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Is Carbon Taxes Will Able To Tackle Forest Fires In Indonesia: A Swot Analysis In Search Of Optimal Policy

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ARTICLES INFORMATION ***ABSTRACT***

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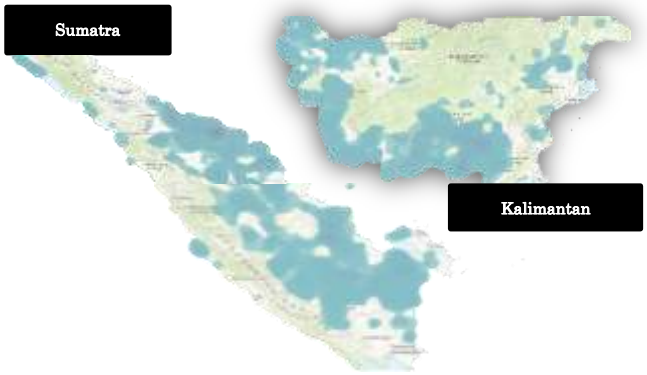
The research was inspired by the necessity to implement a comprehensive environmental strategy as a result of more than a decade of forest and land fires in Indonesia that caused haze pollution. Without thorough enforcement and the inability to identify the underlying cause of policy execution, the societal cost resulting from the economic agent's behavior will surpass the individual value and degrade the environment. After briefly describing the current command and control instrument and other arrangements in tackling land and forest fire, we do a SWOT analysis on carbon tax with the theme of preventing pollution damage. Our study shows that the ability of carbon tax policy to identify, increase fire costs, monitor compliance model, and implement a mixed policy will induce a behavioral change in economic agents. Closing the environmental policy gap, this study would be a push factor in drawing policy measures to implement the carbon tax roadmap as one of the last fortress policies in carbon pricing to tackle land and forest fire. Moreover, improving policy design is based on a 'forward-looking' approach, not pollution amounts.

A. INTRODUCTION

The haze pollution from land and forest fire has become an intermittent problem increasing the Government of Indonesia's environmental mitigation and adaptation spending in the general budget since 1980. The economic impact of haze pollution from land and forest fire in Indonesia in 2015 exceeded US $16 billion. It was equal to about 1.8% of Indonesia's GDP, more significant than the value added to the entire palm oil production in 2014 (World Bank 2016, p.6).

Research has shown that fire coupled with environmental anomalies such as El Nino in Indonesia is one of the factors for haze pollution[1] (Wooster *et al.,* 2012, p.318). In general, haze pollution sources are mainly forest and peatland burning (Usup *et al.,* 2004, pp.1-2; Heil, 2007, pp. 8-71), slash and burn agriculture (Langner *et al.,* 2007, pp.2329-2330). Moreover, in the land use change and forestry sector, people use fire to clear and convert the land for plantation (Miettinen *et al.,* 2012, pp. 126-128; Gaveau *et al.* 2014, pp. 2; Lestari *et al.* 2014, p.6; Vadrevu *et al.* 2014, p. 247-248). Plotting of the hotspot area in the map is presented in Figure 1.

Figure 1: Forest Fire Plotting in Indonesia Period 2001 – 2016



Note: MODIS DATA – NASA and Plotting Using ArcGIS Online &ESRI. The shaded area shows intense burning during the period of observations.
Source: Author Calculation

Even though limited in success in preventing land and forest fire, Indonesia has been enacting strict "command and control" regulations (please see: Iskandar 2012, pp. 22-23; Varkkey 2015, pp. 3-7). Command and control are a policy characterized by a target coupled with punishment to be enforced if we fail to meet the emission target (Gunningham & Grabosky, 1999, p. 38). This policy instrument implementation has been widely evaluated in terms of cost for the enforcement compared to equalization marginal pollution cost by researchers (Hahn & Hester 1989, pp.110-111; Faure & Ubachs 2003, pp.34-35; Faure & Weishaar 2012, pp. 406-407; Barde *et al.,* 2012, p.47). In Indonesia cases, criminal law enforcement in the judicial sanctioning decision as a last resort with greater certainty of deterrence, severity, and celerity of punishment are less consistent in

[1] Haze pollution are smoke resulting from land and/or forest fire that cause deleterious effect of such nature as endangering human health, harming living resources and ecosystem and material property, and impairing amenities and uses of the environment (ASEAN Agreement on Transboundary Haze Pollution, 2002)

internalizing the harm caused by the land and forest fire as a result; the rigidity does not always lead to higher deterrence level without a degree effective internalizing environmental harm (Tatariyanto, 2018).

