimates generated by the aggregate model that accounts for the fixed effect and the GMM appear to be the most meaningful. Examining the facts reveals that

the transition to an electronic government positively impacts the environment by reducing carbon emissions. Furthermore, a correlation between economic growth and CO2 emissions has been demonstrated.

5. CONCLUSION

The outcomes of this study revealed that it is the responsibility of the government in every country to safeguard the environment since economic freedom ensures economic sustainability. Similarly, the results of this study indicate that e-government procedures in ASEAN nations, particularly Indonesia and Thailand, should be improved to reduce environmental degradation in the country. Indeed, the government of every nation is directly accountable for ensuring environmental sustainability. Therefore, organizations should focus on enhancing core behaviors and collaborating with non-governmental organizations to prevent environmental deterioration. According to this study's results, the outcomes are extraordinary and have important consequences for Thailand and Indonesia.

6. IMPLICATIONS OF STUDY

This study's conclusions have theoretical and practical implications for strengthening the body of knowledge and the effectiveness of government machinery to improve the government sector. The existing body of knowledge contains no evidence of economic stability and growth in Indonesia during covid-19. Second, earlier studies did not explore the significance of e-government in ASEAN nations, particularly Thailand and Indonesia, in controlling environmental degradation. To fill this vacuum in the research, this study reveals that e-government has the greatest potential to enhance government performance in any nation. E-government is essential for environmental protection since it facilitates paperless operations.

Moreover, the aspect of e-government is crucial for the economic growth of ASEAN countries since it has a greater capacity to monitor economic progress and makes judgments from a variety of perspectives. In addition, the findings relating to health facilities and the government's participation in these institutions have been examined in the literature. In addition, studies aimed at enhancing healthcare facilities are prevalent in the literature. Nevertheless, the corpus of information was pertinent in terms of the role of e-government, economic growth, and environmental sustainability. In this light, these implications for enhancing the literature are essential for future research since they would provide a deeper understanding of the literature. In addition, this work has considerably contributed to the literature by demonstrating the relationship between e-government and economic stability and environmental sustainability.

Moreover, this study has significant practical consequences for ASEAN nations, especially Thailand and Indonesia. The study revealed that Indonesia's government sector could boost the economy's performance by implementing e-government services

across all ministries. Because of this, e-government is sustainable, and in particular, it facilitates the government's real-time monitoring of government operations. Moreover, this study generalizes the implications for all ASEAN nations because it is undertaken inside the setting of these nations. Consequently, the e-government structure is suitable for all government facilities in light of this study. Without a doubt, the government of any country cannot safeguard the environment without community backing. Therefore, the government sector should prioritize uniting the community against environmental deterioration and collaborating effectively with community support. In addition, the study investigates whether e-government is a cause of good governance in Thailand and Indonesia, as government performance was inferior before the advent of e-government. Thus, e-government is highlighted as an important aspect of the economic success of any nation, as it also promotes the development of underdeveloped countries. ASEAN nations should adopt and execute developed nations' e-government model to improve government performance in order to regulate economic growth and ensure environmental sustainability. The governments of ASEAN nations, particularly Thailand and Indonesia, would be able to achieve more regulated economic growth and environmental protection in this manner.

7. FUTURE DIRECTION

Nevertheless, environmental issues must be considered in the research, as environmental deterioration is expanding globally, including in ASEAN countries. This study aimed to assess the economic growth, e-government, and environmental deterioration in Thailand and Indonesia over the period covered by covid-19. However, this study is based on secondary data, which is a drawback of this study; consequently, further research on the role of government policy in environmental sustainability is required. Future research must explore the importance of good governance in economic growth; this study has focused on the role of e-government in economic growth. Lastly, this study is confined to covid-19; however, future research should investigate waste management issues' role in environmental degeneration. Thus, the holes in the literary canon would be filled.

REFERENCES

Barua, P., & Narattharaksa, K. (2020). The impact of the stateless health insurance scheme on inpatient service utilization of stateless children at the four selected district hospitals in Tak Province, Thailand. *The International Journal of Health Planning and Management, 35*(1), e12-e27. doi: https://doi.org/10.1002/hpm.2913

Breusch, T. S., & Pagan, A. R. (1979). A simple test for heteroscedasticity and random coefficient variation. *Econometrica: Journal of the econometric society, 47*(5), 1287-1294. doi: https://doi.org/10.2307/1911963

Chanthawong, A., Dhakal, S., Kuwornu, J. K., & Farooq, M. K. (2020). Impact of subsidy and taxation related to biofuels policies on the economy of Thailand: A

dynamic CGE modelling approach. *Waste and Biomass Valorization, 11*(3), 909-929. doi: https://doi.org/10.1007/s12649-018-0417-4

