

Impact of Environmental, Social, and Governance Factors on the Sustainability of Banking's Financial System: Southeast Asia Perspective

Jessika

Accounting Department, Faculty of Economics and Communication, Bina Nusantara University

Kevin Deniswara

Accounting Department, Faculty of Economics and Communication, Bina Nusantara University,

Abstract - Environment, Social, and Governance factors and risks have been significant to financial services industry and how those factors being controlled could impact the industry's performance. Although several studies have been conducted regarding the issues, inconsistencies of the results still exist. In this study, quantitative explanatory based on multiple linear regression and data of 7 countries in Southeast Asia from 2010 to 2017 are used. Results indicated that increase in ecological footprints and carbon emissions decrease non-performing loans and increase domestic credit to private sectors. Moreover, increase in human development increases non-performing loans and domestic credit to private sector, while increase in gender inequality decreases non-performing loans and domestic credit to private sector. Lastly, the effect of WGI variables indicates a positive and negative relationship to non-performing loans and domestic credit to private sectors. This study suggests policymakers to expand input for sustainable economy development that aligns environment and social interest.

Index Terms – ESG, Financial System, Sustainability Banking

INTRODUCTION

A responsible economy through a sustainable finance is essential to maintain infrastructure and social stability to create a better harmonization of the environment in a longer term, whereas sustainable finance aligns the economy, social, and environmental interest to achieve a sustainable economic growth [1]. To achieve the objectives of sustainable economic, the effectiveness of governments in developing policies and regulations also collaboration with stakeholders in public and private sector play important roles. Sustainable finance that aligns with the triple bottom concept, which strive for the harmonization between people, planet, and profit (3P) has now become both focus and challenges faced by the world, including countries in Southeast Asia [2]. This can be seen where governments have started to include initiatives that align with environmental, social, and governance (ESG) principles in their development plan, like Green Finance Action Plan in Singapore, Responsible Lending Guidelines in Thailand, and Sustainable Finance Roadmap in Indonesia [1, 3].

Besides government, all sectors in the business landscape have significant influences on the economy, environment, and social activities, especially for the financial services industry, where investment and lending decisions made by them does not only affect individual and business but could also affect the alignment of industrial development and sustainable development agenda [4, 5, 27]. The development of the financial services industry is ought to be able to increase its positive impact on economy, society, and environment [6]. In Indonesia, the Financial Services Authority (OJK) has required the in the financial services industry's players to create strategy that could integrate the ESG principles in their business plan and report their ESG implementation to the public as the initiatives to mitigate the ESG risk [1].

The initiatives of ESG principles are subjected to create more effective use of finance to provide sustainability and prevent the increase in environmental and social issues globally. The healthy financial services industry could emphasize the role of private sector to contribute to sustainable development by minimizing environmental impacts and reduce poverty from economic activities [7]. But investment and financial access to the high carbon emitting companies could impact business in the long run. As easier access to finance enable business to invest in more machine and technology that consume larger amount of energy and discharge more carbon and waste [8]. Carbon emissions are now 62% higher than the emissions in 1990, marked as the highest record of global carbon emission reaching 36.7 gigaton in 2019 [9]. The significant growth of carbon emission has contributed to global climate change, whereas the five-year period from 2016-2020 is expected to be the warmest record of temperature on earth [9]. The impact of climate change could be more severe for Asia than other regions, as the high intensity of carbon emissions of the region led to a rapid climate change that would risk on average between \$2.8 trillion and \$4.7 trillion of GDP in Asia, accounted for more than two-thirds of the total annual global GDP, due to its socioeconomics impacts of five systems: livability and workability, food systems, physical assets, infrastructure services, and natural capital [10]. Thus, Indonesia become one of the first movers to implement carbon tax policy that will be effective by April 2022 as the instrument to mitigate climate change [11].

The environmental risk arise due to environmental degradation could increase the credit risk of bank, where socioeconomics impacts of climate change increased the number of defaults, delayed payment, and bad debts or non-performing loans [4]. As most

of countries in Southeast Asia are classified as developing countries, non-performing loans are considered as the major threat for their sustainable development and financial stability [12]. During the Asian Financial Crisis, non-performing loans ratio peaked at 48.6% in Indonesia and 13% in Thailand causing a vulnerable banking system towards fraud and loose underwriting standards [13]. Therefore, players in financial services industry, like bank should be able to mitigate the credit risk by developing sustainable financial product and services, also implementing policies that support the sustainable finance, such as requiring the potential borrowers to disclose their climate-related risk based on TCFD recommendations that includes governance, strategy, risk management, metrics, and target to assess their climate-related risk [1, 14].

Social risk, like human rights, health risks, security, is associated with the interactions between institutions, stakeholders, and the society, whose behaviors and expectation keep evolving over the time. One of the most severe risks that impacted economy is the social inclusion, in which could impact the efficiency of socioeconomic policies, productivity, and the level of economy [15]. In Southeast Asia, the common challenges faced by countries in this region includes highly unequal gender division of labor, uneven social and economic development, and poverty. These issues could be alleviated by increasing the financial development, where an availability and easier access of funds for the poor will increase their income level and create more job opportunities following with a higher economic output [16].

