The role of central government and local government and the moderating effect of good governance on forest fire policy in Indonesia

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Abstract

Purpose – The purpose of this paper is to investigate forest fires and their relationship to prevention and mitigation strategies based on the empirical problems raised by this study. Public policy implementation (in this case, the policy of forest fire management) is influenced by the role played by government and by the participation of the public and stakeholders (in this case, companies), as well as the effects of good governance. Thus, from the empirical problems associated with theoretical problems and normative problems, this study raises the influence of the role of central and local government on the implementation of forest fire prevention policy in Indonesia, which is moderated by the good governance variable.

Design/methodology/approach – This study used a quantitative approach by adopting survey methodology. The study has aimed to assess both large and small population groups, by selecting and reviewing carefully chosen samples of the population to find the incidence, distribution and relative interrelation of the variables considered (Kerlinger and Lee, 2000). The survey was undertaken in areas of Indonesia that have a high level of vulnerability to forest fires. There are currently six provinces – Riau, Jambi, South Sumatra, West Kalimantan, East Kalimantan and South Kalimantan – that have the highest intensity of forest fires. The study population was taken from 105 villages in those six major provinces experiencing forest fires. Sample size precision was determined by using Slovin's formula with a precision of 10 percent and, thus, a sample size of 52 was obtained.

Findings – The central government's activities have no significant effect on regional forest fire prevention. However, the results found that there is a significant effect caused by the interaction between the central and local governments and their governance of forest fire prevention. Even though the direct effect is not significant, the interaction effect significantly influences the forest fire prevention governance variable, which is a pure moderator. This study found that the role of central government has no effect on forest fire prevention. If the role of the central government is high, it will not impact the effectiveness of forest fire prevention, which is reflected in the aspects of prevention and early warning, reward and punishment, the improvement and management of ecosystems by reviewing courts, law enforcement and national and regional synergy.

Originality/value – This is one of the few public administration science studies to have investigated the relationship between good governance and forest fire policy in Indonesia, particularly the combined roles played by central and local governments.

Keywords Good governance, Forest fire policy, Role of central government, Role of local government

Paper type Research paper

1. Introduction

Policies issued by governments are commonly known as "public policy." Dye (1987) suggests that public policy concerns "whatever government chooses to do or not to do." This means that public policy refers to the choices made by any government, whether to implement or not to implement something. This understanding equates government policy with government actions and, looked at in this way, every option taken by the government has goals and objectives to be achieved. This understanding includes the freedom of governments to choose whether to implement something and also them choosing not to do so.

What is needed is a public policy that addresses the needs and problems of the real world. Public policy seeks to respond concretely to the problems or needs arising in the community (Suharto, 2010). One implementation that is to be developed in this dissertation's studies is the policy related to the prevention and control of forest fires, considering how these have become an issue of national and even international concern because of the impact they have on neighboring countries. The explanation will be presented in the next section.

Public policy will not succeed if it is not supported by the role played by government itself or by the roles of communies and other stakeholders. This has been described by Lopez, who stated that government policy has the authority to promote values for a society as a whole, so that the community becomes an active object in the policy tool set. The state policy also encompasses the allocation of the overall values of the community members by something that is legitimated by government. Further, it is said that there are three kinds of connotations associated with the term "public policy," especially the word "public," namely, the government, the community and the general context, or in this case there are the dimensions of "subject, object, and environment" for that policy. The dimensions of subjects are characterized by the presence of government policy, so it is said that one feature of the policy is "what governments do or choose not to do." The second dimension is that society is subjected to the government policy, while the third dimension is the general nature of the policy determined by the strata or the order in which the policy is adopted. This shows that theoretically there are linkages between the role played by government and community participation in the implementation of a public policy.

This is reinforced by the phenomenon mentioned by Suharto (2010). Policy depends on the government authorities. Public policy is action developed and implemented by government agencies that have the legal authority, and the political and financial means to do so. This means there is a real, active role for both central and local governments in the implementation of their policies. Policy also depends on: a reaction to real world needs and problems. Public policy seeks to respond concretely to the problems or needs developed in the community. This second formulation demonstrates the importance of community participation in the implementation of public policy since the policy will be made as a reaction to the needs of people in the real world and should aim to solve problems that occur in the community addressed.

In addition to the role of government and society, it is also necessary that the wheels of government run according to the tenets of good governance, in order to support the implementation of public policy. Globalization touches many areas of life in all areas of state government relating to economic and administrative systems, including the bureaucracy, enabling economic interaction between regions and between nations to take place more efficiently. Key to the success of economic development is competitiveness, and competitiveness is a key to the efficiency of service processes, quality assurance accuracy and public policy. As part of the efforts to deal with these challenges, one of the preconditions that needs to be developed is a strong commitment to implement the core values and principles of good governance to realize the ideals and objectives of the state.