Researcher study showed that an instrument or strategy approach needs to be sufficiently flexible and resilient in addressing all environmental problems in all contexts (Gunningham & Grabosky, 1999, pp. 375-422). The complementary policy with the market-based instrument will create more optimal policy outcomes based on those conditions. Tax as a market-based instrument would be placing a direct cost on environmental damage; the polluter should bear the cost of measures to reduce pollution according to the extent of either damage done to society or the exceeding of an acceptable level (OECD, 1975). The regulatory policy or command and control and tax policy as an instrument mix is expected to have optimal policy output in the paper following Gunningham and Grabosky (1999, pp.428-429): whereas regulation is positively correlated with the board-based economic policy and supply-side incentives.

The carbon tax is part of the environmental taxation that focuses primarily on reducing the greenhouse gases emitted through land and forest fire in Indonesia. Several research on carbon tax implementation in developed countries have shown that income levels and tax administration systems do not witness rapid changes but are more or less stable (Tiezzi, 2005; Wier *et al*., 2005; Bork, 2006; Dresner & Ekins, 2006; Callan *et al.,* 2009). Also, most of the Indonesia carbon tax research case (with a source of pollution burning fossil fuels) has been done in the theoretical, experimental study and distributional impact analysis (please see: Iskandar 2012, pp.66-102; Yusuf & Resosudarmo 2015, pp.10-33). Furthermore, there was no previous study related to taxing haze pollution in the case of Indonesia. Based on those conditions, the paper aims to contribute to solving the haze pollution puzzle, prevent land/forest fires, and promote green economy initiatives. Additionally, the article addresses the questions: Is implementing a carbon tax on land use and land use change will contribute to stopping the Indonesia haze pollution damage?

The paper follows Larsson's (1957, p.158) definition that pollution damage is the pollutant released 'in the wrong place,' negatively affecting air and further causing damage to the environment, property interests, or living conditions. Furthermore, Tax Policy in this paper refers to the Pigouvian Tax concept that pollution can be reduced by increasing a firm's marginal private cost to reflect the marginal cost of all negative externalities (Pigou, 1932, p.13). Accepting those starting points, the paper will discuss the taxes on haze pollution.

Environmental policy analyses related to haze pollution or climate change are mainly performed through the law, institutional, case studies, cost-benefit analysis, and SWOT (e.g., Fauzi and Anna, 2013; Forsyth, 2014; Quah, 2002; Nurhidayah, 2013; Fertel *et al.,* 2013). We will perform SWOT as a strategic policy analysis tool. The goal is to help define a development strategy (Jackson & Dutton, 1988, p. 371). The analysis considers internal and external factors and incorporates comprehensive economic, organizational, and legal aspects. Following Fertel *et al*. (2013, p.1140), the SWOT approach in examining tax on tackling haze pollution has advantages. Compared to simple discourse, it presents a comprehensive tax policy analysis and focuses on change by creating dynamic value in improving the current environmental policy. Furthermore, compared to the cost-benefit study, the SWOT is more practical and based on more than just an economic-rationality point of view.

The GDP development from plantations, especially in Indonesia's palm oil sector, has a positive direction. The plantation is the most significant export product, providing

3.57% of the GDP (Feintrenie *et al*., 2010, p.1). Additionally, as a source of national revenue, the estimated contribution of the palm oil sector from tax for 2015 is reaching 1.281 billion. Please refer to Table 1 for detailed palm oil development. However, the plantations have a severe negative impact related to the environment, mainly due to the plantation expansion through forest and peat land clearing (Sheil *et al*., 2009, pp. 22-23). The carbon tax on emissions as part of the comprehensive environmental policy is expected to help control the emission by raising the responsibility of the economic agent for polluting the environment.