The impact of ESG risk is significant to financial services industry and how they control the risks could impact the performance of the industry [17]. In last decade, sustainable development and business practices that has been focusing on economic growth and expenses the environmental and social dimension has started to catch the attention of countries globally due to the rise of ESG risk starting from climate change and carbon emissions from the unsustainable business practice to wider social gap that increased both financial and non-financial risk to the business. Moreover, the rate of shifting into ESG-based investment are still low although ESG-based portfolio has shown to be a better investment rather than market capitalization-based investment [18].

Although several studies have been actively analyzing the impact of the environment [8, 19, 20], social, and governance factors [15, 16, 17] on the sustainability of financial system, this study contributes to the extent of literature in multiple ways. First, this study focuses on Southeast Asia countries that has not been analyzed for their ESG impact to the financial systems. As Southeast Asia countries are mainly driven by agriculture, industrial, and transport sector that consume large amounts of natural resources, discharges most of the carbon and waste, and the crucial social issues existed in the region, it is essential to understand how ESG risk could impact the sustainability of financial system, by looking at the result of non-performing loan (NPL) and domestic credit to private sector (DCPS). Second, this study uses ecological footprint and carbon emissions as the proxies for environmental dimension, Human Development Index (HDI) and Gender Inequality Index (GII) suggested by UNDP as the proxies for social dimension, and the Worldwide Governance Indicators as the proxy for governance dimension. Third, this study objective is to provide insights and evidence to government and financial services industry's players as it investigates the effectiveness of current policies in creating a sustainable economy that take accounts the environmental and social interest.

LITERATURE REVIEW

I. Environment Factors and Sustainability of Financial System

Energy and natural resources are essential in economic development, especially to fulfil the demands of manufacturing production that keeps increasing over the time. The extensive uses of fossil fuels, exploitative consumption of natural resources, low awareness on the importance of renewable energy, to low monitoring level on the production activities are the major contributor to the incremental of ecological footprints, carbon, and waste that led to environment degradation and threat of ecosystem and sustainable development in the long run [21]. Ecological footprint and carbon emissions as the indicators use to measure environment degradation, in which increase in both could increase the likelihood of climate change that led to an increase in credit risk [17, 22]. Several studies have investigated the impact of environmental factors towards both non-performing loans and domestic credit to private sectors, but to date, inconsistencies of the results still exist. Based on [4], the results shows that the increase in carbon intensity of loans increase non-performing loans ratio of banks. However, [8] has shown that the increase in ecological footprint has resulted in economic growth measured by the GDP per capita that indirectly decrease non-performing loans. On the other side, [19] and [24] confirmed that the increase in domestic credit to private sector led to an increase in carbon emissions significantly. Similarly, [26] and [8] strengthened the finding on the importance for the policymakers to limit the credit access as easier access of credit to high-carbon emitting companies increase the likelihood of environmental issues, where they could use the capital to invest on new technology that require more energy and generate more carbon and waste to increase the quality and efficiency of production. Contrary, [25] shows that easy access to credit could increase the investment on more efficient technology and promote the use of renewable energy that will alleviate the effect on environment degradation.

Hypothesis 1 (H1). Ecological footprint has positive effect on the non-performing loans and negative effect on the domestic credit to private sector.

Hypothesis 2 (H2). Carbon emissions has positive effect on the non-performing loans and negative effect on the domestic credit to private sector.

II. Social Factors and Sustainability of Financial System

As most of the countries in Southeast Asia are developing countries, they have been facing crucial imparity of health, education, and gender inequality issues, where women always have a lower education level and given limitations in power and rights for health, job employment, educations, and social protection, which lead to an increase in socioeconomic risk and economic crisis [23]. [17] has shown that the social inequality decreases the robustness of the banking system, as increases in social inequality could results in a lower level of domestic credit to private sector. Similarly, [16] has confirmed that an effective allocation of

credit access at a reasonable rate towards technology and infrastructure to enhance the quality of life, such as health and education could be a solution for the social inequality issues among the poor and increase their economic opportunities and standard of living, which decreases the credit risk. However, based on [8], increase in credit to access increases the buying power of people to purchase for luxury goods which could potentially results in an increase the credit risk. In addition to that, [17] shows that social inequality has negative correlation the non-performing loan ratio.

Hypothesis 3 (H3). Human Development Index has negative effect on the non-performing loan and positive effect on the domestic credit to private sector.

Hypothesis 4 (H4). Gender Inequality Index has positive effect on the non-performing loan and negative effect on the domestic credit to private sector.