Charoenwat, B., Suwannaying, K., Paibool, W., Laoaroon, N., Sutra, S., & Thepsuthammarat, K. (2022). Burden and pattern of acute diarrhea in Thai children under 5 years of age: a 5-year descriptive analysis based on Thailand National Health Coverage (NHC) data. *BMC Public Health, 22*(1), 1-10. doi: https://doi.org/10.1186/s12889-022-13598-8

Choi, I. (2001). Unit root tests for panel data. *Journal of International Money and Finance, 20*(2), 249-272. doi: https://doi.org/10.1016/S0261-5606(00)00048-6

Chuaypen, N., Khlaiphuengsin, A., Prasoppokakorn, T., et al. (2022). Prevalence and genotype distribution of hepatitis C virus within hemodialysis units in Thailand: role of HCV core antigen in the assessment of viremia. *BMC Infectious Diseases, 22*(1), 1-11. doi: https://doi.org/10.1186/s12879-022-07074-2

De Hoyos, R. E., & Sarafidis, V. (2006). Testing for cross-sectional dependence in panel-data models. *The Stata Journal, 6*(4), 482-496. doi: https://doi.org/10.1177/1536867X0600600403

Ditta-Apichai, M., Kattiyapornpong, U., & Gretzel, U. (2020). Platform-mediated tourism micro-entrepreneurship: implications for community-based tourism in Thailand. *Journal of Hospitality and Tourism Technology, 11*(2), 223-240. doi: https://doi.org/10.1108/JHTT-05-2019-0079

Gujarati, D. N., & Porter, D. (2009). Basic Econometrics Mc Graw-Hill International Edition. In.

Hair, J. F., Money, A. H., Samouel, P., & Page, M. (2007). Research Methods for Business. *Education + Training, 49*(4), 336-337. doi: https://doi.org/10.1108/et.2007.49.4.336.2

Jermsittiparsert, K. (2021). Does Urbanization, Industrialization, and Income Unequal Distribution Lead to Environmental Degradation? Fresh Evidence from ASEAN. *International Journal of Economics and Finance Studies, 13*(2), 253-272. Retrieved from https://sobiad.org/menuscript/index.php/ijefs/article/view/835

Khamken, P. W., Klomkul, L., Khaw-ngern, C., & Khaw-ngern, K. (2021). Sufficiency economy philosophy towards poverty eradication in Thailand. *Psychology and Education Journal, 58*(1), 1406-1411. Retrieved from https://pdfs.semanticscholar.org/9c94/e181c5a98659da3701eb424b991ced7b3b87.pdf

Khamsuk, A., & Whanchit, W. (2021). Storytelling: An alternative home delivery of English vocabulary for preschoolers during COVID-19's lockdown in southern Thailand. *South African Journal of Childhood Education, 11*(1), 1-13. doi: http://dx.doi.org/10.4102/sajce.v11i1.897

Kitchanapaibul, S., Apidechkul, T., Srichan, P., et al. (2022). Status of the stateless population in Thailand: How does stigma matter in their life? *PLOS ONE, 17*(3), e0264959. doi: https://doi.org/10.1371/journal.pone.0264959

Kokkhangplu, A., & Kaewnuch, K. (2022). *Model For Quality-of-Life Enhancement in Community-Based Tourism by Understanding Factors Influencing Social Inequalities, Thailand.* National Institute of Development Administration, Retrieved from https://repository.nida.ac.th/handle/662723737/5583

Moallef, S., Salway, T., Phanuphak, N., Kivioja, K., Pongruengphant, S., & Hayashi, K. (2022). The relationship between sexual and gender stigma and difficulty accessing primary and mental healthcare services among LGBTQI+ populations in Thailand: Findings from a national survey. *International Journal of Mental Health and Addiction*, 1-18. doi: https://doi.org/10.1007/s11469-021-00740-7

Mohd Nawawi, M. S. A., Abu-Hussin, M. F., Faid, M. S., Pauzi, N., Man, S., & Mohd Sabri, N. (2020). The emergence of halal food industry in non-Muslim countries: a case study of Thailand. *Journal of Islamic Marketing, 11*(4), 917-931. doi: https://doi.org/10.1108/JIMA-05-2018-0082

Montes, M. F., & Cruz, J. (2020). The political economy of foreign investment and industrial development: the Philippines, Malaysia and Thailand in comparative perspective. *Journal of the Asia Pacific Economy, 25*(1), 16-39. doi: https://doi.org/10.1080/13547860.2019.1577207

Nakasu, T., Bula-Or, R., Anantsuksomsri, S., et al. (2022). Measuring capacities and protecting communities: strengthening regional resilience in the flooded industrial area in Thailand. *International Journal of Disaster Resilience in the Built Environment, 13*(2), 163-179. doi: https://doi.org/10.1108/IJDRBE-08-2021-0120