Table 1: The Plantation to GDP and Total Tax Revenue Development Note: Tax Revenue from Palm Oil Plantation from unpublished data from the Directorate General of Taxes

	Plantation to GDP Current Prices (In Percentage)	Tax Revenue from Palm Oil Plantation (In Percentage)
2006	1.90	N/A
2007	2.07	0.89
2008	2.14	N/A
2009	2.00	1.27
2010	1.93	1.24
2011	3.87	1.48
2012	3.75	1.34
2013	3.75	1.14
2014	3.77	1.01
2015	3.57	1.21

Source: Author Calculation and Statistically Year Book, BPS

The paper is presented as follows. Part two analyzes Indonesia's current environmental policy and other related policy arrangements. Part three, we present Indonesia tax related environmental briefly and then explore the future approach through SWOT analysis and discuss the policy development, focusing on the interlink between environmental policy and carbon tax policy. Part four, in the conclusion, will present the conclusion and policy recommendation.

B. LITERATURE REVIEW

Current Environmental Policy in Tackling Emission from Land and Forest Fire

In chapter two, we present the current environmental-related policy that has been enacted and other arrangements mainly focusing on fire/haze pollution in Indonesia. This analysis leads to an introduction of the challenges to be analyzed through SWOT.

Indonesia Environmental Policy

Indonesia's environmental policy relevant to haze pollution and forest/land fire comprises several laws but only ones in the legal, structural hierarchy that particularly focuses on the issue. Table 2 compares the legal structure of Indonesia's environmental policy in tackling haze pollution. Despite the strength of the regulation, several drawbacks are needed to be resolved. Law No.32/2009 and Presidential Decree No. 98/2021 are policies interlinked to tax policy as part of the carbon levy, even though they are not comprehensively regulated. Implementing Law No. 7/2021 on Harmonization of Tax Regulation as the baseline of an implementation carbon tax with the first implementation

phase in the energy sector does not automatically make the provision in line with the carbon pricing policy in Presidential Decree 98/2021. Additionally, all the provision has inherent weakness due to unclear coordination between Central Government and Local Government. The autonomy decentralization in Indonesia transfers authority to define policy at the Provincial and Municipal/City level without proper guidance, creating extreme complexity in implementing environmental policy (Tacconi, 2007, pp.344-345).

Other Environmental Instruments

Intergovernmental cooperation as a part of the ASEAN country's framework has established the ASEAN Haze Agreement to mitigate forest and plantation burning. Even though the ASEAN Haze Agreement enacted no burning policy and embraced the implementation of domestic anti-burning laws (Art. 9), several drawbacks in enforcement and lack of incentives also have been identified (Tan, 2015, pp.331-334; Laode, 2015, pp.316-317).

In the private sector arrangements, the palm oil industry and NGO 2004 established a Roundtable on Sustainable Palm Oil (RSPO) to promote production and sustainability for people, the planet, and prosperity. In the RSPO NEXT[2] principle and criteria for using fire for land clearing in new planting or replanting are not permitted, except has been approved by appropriate authorities (NFR 1.1-RSPO). Despite its comprehensiveness in promoting environmental sustainability, the RSPO has yet to receive comments regarding the stringency of principles and criteria and the ability to enforce economic agent compliance on the ground (Pacheco *et al*., 2017, p.33). An example is the company's noncompliance to RSPO HCV (High Conservation Value) with no deforestation and no peatland criteria. However, a significant company group that is a member of RSPO identified clearing tropical forests via their subsidiaries in Indonesia (Greenpeace, 2007;2015)

Table 2: Comparison of Selected Environmental Related Policy in Indonesia

Provision	**Law No. 4/2001 amended by Presidential Instruction No. 16/2011**	**Law No. 32/2009**	**Presidential Decree No. 98/2021**
Topic Regulation	Environmental Control Impact and/Pollution	Environmental Protection Management	Carbon Pricing
Burning Activities	• Forbidden (Art. 11)	• No rules regulated land/forest fire define as part ecosystem damage (Art. 21) • Zero Burning Policy (only in sanction)	Provision on NDC Sector implementation strategy (Art.3)
Enforcement/ Punishment	• Administrative for fail to preventing event of environmental degradation (Art. 48) • Criminal for negligent	• Administrative from formal notice to revocation of license • Criminal action burning Sentence to jail 3 – 10	• Mitigation through carbon pricing implementation • Carbon trading, carbon levy, and results based