III. Governance Factors and Sustainability of Financial System

Governance as the institutions where authority in a country is exercised includes the process of how government are being selected, monitored, and replaced that are measured with voice and accountability and political stability and absence of violence variables; the capacity of government to effectively develop and implement sound policies that are measured with government effectiveness, regulatory quality variables; and the respect of the people towards the socioeconomic interaction that are measured with rule of law, and control of corruption variables. Governance's role is crucial to the sustainability of financial system, as it is highly influenced by the policymakers in the financial field and regulations regarding the mechanism of low-carbon economy transition and sustainable finance, climate-friendly investment program, and how it could impact the real economy [28]. According to [17], government effectiveness and regulatory quality have negative correlation with non-performing loan, as decreased in government ability to formulate and implement sound policies and regulations that promote private sector development could increase the non-performing loan ratio. Moreover, government effectiveness and their ability in developing policy and regulation that control the credit access focusing on the investment of environment friendly technology and alleviation of social issues by limiting the capital for unsustainable acts could have positive effect on the sustainable of financial system. Therefore, it is essential to analyze whether governance in Southeast Asia countries could tackle the sustainable issues exists.

Hypothesis 5 (H5). Worldwide Governance Indicator has negative effect to non-performing loan and positive effect on domestic credit to private sector.

RESEARCH AND METHODOLOGY

I. Data and Variables

This study analyzes the impact of environment, social, and governance factors on the sustainability of banking's financial system from the Southeast Asia perspective based on panel data of 7 countries in Southeast Asia from 2010 to 2017, which includes Cambodia, Indonesia, Myanmar, Philippines, Vietnam, Singapore, and Thailand that are selected based on the data availability. Table 1 summarized the variables used in this study, where the sustainability of

TABLE I
LIST OF VARIABLES

Variable	Definition	Units	Source
NPL	Non-performing loans to total gross loans.	%	World Development Indicators (World Bank)
DCPS	Domestic credit to private sector	% of GDP	World Development Indicators (World Bank)
EF	Ecological footprints that measure the ecological assets that a given population or product requires to produce the natural resources it consumes and to absorb its waste, especially carbon emissions.	gha	Global Footprint Network
CO2E	CO2 emissions	Metric tons/capita	World Development Indicators (World Bank)
HDI	Composite index measuring average achievement in three basic dimensions of human development: long and healthy life, knowledge, and decent standard of living	-	UNDP Human Development Reports
GII	Composite measuring inequality in achievement between women and men in three dimensions: reproductive health, empowerment, and labor market	-	UNDP Human Development Reports
CC	Control of corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	-	Worldwide Governance Indicators (World Bank)
GE	Government effectiveness - perceptions of quality of public and civil service and the degree of its independence from political pressures, quality of policy formulation and implementation, and credibility of the government's commitment to such policies.	-	Worldwide Governance Indicators (World Bank)
PSAV	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically motivated violence.	-	Worldwide Governance Indicators (World Bank)
RQ	Regulatory quality captures the ability of government to formulate and implement sound policies and regulations that permit and promote private sector development.	-	Worldwide Governance Indicators (World Bank)
RL	Rule of law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, in particular the quality of contract enforcement, property rights, the police, the courts, as well as the likelihood of crime and violence.	-	Worldwide Governance Indicators (World Bank)
VA	Voice and accountability capture perceptions of the extent to which a country's citizens can participate in selecting the government, freedom of expression, freedom of association, free media.	-	Worldwide Governance Indicators (World Bank)

TABLE 2
DESCRIPTIVE STATISTICS RESULT

Descriptive Statistic	NPL	DCPS	EF	CO2E	HDI	GII	CC	GE	PSAV	RQ	RL	VA
mean	2.17	87.03	147.55	3.53	0.73	0.35	-0.12	0.35	-0.19	0.23	-0.02	-0.50
median	2.18	101.05	122.48	1.99	0.70	0.39	-0.44	0.10	-0.06	-0.05	-0.34	-0.38
min	0.76	27.25	16.38	0.34	0.54	0.07	-1.29	-0.94	-1.65	-0.67	-1.12	-1.50
max	3.89	149.37	438.65	8.64	0.94	0.51	2.18	2.24	1.62	2.26	1.83	0.18
sd	0.70	41.89	118.96	2.91	0.11	0.14	1.00	0.91	0.83	0.85	0.85	0.55
skew	0.11	-0.22	1.10	0.65	0.42	-0.81	1.40	0.88	0.39	1.22	1.03	-0.43

banking's financial system is the explanatory variables that is measured by non-performing ratio (NPL) and the domestic credit for private sector (DCPS). The dependent variables are ecological footprint (EF) and carbon emissions (CO2E) as the proxies of environment, human development (HDI) and gender inequality (GII) as the proxies of social, also worldwide governance indicators that consists of six different variables as the proxies of governance. Table 2 reports the descriptive statistics of the variables in Southeast Asia countries. The study finds that ecological footprint has the highest volatility while human development index has the lowest. Furthermore, most of the variables are positively skewed, with only domestic credit to private sector, gender inequality index, and voice and accountability that are negatively skewed.