Numpong, S., Kengganpanich, M., Kaewkungwal, J., et al. (2022). Confronting and Coping with Multidrug-Resistant Tuberculosis: Life Experiences in Thailand. *Qualitative Health Research, 32*(1), 159-167. doi: https://doi.org/10.1177/10497323211049777

Otwong, A., Jongmeewasin, S., & Phenrat, T. (2021). Legal obstacles for the circular economy in Thailand: Illegal dumping of recyclable hazardous industrial waste. *Journal of Cleaner Production, 302*, 126969. doi: https://doi.org/10.1016/j.jclepro.2021.126969

Paiboonvong, T., Tedtaisong, P., Montakantikul, P., Gorsanan, S., & Tantisiriwat, W. (2022). Correlation between Carbapenem Consumption and Carbapenems Susceptibility Profiles of Acinetobacter baumannii and Pseudomonas aeruginosa in an Academic Medical Center in Thailand. *Antibiotics, 11*(2), 143. doi: https://doi.org/10.3390/antibiotics11020143

Papwijitsil, R., Kosiyaporn, H., Sinam, P., Phaiyarom, M., Julchoo, S., & Suphanchaimat, R. (2021). Factors Related to Health Risk Communication Outcomes among Migrant Workers in Thailand during COVID-19: A Case Study of Three Provinces. *International Journal of Environmental Research and Public Health, 18*(21), 11474. doi: https://doi.org/10.3390/ijerph182111474

Pattanakuhar, S., Kammuang-Lue, P., Komaratat, N., Chotiyarnwong, C., Mahachai, R., & Kovindha, A. (2022). Health care and rehabilitation services utilization,

benefits and satisfaction: a community survey of individuals with spinal cord injury in Thailand. *Spinal Cord, 60*, 739–745. doi: https://doi.org/10.1038/s41393-022-00777-y

Pholphirul, P., Rukumnuaykit, P., Charoenrat, T., Kwanyou, A., & Srijamdee, K. (2022). Service marketing strategies and performances of tourism and hospitality enterprises: implications from a small border province in Thailand. *Asia Pacific Journal of Marketing and Logistics, 34*(5), 887-905. doi: https://doi.org/10.1108/APJML-01-2021-0064

Phrakhruopatnontakitti, P. (2020). Energy consumption, economic growth and environmental degradation in 4 Asian Countries: Malaysia, Myanmar, Vietnam and Thailand. *International Journal of Energy Economics and*

Policy, 10(2), 529-539. doi: https://doi.org/10.32479/ijeep.9229

Pisitsankkhakarn, R., & Vassanadumrongdee, S. (2020). Enhancing purchase intention in circular economy: An empirical evidence of remanufactured automotive product in Thailand. *Resources, Conservation and Recycling, 156*, 104702. doi: https://doi.org/10.1016/j.resconrec.2020.104702

Pongsakornrungsilp, P., & Pongsakornrungsilp, S. (2021). Mindful tourism: nothing left behind–creating a circular economy society for the tourism industry of Krabi, Thailand. *Journal of Tourism Futures, ahead-of-print*(ahead-of-print). doi: https://doi.org/10.1108/JTF-01-2021-0001

Puntub, W., & Greiving, S. (2022). Advanced Operationalization Framework for Climate-Resilient Urban Public Health Care Services: Composite Indicators-Based Scenario Assessment of Khon Kaen City, Thailand. *International journal of Environmental Research and Public Health, 19*(3), 1283. doi: https://doi.org/10.3390/ijerph19031283

Rajbhandari, S., Limmeechokchai, B., & Masui, T. (2019). The impact of different GHG reduction scenarios on the economy and social welfare of Thailand using a computable general equilibrium (CGE) model. *Energy, Sustainability and Society, 9*(1), 1-21. doi: https://doi.org/10.1186/s13705-019-0200-9

Sampantamit, T., Ho, L., Lachat, C., Sutummawong, N., Sorgeloos, P., & Goethals, P. (2020). Aquaculture production and its environmental sustainability in Thailand: Challenges and potential solutions. *Sustainability, 12*(5), 2010. doi: https://doi.org/10.3390/su12052010

Sangchumnong, A. (2019). Development of a sustainable tourist destination based on the creative economy: A case study of Klong Kone Mangrove Community, Thailand. *Kasetsart Journal of Social Sciences, 40*(3), 642-649. Retrieved from https://so04.tci-thaijo.org/index.php/kjss/article/view/242302

Sapbamrer, R., Chittrakul, J., Sirikul, W., et al. (2022). Impact of COVID-19 Pandemic on Daily Lives, Agricultural Working Lives, and Mental Health of Farmers in Northern Thailand. *Sustainability, 14*(3), 1189. doi: https://doi.org/10.3390/su14031189