[2] RSPO Next certification voluntary effort that engages with RSPO Board of Governors, that companies have met the current requirements and guidance of the RSPO P & C to directly tackle deforestation and implement forest safeguards.

	burning and failure to provide adequate infrastructure and mitigate land/forest fire (Art. 52)	years and/ fine Rp. 3 – 10 Billions for uncomplying to policy (Art. 108)	payments. (Art. 47) • Administrative sanction and criminal sanction as part mitigation action in climate change (Art.70)
Institutional Capacity	• Segregated responsibility (Monocentric Approach) (Art 23, 24,27,28, 30) • Improve in Presidential Instruction by multi-level governance and Appointed National Disaster Management (BNPB) based on Law No.24/2007	• Segregated responsibility between Central Government and Regional (Chapter IX) • Role of society in environmental protection (Art. 70) • Appointed Environmental Investigator and Investigator for criminal action (Art.74)	Segregated responsibility between Central Government and Regional in Carbon Pricing
Specific Measures	• The only legal structure hierarchy focus to the issue land/forest fire	• Implementation AMDAL, Environmental License before applying for business permit • Tax on Environmental as part incentive (Art.43)	• Incorporating International Carbon Trading • Carbon Offset

Source: Author

C. RESEARCH METHODOLOGY

SWOT Analysis in Tackling Haze Pollution

There have been previous attempts, as presented in part two, to tackle haze pollution but have yet to be successful. Therefore, an observation for shifting the policy to a comprehensive policy mix with tax policy as a market-based approach is worth doing, pushing the economic agent to reduce haze pollution. Indonesia's current tax policy is imposing a traditional environmentally related tax[3] without specific measures for haze pollution prevention. Moreover, from provision[4], we can observe that the tax is mainly the source of income for the Central/Province/Municipal to finance Indonesia's development. Departing from this point, in this next part, we will analyze future tax policies to tackle pollution damage in Indonesia. Table 3 will present our analysis.

[3] Motor vehicle tax, motor vehicle changes ownership duty, fossil fuel of motor vehicle tax, surface water tax, cigarette tax administered by Provincial. Non-metallic minerals and rocks, groundwater tax, land and building tax for urban and rural regions, acquisition of land and building duty are administered by Municipal/District.

[4] Law No.28/2007 on General Provision and Law No.28/2009 Law No.34/2000 that amendment with Law No.28/2009 on Local Tax and Charges.

The Analysis of Pollutant Damage Prevention

Land and forest fire has created persistent severe pollution of haze in Indonesia (Friend of the Earth *et al*. 2008, p.58; Greenpeace, 2007, p.3). Closing the gap from the regulatory policy (command and control), the carbon tax policy is expected to induce positive behavior through the policy scheme that puts pollution damage (emission) as the tax base and lower risk of evasion than fixed emission standard policy that is monitored by inspection. However, as a general rule design, the policymaker should achieve a balance between taxing the actual damage with administration feasibility. In the case of Indonesia, the Ministry of Finance identified that most emissions in 2015 came from land use and forestry (Jakarta Post, September 27, 2017). Indonesia's Green House Gas projection in 2030 from the agriculture sector would increase by 1.9 times, and net emissions from land use would increase by 1.7 times from 2005 (Hasegawa & Matsuoka, 2013, p. 417). Understanding the share of emission magnitude, the model of the carbon tax would be optimal if levied on polluting source fire as proxies for the emission of carbon dioxide. In the land use and land use change context, the intentionally burned area is the taxable event that reflected emissions with administrative feasibility. Essential requirements policy in assessing agricultural land is based on current use (Bell *et al*., 2009). In addition, the policy favors the use of land with a smaller environmental footprint (Vasijevic, 2016, p.717).