II. Model and Methodology

To evaluate the impact of each environment, social, and governance variable on the sustainability of financial system, the quantitative research with multiple linear regression method is used with the following regression model:

$$NPL_{i,t} = \beta_0 + \beta_1 EF + \beta_2 CE + \beta_3 HDI + \beta_4 GII + \beta_5 CC + \beta_6 GE + \beta_7 PSAV + \beta_8 RQ + \beta_9 RL + \beta_{10} VA + \varepsilon_{i,t} \quad (1)$$

$$DCPS_{i,t} = \beta_0 + \beta_1 EF + \beta_2 CE + \beta_3 HDI + \beta_4 GII + \beta_5 CC + \beta_6 GE + \beta_7 PSAV + \beta_8 RQ + \beta_9 RL + \beta_{10} VA + \varepsilon_{i,t} \quad (2)$$

Where $NPL_{i,t}$ and $DCPS_{i,t}$ represents non-performing loan and domestic credit to private sectors respectively; $\beta_0, \beta_1, \beta_n$ are the corresponding coefficients; ecological footprints, carbon emissions, human development, gender inequality, and six variables of worldwide governance indicator are the explanatory variables, while $\varepsilon_{i,t}$ is the error term. All the variables except worldwide governance indicators variables are transformed into logarithms with base 10 to reduce normality and heteroscedastic issue. Additional tests are conducted to test whether normality, multicollinearity, heteroscedastic, and autocorrelation existed in the model.

Kolmogorov-Smirnov normality test was carried out in the study and the results shows that both models are distributed normally as the p-value are 0.89 and 0.22 (> 0.05) respectively. The evaluation of variance inflation factor (VIF) also confirmed that all variables in both models were not affected by the multicollinearity issues in the data, whereas the maximum VIF are 7.16 and 7.35 and are not above 10. The variables data are also free from heteroscedastic issues as the p-value for both model in the Glejser's test is 0.91 and 0.11 respectively. Since Hausman test results for both models are not significant at 5% level (p-value = $0.99 > 0.05$ and p-value = $0.96 > 0.05$), we accept the null hypothesis which states that the random effect (RE) model is appropriate and reject the alternative hypothesis which states that fixed effect (FE) model is appropriate. As random effect has already accounted for individual effects, this study does not analyze the model further through the two-step GMM. For this research, R is used as the tools for running the models.

EMPIRICAL RESULT AND DISCUSSION

TABLE 3
REGRESSION OUTPUT – NON-PERFORMING LOAN (NPL)

Variables	Estimate	Std. Error	z-value	Pr(> z)
Log10(EF)	-0.255335	0.455795	-0.5602	0.575346
Log10(CO2E)	-0.923327	0.326154	-2.8310	0.004641 **
Log10(HDI)	3.241308	3.243167	0.9994	0.317588
Log10(GII)	-0.846116	0.550622	-1.5367	0.124378
CC	0.041539	0.136593	0.3041	0.761046
GE	0.442923	0.156563	2.8290	0.004669 **
PSAV	-0.109009	0.078902	-1.3816	0.167102
RQ	-0.529452	0.161927	-3.2697	0.001077 **
RL	-0.040643	0.137556	-0.2955	0.767636
VA	-0.030453	0.122133	-0.2493	0.803097

***, **, *, and . indicate that the coefficients are significant at the 0, 0.1%, 1%, and 5% level of significance, respectively.

TABLE 4
REGRESSION OUTPUT – DOMESTIC CREDIT TO PRIVATE SECTORS (DCPS)

Variables	Estimate	Std. Error	z-value	Pr(> z)	
Log10(EF)	0.422792	0.295443	1.4310	0.152418	
Log10(CO2E)	0.743687	0.187529	3.9657	7.32E-02	***
Log10(HDI)	1.791868	1.869.910	0.9583	0.337929	
Log10(GII)	-0.527189	0.316790	-1.6642	0.096081	.
CC	0.010872	0.077232	0.1408	0.888051	
GE	-0.033942	0.088185	-0.3849	0.700314	
PSAV	0.120992	0.045671	2.6492	0.008067	**
RQ	0.044192	0.091436	0.4833	0.628875	
RL	-0.163641	0.077698	-2.1061	0.035193	*
VA	-0.086303	0.070369	-1.2264	0.220037	

***, **, *, and . indicate that the coefficients are significant at the 0, 0.1%, 1%, and 5% level of significance, respectively.

Table 3 reports the results of from the random effects model regression analysis for the effect ESG on the non-performing loan for Southeast Asia countries, while Table 4 reports the results of from the random effects regression analysis for the effect ESG on the domestic credit to private sector for Southeast Asia countries.