Stange, G., & Sasiwongsaroj, K. (2020). Transcultural Lives of Myanmar Migrant Youths in Thailand: Language Acquisition, Self-perceived Integration, and Sense of Belonging. *International Quarterly for Asian Studies, 51*(3-4), 185-200. doi: https://doi.org/10.11588/iqas.2020.3-4.13614

Suki, N. M., Suki, N. M., Sharif, A., Afshan, S., & Jermsittiparsert, K. (2022). The role of technology innovation and renewable energy in reducing environmental degradation in Malaysia: A step towards sustainable environment. *Renewable Energy, 182*, 245-253. doi: https://doi.org/10.1016/j.renene.2021.10.007

Suttipun, M., & Arwae, A. (2020). The influence of sufficiency economy philosophy practice on smes' performance in Thailand. *Entrepreneurial Business and Economics Review, 8*(2), 179-198. doi: https://doi.org/10.15678/EBER.2020.080210

Suwannarong, K., Soonthornworasiri, N., Maneekan, P., et al. (2022). Rodent–Human Interface: Behavioral Risk Factors and Leptospirosis in a Province in the Central Region of Thailand. *Veterinary Sciences, 9*(2), 85. doi: https://doi.org/10.3390/vetsci9020085

Tanantong, T., Pannakkong, W., & Chemkomnerd, N. (2022). Resource management framework using simulation modeling and multi-objective optimization: a case study of a front-end department of a public hospital in Thailand. *BMC Medical Informatics and Decision Making, 22*(1), 1-21. doi: https://doi.org/10.1186/s12911-022-01750-8

Tancho, N., Sriyakul, T., & Tang, C. (2020). Asymmetric Impacts of Macroeconomy on Environment Degradation in Thailand: A NARDL Approach. *Contemporary Economics, 14*(4), 579-589. Retrieved from http://www.contemporary-economics.eu/en/home

Tangcharoensathien, V., Patcharanarumol, W., Kulthanmanusorn, A., Saengruang, N., & Kosiyaporn, H. (2019). The political economy of UHC reform in Thailand: lessons for low-and middle-income countries. *Health Systems & Reform, 5*(3), 195-208. doi: https://doi.org/10.1080/23288604.2019.1630595

Tevapitak, K., & Helmsing, A. B. (2019). The interaction between local governments and stakeholders in environmental management: The case of water pollution by SMEs in Thailand. *Journal of Environmental Management, 247*, 840-848. doi: https://doi.org/10.1016/j.jenvman.2019.06.097

Thaothampitak, W., & Wongsuwatt, S. (2022). The Effect of e-WOM on Foreign Students' Travel Intention Related to Visiting Tourism Destinations along Thailand's Andaman Coast in the Wake of the COVID-19 Pandemic: Mediating Roles of Destination Image. *Journal of Community Development Research (Humanities and Social Sciences), 15*(1), 62-75. doi: https://doi.org/10.14456/jcdr-hs.2022.6

Thumronglaohapun, S., Maneeton, B., Maneeton, N., et al. (2022). Awareness, perception and perpetration of cyberbullying by high school students and

undergraduates in Thailand. *PLOS ONE, 17*(4), e0267702. doi: https://doi.org/10.1371/journal.pone.0267702

Wattanawong, O., Iamsirithaworn, S., Kophachon, T., et al. (2021). Current status of helminthiases in Thailand: A cross-sectional, nationwide survey, 2019. *Acta Tropica, 223*, 106082. doi: https://doi.org/10.1016/j.actatropica.2021.106082

Weerasombat, T., Pumipatyothin, P., & Napathorn, C. (2022). Understanding Employability in Changing Labor Market Contexts: The Case of an Emerging Market Economy of Thailand. *Sustainability, 14*(16), 10436. doi: https://doi.org/10.3390/su141610436

Yoelao, D., Mohan, K. P., & Sombatwattana, P. (2019). A qualitative construction of sufficiency living wage in Thailand based on the sufficiency economy philosophy. *International Perspectives in Psychology: Research, Practice, Consultation, 8*(4), 227. doi: https://psycnet.apa.org/doi/10.1037/ipp0000117

Yohmad, S., & Prabrat, S. (2022). Approaches for the Accounting Profession-Based Development of Skills and Abilities for the Accountants Working in Accounting Offices in Southern Thailand. *Central Asia and the Caucasus, 23*(2), 35-49. doi: https://doi.org/10.37178/ca-c.23.2.005

Zhang, Y., Khan, S. A. R., Kumar, A., Golpîra, H., & Sharif, A. (2019). Is tourism really affected by logistical operations and environmental degradation? An empirical study from the perspective of Thailand. *Journal of Cleaner Production, 227*, 158-166. doi: https://doi.org/10.1016/j.jclepro.2019.04.164