Following the first strength in the tax policy, identifying entities subject to the tax is also one of the basic structures in designing tax policy. Based on Crowding Theory, the way tax administration identifies taxpayers (as an external intervention) has an impact on taxpayers' behavior (as intrinsic motivation) (Frey & Feld, 2002, p.7). In the carbon tax on land and forest fire, the tax administration's ability to "tag" the personal characteristic 6, income, and land ownership records from pool data integration would be the most substantial factor in identifying the taxpayers who are non-compliance with the carbon tax policy.

Furthermore, following Pigou, the carbon tax design will increase the emitter's cost by giving explicit and implicit prices driven to encourage behavioral change. This increases human welfare from environmental benefits (Pigou, 1932, p.13; Ekins & Baker 2001, pp.327-328). In Indonesia's land and forest case, the carbon tax through design in the taxable event will increase the cost of planting/replanting using the burning method since it is cheaper than heavy machinery. The price of zero burning by using heavy machinery is much higher at 44% to 70% than the cost of burning (Simorangkir, 2007, p.151). This point would be the foremost opportunity for implementing the carbon tax on land use and land use change. Nevertheless, this design also creates a threat where the economic agent in palm oil plantations seems to have a license to burn as long as they pay the tax. This condition will emerge if the tax administration fails to mitigate the tax obligation equal to or lower than the cost that creates environmental pollution.

Table 3: Synthesis of SWOT Analysis

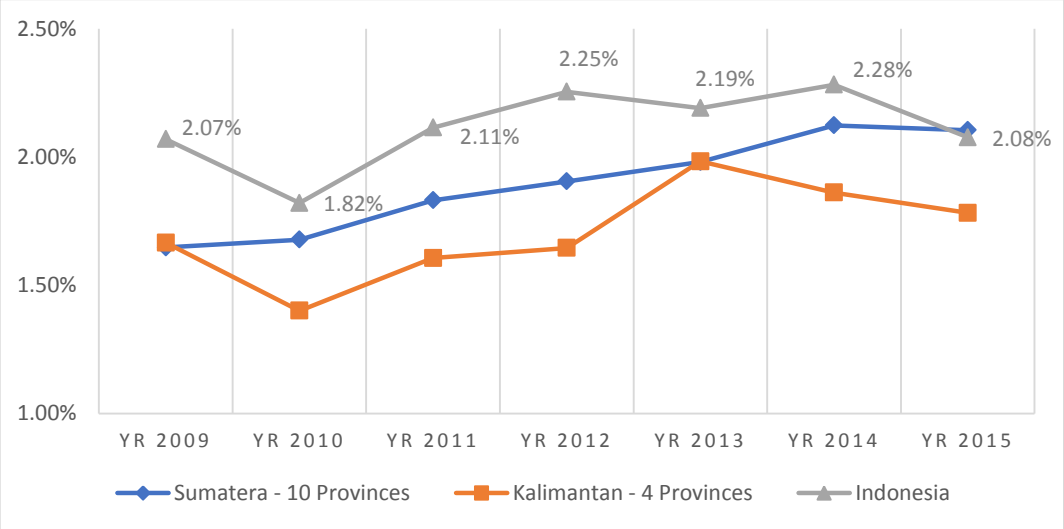
Internal (Positive) Strengths (S)	**Internal (Negative) Weaknesses (W)**	**External (Positive) Opportunities (O)**	**External (Negative) Threats (T)**
• Tax Base on direct pollution source not proxy. • Identified the	• Increasing Tax Collection Cost • Corruption • Limited Officer	• Market-based driven behavioral change (the implementation	• Licence to burn • Tax policy not fully linked

Personal Characteristic on Income and Land • Revenue for Environmental Improvement • Increasing Compliance • Institutional Capacity • Law No. 7/ 2021 the implementation on Carbon Tax	with Environmental Competencies	of Presidential Decree No. 98/2021) • Carbon Trading as policy mix • Intradepartmental Coordination	with Environmental Policy • Carbon Leakage

Source: Author

Further discussion on the strength of carbon tax in land use and land use change is the additional revenue allocation. Figure 3 provides the current Indonesian Government National and Regional Budget, whereas only 2,08% of the total spending is allocated for environmental functions. Furthermore, the carbon tax would link the revenue scale to the degree of environmental mitigation and adaptation in Indonesia. Maatta (1999, p.11) underlined that fiscal and environmental taxes primarily generate revenue but significantly positively affect the environment (see also: Maatta, 2006). Additional revenue in the state budget allocated for specific purposes (e.g., ecosystem protection and rehabilitation project) will also increase the acceptance of the citizen (Soares, 2012, p.110; Kallbekken & Aasen, 2010, p.1). This approach is earmarked. The revenue also has been taken in Japan and India (World Bank 2017, p.128).