I. Environmental Factors on Non-Performing Loans

First, a higher ecological footprint and carbon emission increase climate risk could result in an increase of non-performing loan ratio of the country. However, the results of the analysis for data during 2010-2017 shows that effect of ecological footprint and carbon emissions are negative to Southeast Asia countries' non-performing loan. The effect of ecological footprint and carbon emission on non-performing loan are -0.255 and -0.923 respectively, which indicate that increase in ecological footprint and carbon emissions contribute to a lower non-performing loan. This implies that non-performing loan has been decreased by the economic growth measured by GDP growth, whereas [29] shown that increase of 1 percentage point in GDP growth could led to a decline in 0.3 percentage points in non-performing loan. Carbon emission and ecological footprint especially in the high industrialization and commercialization activities are the major indicator for economic growth in Southeast Asia, where as transport, energy, agriculture, forestry, fisheries, and technology are contributing sectors in achieving economic growth and integrated market under the ASEAN Economic Community. The period of 1990-2018 has shown a linear increase in carbon emission from energy use in ASEAN led by sectors in electricity and heat production, manufacturing industries and transport [30]. According to [30], increased in carbon emissions from fossil fuel during the period has increased along with the economic growth over the year, as the economy at the stage on initial industrialization discharge more carbon emission from fossil fuel compared to those with more dependence on the service industry. The results also aligned with [8] that ecological footprint could arise due to outdated technology used in the industrialization activities. Thus, economic growth as the result of carbon emission and energy consumption could reduce poverty, increase education quality, and job employment that could minimize non-performing loan. Although the result contradicted with hypothesis 1 and 2, environment risk like climate change has long-term effect and global temperature is expected to increase by 2.3 degrees Celsius by 2050 creating risk to life, ecosystem, and economy if no significant changes are made to decarbonize and limit environment degradation. Thus, integration of environmental sustainability principles in credit structure policy and regulation on transition to low-carbon energy to minimize loan defaults and non-performing loan are essentials [31, 32].

II. Social Factors on Non-Performing Loans

Human development and gender inequality demonstrate positive and negative associations with non-performing loan, respectively. The effect of human development and gender inequality are 3.241 and -0.846 respectively, as increase in human development could increase the non-performing loan, while increase in gender inequality could decrease the non-performing loan ratio. This finding implies that increase in life expectancy, education, and standard of living could increase the buying power of people that enable them to buy for more luxury goods, like property, automobile, clothes, and jewelry to improve their self-worth and status among their peers. Thus, increase in spending could potentially lead to increase in credit risk [8]. The mitigation of non-performing loan is essential, so the role of financial institutions should be able to screen and filter both existing and potential consumers by engaging environmental and social risk assessment. In addition, human development could increase non-performing ratio due to the correlation between human development and the likelihood of corruption that positively associated with non-performing loan. The likelihood of corruption increases as human development increase, as it is moderated by power distance and individualism [33]. As according to fraud triangle, fraudulent acts like corruption are triggered by the opportunity given because of the power and authority. Corruption contributes to severe impacts on economic and social development, also worsened banks' non-performing loan in MENA countries. [34] showed that corruption increases bank credit risk because some bank loans are willing to be defaulted by borrowers who believe that they would not be subjected to any penalty because of their political connections. On the other side, the association of gender inequality and non-performing loan could be seen through the impact of gender inequality on economic growth [29]. Range of studies have found that gender gaps in education and job employment reduce economic growth, as low participation of female labor force caused by the wide wage gaps led to a lower GDP per capita [35, 36, 37]. However, the finding in this study aligns with [38] study on Asian economic growth who found that country with the widest gender gaps grew the most rapidly especially in early stage of economic development, as increase in gender inequality could stimulate investment spending as a share of GDP because of the lower uncertainty provided from male wage raise. Women's low wages also stimulated export sales and provide the foreign exchange to purchase capital and intermediate goods which raise productivity and growth rates [38].

IV. Environment Factors on Domestic Credit to Private Sectors

The ecological footprint and carbon emission demonstrate a positive association to domestic credit to private sector, which results in 0.423 and 0.744 respectively. The result indicates that an increase in both ecological footprint and carbon emission lead to an increase in the domestic credit to private sectors. The result could have two implications: (1) an easy access to credit for investment on renewable energy or more efficient technology to minimize the effect towards environment degradation; (2) an easy access to credit to improve the economic could stimulate an increase in investment or spending on non-environmental friendly project, such as manufacturing activities that increased industrial waste and infrastructure enhancement projects that require huge amount of natural resources which actively contribute to environment degradation and increased in carbon emissions [8, 26]. According to [30], carbon emission in ASEAN has shown a linear increase from energy use led by sectors in electricity and heat production, manufacturing industries and transport, which strengthen the findings of the second implication. The finding has shown that the increase in domestic credit to private sector has not been able to lead Southeast Asia countries to develop renewable energy, but contrary has become the opportunity for business to expand their production scale and invest on more equipment that increase carbon emission with lower cost. Moreover, easier access to credit access could build confidence and increase the buying power of individual to purchase more properties, automobiles, and electronic appliances that contributes to carbon emission [24, 26]. Therefore, the finding implies that general credit systems provided for the private sectors should be ensured to fulfill sustainability principles, in which credit structure and regulation should support the investment in cleaner technology along with environment friendly specification in existing financial instruments and products [20].

V. Social Factors on Domestic Credit to Private Sectors

Human development has positive relationship with domestic credit to private sectors, while gender inequality has negative relationship with domestic credit to private sectors. The effect of human development and gender inequality are 1.792 and -0.528 respectively, as an increase in human development and decrease in gender inequality contribute to a higher level of the domestic credit to private sectors. This result indicates that an effective allocation of credit access at a reasonable rate towards technology and infrastructure to enhance the quality of life, such as health and education for the poor could be a solution for the social inequality issues and increase their economic opportunities and standard of living [16]. Poverty that mainly become the identity of marginalized and vulnerable groups is beyond of lack of income, it also covers the inability to afford basic needs, such as access to food, health, and education. Thus, the development of financial sector that focuses on the poor, includes the relaxation of constraints to credit and improve money and deposit for the poor could boost growth, income inequality, and alleviating social issues, such as poverty, gender inequality, and malnutrition [41]. On the other side, cointegrated relationship between gender inequality, financial development, and economic growth exists, in which increase in gender income inequality impairs economic growth, but financial development increases economic growth. The alleviation of gender inequality could boost the financial development that could reduce gender inequality by income, education, and health as the feedback. As increase in credit access by enabling low-interest loans for entrepreneurial activities increase independency, productivity, and enhance employment opportunities to women. The improved access to financial resources could enable women for better socio-economic contribution in the society [42].

VI. Factors on Domestic Credit to Private Sectors

The effect of WGI variables also indicates a positive and negative relationship with domestic credit to private sector. The effect of control of corruption, political stability and absence of violence/terrorism, and regulatory quality are positive to domestic credit to private sector, while the effect of government effectiveness, rule of law, and voice and accountability are negative to domestic credit to private sector. This finding indicates that the increases in government's ability to formulate and implement sound policies and regulations that permit promote private sector development could increases the credit access for the private sector, including SMEs to develop their business and create more job employment. With the easier access to financial services and access to job enable the poor to rise their income level and enhance their standard of living [16]. Moreover, the results also shows that government effectiveness has negative relationship to domestic credit to private sectors, in which as the influence of governance has been crucial to the sustainability of financial system, where it is highly influenced by the regulations and role of policymakers in the financial field to develop mechanism of the low-carbon economy transition, climate-friendly investment programs, sustainable financing mechanism, and socialize on how it could impact the real economy [28]. This shown that the quality of policy formulation and implementation, and the credibility of the government's commitment to the policies, should be able to minimize the growth of carbon emission and environment deterioration risk by establishing a strict policy that limits the credit access to non-environmentally friendly project and promote sustainable finance initiatives.

CONCLUSION

This study examined the environmental, social, and governance impacts on the sustainability of financial system in Southeast Asia from 2010 to 2017 using quantitative research with multiple linear regression method. The findings highlight that increase in ecological footprints and carbon emissions could decrease the non-performing loan ratio due to high dependency of Southeast Asia countries on industrialization and commercialization activities to stimulate their economic growth. On the other hand, increase in both ecological footprints and carbon emissions lead to an increase in the domestic credit to private sectors as the increase in domestic credit to private sector has created an opportunity for the business to receive financial capital with lower cost to expand their production scale and invest on more equipment that increase carbon emission. On social side, increase in human development could increase non-performing loan ratio and increase domestic credit to private sector, while increase in gender inequality could decrease the non-performing loan ratio and lower domestic credit to private sector. Human development has

increased the buying power and tendency of individual towards corruption, while lower gender inequality could increase the credit access by enabling low-interest loans for entrepreneurial activities increase the independency, productivity, and employment opportunities to women. Lastly, the effect of WGI variables indicates a positive and/or negative relationship with non-performing loan, in which all variables except control of corruption and government effectiveness have negative relationship with non-performing loan and the effect of control of corruption, political stability and absence of violence/terrorism, and regulatory quality are positive to domestic credit to private sector, while the effect of government effectiveness, rule of law, and voice and accountability are negative to domestic credit to private sector.

To date, Southeast Asia countries have started to establish ESG principles-based initiatives, like Indonesia that will be implementing carbon tax as an instrument to mitigate climate change and increase public awareness on sustainability finance to limit non-environment friendly credit, support renewable energy and other green investment. Based on the empirical results, we propose several policy recommendations to increase the sustainability of the financial systems. First, significant changes to decarbonize and limit environment degradation are essential, where policymakers should implement the integration of environmental sustainability principles in credit structure, policy, and regulations on transition to low-carbon energy to minimize the loan defaults and non-performing loans. Second, financial institution should start screening and filtering both existing and potential consumers by engaging environmental and social risk assessment. Third, concerning on the social and gender inequality, government should promote private sector development that create job employment and improve access to financial capital, which enable women to have better socio-economic contribution in the society. Future studies could be conducted by implementing individual case studies on each country in this region or dividing the countries into economic sub-groups. In addition, research could focus on a more detailed classification of environmental factors especially on carbon emissions into industry classification.