Figure 3: Spending on Environmental Function 2009 – 2015



Note: The figure compares the budget pattern for environmental spending for Regional Government (the Province heavily impacted by Indonesia's haze pollution in Sumatra and Kalimantan Island) and National Level.
Source: Indonesia Ministry of Finance and Author Calculation

In the institutional arrangement, the approach is from the point of view Central Government. In contrast, as a Tax Administrator, the Directorate General of Taxes can intervene to control environmental damage. The current command and control policy in the plantations, especially palm oil, still needs comprehensive enforcement to address correct actors when haze returns to blanket the region (Varkkey, 2016, pp.6-7). Imposing a tax on haze pollution will close the gap due to Tax Administration being equipped with compliance model[5] to enforce non-compliance behavior. Furthermore, the capability of tax administration in Indonesia, with 586 operational offices and 37.987 employees[6], will be supporting and monitoring the effective mean of the taxpayer's compliance. Additionally, Appraisal Officer will be able to measure the environmental damage level and calculate the fire impact tax. However, the institutional capability also has potential weaknesses in the issue of corruption/bribery (Iskandar, 2013, p.25).

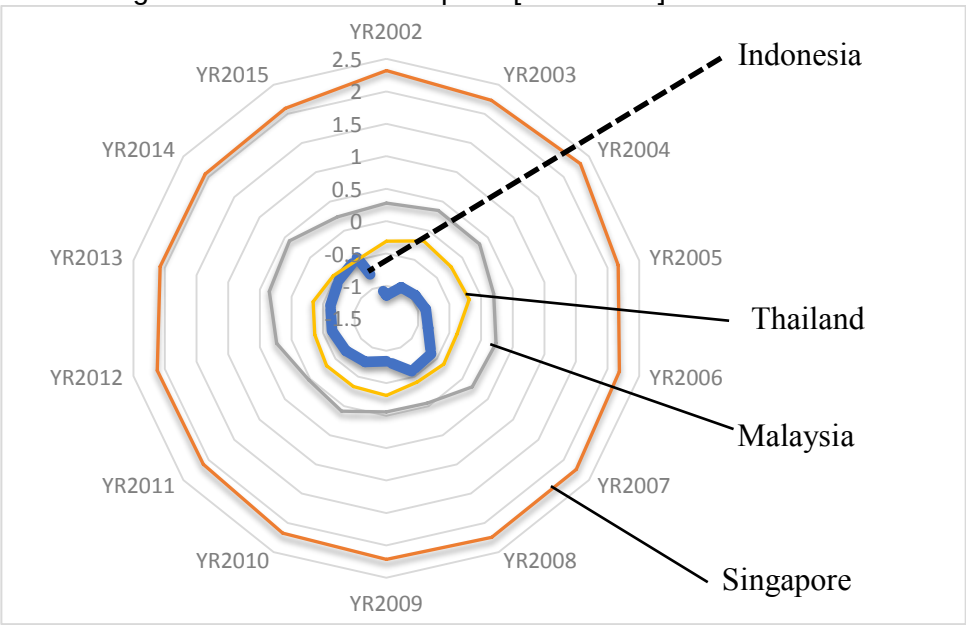
As stated in Law No. 7/2021 on tax harmonization, the carbon tax implementation will be implemented gradually by the carbon tax roadmap and considering the carbon trade roadmap to support the Indonesia NDC target. The first sector that began on April 1, 2022, is the energy sector, especially power generators that use coal, with a cap and tax scheme at IDR 30 per kg of carbon dioxide equivalent or IDR 30,000/tCO2e. As a result, implementing the carbon tax in land use and land use change throughput in the roadmap would be a strong point for implementation.