REFERENCES

- [1] OJK, "Roadmap Keuangan Berkelanjutan Tahap-II (2021-2025)," 2021. [Online]. Available: [https://www.ojk.go.id/id/berita-dan-kegiatan/publikasi/Pages/Roadmap-Kuangan-Berkelanjutan-Tahap-II-\(2021-2025\).aspx](https://www.ojk.go.id/id/berita-dan-kegiatan/publikasi/Pages/Roadmap-Kuangan-Berkelanjutan-Tahap-II-(2021-2025).aspx)
- [2] World Bank, "Sustainable Finance," 2021. [Online]. Available: <https://www.worldbank.org/en/topic/financialsector/brief/sustainable-finance>
- [3] Green Finance Platform, "Singapore's Green Finance Action Plan," 2019. [Online]. Available: <https://www.greenfinanceplatform.org/policies-and-regulations/singapores-green-finance-action-plan>
- [4] R. Guan, H. Zheng, J. Hu, Q. Fang and R. Ren, "The Higher Carbon Intensity of Loans, the Higher Non-Performing Loan Ratio: The Case of China," *Sustainability*, vol. 9, no. 4, pp. 667, 2017.
- [5] Ceres, "Corporate Governance and Climate Change: The Banking Sector". New York: RiskMetrics Group Inc., 2008.
- [6] T. Pathak and R. Tewari, "Theoretical grounding for sustainability reporting: a comparison between Indian and European banks," *ACRN Oxford Journal of Finance and Risk Perspectives*, vol. 6, no. 3, pp. 107-120, 2017.
- [7] S. Dong, L. Xu, and R. McIver, "China's financial sector sustainability and "green finance" disclosures," *Sustainability Accounting, Management and Policy Journal*, 2020.
- [8] M. A. Baloch, J. Zhang, K. Iqbal and Z. Iqbal, "The effect of financial development on ecological footprint in BRI countries: evidence from panel data estimation," *Environmental Science and Pollution Research*, vol. 26, no. 6, pp. 6199-6208, 2019.
- [9] WMO, GCP, UNESCO-IOC, IPCC, UNEP, and the Met Office, "United In Science: A multi-organization high-level compilation of the latest climate science information," 2020. [Online]. Available: public.wmo.int/en/resources/united_in_science
- [10] McKinsey Global Institute, "Climate risk and response in Asia," 2020. [Online]. Available: <https://www.mckinsey.com/business-functions/sustainability/our-insights/climate-risk-and-response-in-asia>
- [11] Kemenkeu, "Pajak Karbon Sebagai Instrumen Pengendali Perubahan Iklim," 2021. [Online]. Available: <https://www.kemenkeu.go.id/publikasi/berita/pajak-karbon-sebagai-instrumen-pengendali-perubahan-iklim/>
- [12] C. Zheng, P. K. Bhowmik, and N. Sarker, "Industry-specific and macroeconomic determinants of non-performing loans: a comparative analysis of ARDL and VECM," *Sustainability*, vol.12, no. 1, pp. 325, 2020.
- [13] J. Fell, M. Grodzicki, J. Lee, R. Martin, C. Y. Park, and P. Rosenkranz, "Nonperforming Loans in Asia and Europe—Causes, Impacts, and Resolution Strategies," 2021.
- [14] TFCF, "Recommendations of the Task Force on Climate-related Financial Disclosures," 2017. [Online].
- [15] M. Ziolo, B. Z. Filipiak, I. Bık, and K. Cheba, "How to design more sustainable financial systems: The roles of environmental, social, and governance factors in the decision-making process," *Sustainability*, vol. 11, no. 20, pp. 5604, 2019.
- [16] T. H. Ng, C. T. Lye, K. H. Chan, and Y. Z. Lim, "Sustainability in Asia: The Roles of Financial Development in Environmental, Social and Governance (ESG) Performance," *Social Indicators Research*, pp. 1-28, 2020.
- [17] V. Dedu, D. C. Nişescu, and M. A. Cristea, "The Impact of Macroeconomic, Social and Governance Factors on the Sustainability and Well-Being of the Economic Environment and the Robustness of the Banking System," *Sustainability*, vol. 10, pp. 5713, 2021.
- [18] M. Maiti, "Is ESG the succeeding risk factor?," *Journal of Sustainable Finance & Investment*, vol. 11, no. 3, pp. 199-213, 2021.
- [19] S. C. Obiora, O. Bamisile, E. Opoku-Mensah, and A. N. Frimpong, "Impact of Banking and Financial Systems on Environmental Sustainability: An Overarching Study of Developing, Emerging, and Developed Economies," *Sustainability*, vol. 12, pp. 8074, 2020.
- [20] F. Ganda, "The environmental impacts of financial development in OECD countries," *Environmental Science and Pollution Research*, vol. 26, no. 7, pp. 6758-6772, 2019.
- [21] S. Saud, S. Chen, A. Haseeb, and Sumayya, "The role of financial development and globalization in the environment: Accounting ecological footprint indicators for selected one-belt-one-road initiative countries," *Journal of Cleaner Production*, vol. 250, pp. 119518, 2019.
- [22] R. Ulucak, and F. Bilgili, "A reinvestigation of EKC model by ecological footprint measurement for high, middle and low income countries," *Journal of Cleaner Production*, vol. 188, pp. 144-157, 2018.
- [23] R. Holmes, and N. Jones, "Gender inequality, risk and vulnerability in the rural economy," *Refocusing the public works agenda to take account of economic and social risks*, 2011.
- [24] C. Jiang, and X. Ma, "The Impact of Financial Development on Carbon," *Sustainability*, vol. 11, pp. 5241, 2019.
- [25] M. Shahbaz, F. A. Jam, S. Bibi, and N. Loganathan, "Multivariate Granger causality between CO2 emissions, energy intensity and economic growth in Portugal: evidence from cointegration and causality analysis," *Technological and Economic Development of Economy*, vol. 22, no. 1, pp. 47-74, 2016.
- [26] B. Wang, and Z. Wang, "Imported technology and CO2 emission in China: collecting evidence through bound testing and VECM approach," *Renewable and Sustainable Energy Reviews*, vol. 82, pp. 4204-4214, 2018.
- [27] UNEP, "The inquiry into the design of a sustainable financial system," 2015. [Online]. Available: www.unep.org/newscentre/inquiry-design-sustainable-financial-system
- [28] E. Campiglio, Y. Dafermos, P. Monnin, J. Ryan-Collins, G. Schotten, and M. Tanaka, "Climate change challenges for central banks and financial regulators," *Nature Climate Change*, vol. 8, no. 6, pp. 462-468, 2018.