Furthermore, as shown in Figure 4, the Indonesian control of corruption score has increased significantly, even though still at the lowest level compared to the neighboring countries. The second potential weakness is the limited tax officer with environmental knowledge. The interlink between environmental policy and tax policy needs a policymaker who can design a comprehensive tax on haze pollution and a Tax Officer with a sufficient understanding of environmental aspects. Directorate General of Taxes is limited to overcoming both conditions. In addition, the third's potential weakness of institutional capacity is related to increasing the Tax Administration collection cost, especially for compliance monitoring. The board range empirical studies cost of collection is between 0.34– 4.5 percent from revenue (OECD, 2006, p.147; HMRC, 2009, p. 32; Convey *et al.* 2007, pp.7-8). The Tax Administration has to mitigate all the weaknesses and reduce the escalation risk of tax evasion in implementing a carbon tax on haze pollution.

[5] Compliance model as part of Compliance Risk Management is a structured process for systematic identification, assessment, and treatment of tax compliance risk (e.g., failure to report tax liabilities, etc.) (OECD, 2004)

[6] Directorate General of Taxes Annual Report 2015, The Guidance Year of Taxpayers Compliance: Building a Culture of Tax Compliance.

Figure 4: Control of Corruption [Estimation] 2002 – 2015



Note: The score reflects the degree to which public authority is exploited for private benefit, including small and large types of corruption and the "capture" of the state by elites and commercial interests.

Source: Worldwide Governance Indicator and Author Calculation

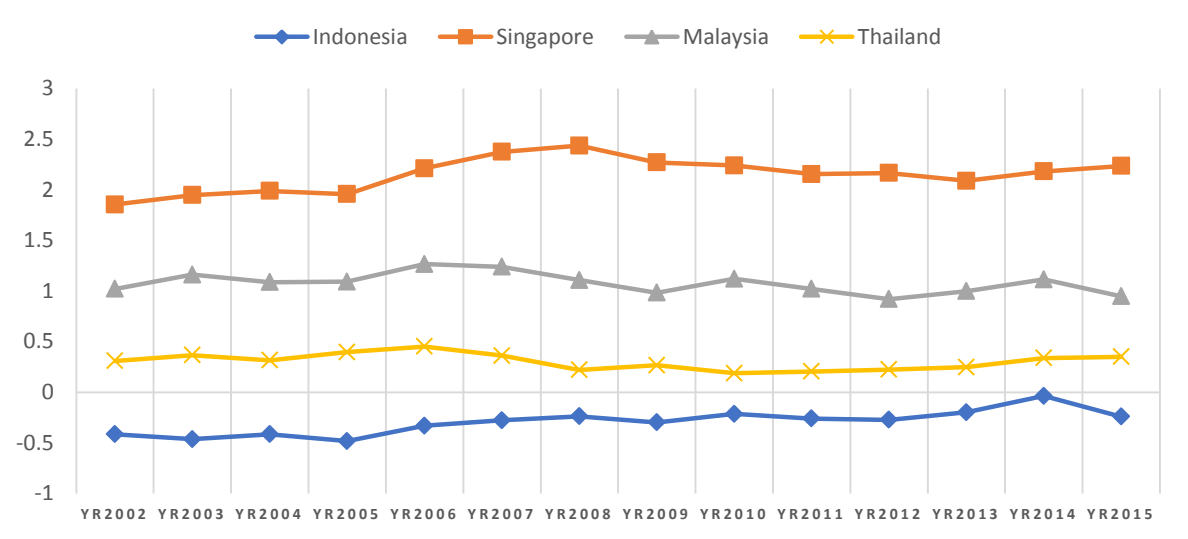
Regardless of the rapid development of palm oil plantation in Indonesia, smallholders[7] palm oil plantation has inequality issue and coupled with the political economy in the district, that stated-based elites, creating fewer incentives for agriculture development (Potter, 2016, pp. 164-165; McCarthy *et al*., 2012a, p.559). Based on those conditions, the implementation incentive policy as part of mix instrument with the tax on haze pollution is acceptable to mitigate resistance and unacceptability. This is in line with Molina (2012, p.96). Tax benefits for polluting–intensive businesses may be justified only as a transitory measure to help implement a higher environmental standard essential for taxpayers' economic survival. The incentive option has to promote standard field planting or in the form of tax deduction such as Value-Added Taxes reduction for sustainable environment goods and service purchases. Additionally, incentive options could be given to enable environmental conservation for plantation areas.

In the competitiveness issue, an overview of the current literature suggests that no strong universal relationship exists between environmental pressure and competitive performance at the firm or industry levels (Jenkins, 1998, p.30). Even though it does not directly correlate between tax and competitiveness, granting special provisions such as a refund system where the smallholder's act is paying the minimum rate as part of compensation measures.

[7] RSPO definition is farmer growing oil palm, where the family provides the majority of labor and the farm provides the principal source of income and where the planted area of oil palm is usually below 25 hectares.

In the last part of the analysis, we observe that the command and control model has a highly troublesome coordination issue in Indonesia. This is due to the current policy design being under the supervision of several ministries without a linked and comprehensive design. The range of responsibility increases and creates more burden on the economic agent. Implementing tax haze pollution as a policy mix does not automatically remove the barrier. However, it will improve intra-departmental coordination and policy implementation on the ground. Furthermore, tax type administered only by the Directorate General of Taxes would effectively promote and monitor governance effectiveness and policy compliance.

Figure 5: Governance Effectiveness Estimation 2002 – 2015



Note: Indonesia Government has the lowest aggregate indicator of effectiveness (e.g., the quality of public services, the quality of the civil service, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies) compared to neighboring countries in South East Asia.

Source: Worldwide Governance Indicator and Author Calculation

Policy Development

The SWOT analysis has been given a foundation for designing policies in tax areas for tackling the haze pollution damage. Building on the policy model, we see that tax policy's ability to comprehend command and control through tagging personal information and monitoring taxpayer compliance will strengthen the perceived detection of polluters. In addition, the policy mixes are also equipped with an incentive for smallholders as one of the driving factors in the transitory measure to enable the optimal environmental policy. Furthermore, implementing a carbon tax on haze pollution will also close the gap in the intergovernmental barrier of command control policy through a single administrator. Moreover, with a comprehensive implementation strategy, earmarking tax revenue policy, controlling emission reduction, and maintaining competitiveness will be manageable. Although the carbon tax on haze policy will support command and control in building optimal environmental policy, the tax instrument must resolve and mitigate weaknesses and potential threats such as corruption, increased collection costs, and limited competency issues.

Implementing a mixed policy, supported by burning plantation land, will serve as one of the tax base options for haze pollution tax. The land would be closely related as the proxy of carbon dioxide emission and administratively feasible to administer. Moreover, tax with proxy on land will increase the cost of planting/replanting as results will likely encourage behavioral change. The drawback of this policy development that needs to mitigate is the taxpayer's perception of having a license to burn as long as they pay the tax. In addition, this condition will exist if the tax administration fails to measure the economic agent's opportunity cost.

D. CONCLUSIONS AND SUGGESTIONS

This study has examined the necessity to enforce comprehensive regulation in environmental management due to more than a decade of environmental destruction through land and forest fire in Indonesia. In the current policy analysis, we found that the clarity of how the sectoral institutions coordinate and ineffective enforcement created an unsuccessful economic agent behavioral change and prolonged the Indonesia land and forest fire episode. The complexity of haze pollution creates no single instrument that could conceivably be successful in addressing all the issues, so we reroute in searching complementary measures in the marked-based instrument.

In the paper, we concluded that the ability of tax policy as a market-based instrument, identify the source of pollution and the personal characteristic, earmark the tax revenue, and enforce based on compliance model becoming a driving factor to the behavioral change in preventing the pollution damage caused by haze in Indonesia. Additionally, implementing incentives for smallholder farmers will be a leading factor in preventing pollution damage on forward-looking policy. Based on those conditions, we proposed two critical strategies as a determinant in tackling land and forest fire. First, we proposed implementing a carbon tax on land use and land use change in the second part as part carbon tax roadmap as a complementary command and control policy instrument. Second, we proposed that the tax base is the plantation land burned due to the closeness linearity to emissions or direct pollution sources.

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