- [29] J. K Josevski, and M. Petkovski, "Non-performing loans in Baltic States: determinants and macroeconomic effects," *Baltic Journal of Economics*, vol. 17, no. 1, pp. 25-44, 2017.
- [30] ASEAN, "ASEAN State of Climate Change Report," 2021. [Online]. Available: <https://asean.org/wp-content/uploads/2021/10/ASCCR-e-publication-Final-12-Oct-2021.pdf>
- [31] McKinsey & Company, "Banking imperatives for managing climate risk," 2020. [Online]. Available: <https://www.mckinsey.com/business-functions/risk-and-resilience/our-insights/banking-imperatives-for-managing-climate-risk>
- [32] McKinsey Sustainability, "Confronting climate risk," 2020. [Online]. Available: <https://www.mckinsey.com/business-functions/sustainability/our-insights/confronting-climate-risk>
- [33] R. L. Sims, B. Gong, and C. P. Ruppel, "A contingency theory of corruption: The effect of human development and national culture," *The Social Science Journal*, vol. 49, no. 1, pp. 90-97, 2012.
- [34] A. Mohamad and H. Jenkins, "Corruption and banks' non-performing loans: empirical evidence from MENA countries," *Macroeconomics and Finance in Emerging Market Economies*, vol. 14, no. 3, pp. 308-321, 2021.
- [35] K. Munir and A. Kanwal, "Impact of educational and gender inequality on income and income inequality in South Asian countries," *International Journal of Social Economics*, 2020.
- [36] D. Elson, "Gender equality and economic growth in the World Bank World Development Report 2006," *Feminist Economics*, vol. 15, no. 3, pp. 35-59, 2009.
- [37] S. Klasen and F. Lamanna, "The impact of gender inequality in education and employment on economic growth: new evidence for a panel of countries," *Feminist economics*, vol. 15, no. 3, pp. 91-132, 2009.
- [38] S. Seguino, "Accounting for gender in Asian economic growth," *Feminist Economics*, vol. 6, no. 3, pp. 27-58, 2000.
- [39] M. T. Schaper, "The Missing (Small) Businesses of Southeast Asia," 2020.
- [40] OECD, "How the private sector can advance development," [Online]. Available: <https://www.oecd.org/development/development-posts-private-sector.htm>
- [41] G. Aslan, C. Deléchat, M. M. Newiak, and M. F. Yang, "Inequality in financial inclusion and income inequality," 2017. [Online]
- [42] S. Claessens, and E. Feijen, "Financial sector development and the millennium development goals (No. 89)", 2007. [Online]
- [43] Aarushi, Naveen Nandal, Parul Agrawal. AN EXPLORATORY RESEARCH IN PRODUCT INNOVATION IN AUTOMOBILE SECTOR. JCR. 2020; 7(2): 522-529. doi:10.31838/jcr.07.02.98
- [44] Kumar, S. (2022). Effective hedging strategy for us treasury bond portfolio using principal component analysis. *Academy of Accounting and Financial Studies Journal*, Vol. 26, no.2, pp. 1-17