Among the above theories, namely, the theory of public policy (policy implementation), the theory of good governance, role theory and the theory of participation, there is no theory that is able to explain the factors that affect the implementation of the policy explicitly, if it is associated with the role of (government) and participation (community and stakeholders), as well as its association with good governance, as described in the section above. When they are united, it is seen that the implementation of a policy is determined by the role of government, participation (public and other stakeholders) and the implementation of good governance. This is the nature of the theoretical problems raised by this research.

Indonesia, as a country that has the third largest area of tropical forests in the world, has committed itself to continue to protect, conserve and utilize forest areas and their natural

resources in a sustainable manner for the socioeconomic, ecological and political benefit of its society, so it can be enjoyed directly or indirectly by Indonesians and the world international community.

One routine disturbance to the existence of the forest that still occurs is the occurrence of land and forest fires, especially in every dry season. Wildfires have negative impacts in ecological terms, including the decline of biodiversity, the declining economic value of forest and soil productivity, as well as contributing to micro and global climate change. In addition, the smoke generated also has various negative socio-economic impacts, affects public health (especially by causing respiratory disorders), is disruptive to land, water and air, and it even disrupts the political relationships between ASEAN countries, especially countries that are located close to Indonesia, including, Singapore, Malaysia and Brunei Darussalam.

Law No. 18 of 2013 on the Prevention and Eradication of Forest Degradation is a metamorphosis of the draft bill for the eradication of illegal logging proposed in the mid-2000s. The phrase, "illegal logging," was introduced due to the absence of appropriate terminology at the time. In Indonesia, "illegal logging" has often been used by EIA/Telapak in a series of publications about Indonesia's illegal logging problem.

The Final Cut, *Above the Law* (2002) and *The Last Frontier* (2005) affirmed that illegal logging was dominated by figures who orchestrated operations in an organized manner. The publications of EIA/Telapak following undercover investigations indicated that illegal logging in Indonesia was often initiated by international criminals. *The Ramin Rackets* (2004) and *Profiting from Plunder* (2004) exposed how unscrupulous Malaysian businessmen exploited Indonesia's forests. *Singapore's Illegal Timber Trade* (2003) revealed similar players were at work in Singapore. *Behind the Veneer* (2006) explored the European and American timber markets that take in illegal timber from Indonesia. The bolder activities of timber barons have been combined with a weak enforcement of the law so that further exceptional rules were needed to capture the criminals exposed by the aforementioned reports.

This focus is not seen in Law No. 18 of 2013 because it only targets the lowest rung of timber mafia organizations that are based in the forest communities. Not many genuinely new things were in the draft bill addressing the eradication of forest destruction. Most of the regulations had been introduced in previous laws, especially the Forestry Law (No. 41 of 1999) and Law No. 5 of 1990 concerning the Conservation of Living Resources and their Ecosystems. Several new things are included, such as a minimum penalty, the establishment of a corporate crime and forest destruction eradication's institutionalization, but the proposed law also has a substantial weakness. The draft bill for the eradication of forest destruction will complicate things because its substance is to regulate the relevant ministries and local governments. This normative problem is the issue raised by this study.

The Ministry of Forestry supports the government's commitment to reducing carbon emissions by 20 percent, implemented by the Directorate General of Forest Protection and Nature Conservation through the Directorate of Forest Fire Control as mandated by Government Regulation No. 45 of 2004 on Forest Protection and the regulation of the Ministry of Forestry No. P.12/Menhut-II/2009 on Forest Fire Control. The Directorate of Forest Fire Control has been established as a work unit, and has conducted the technical activities of National Forest Fire Control since 2001. Its activities include forest fire prevention, firefighting and post-fire handling. Institutionally, the main duties and functions of the Directorate of Forest Fire Control are reinforced by Presidential Decree No. 177 of 2000 and the regulation of the Ministry of Forestry No. 123/Kpts-II/2001 on the Organization and Working Procedures of the Ministry of Forestry.

For the Second United Indonesia Cabinet (*Kabinet Indonesia Bersatu II*), forest and land fire control activities became a particular concern. This activity became part of the

11 priorities of the National Policy of Indonesia Bersatu II of 2010–2014, particularly the ninth priority (Environment and Disaster Management). The Ministry of Forestry also placed forest fire control activities into one of the eight policy directives (2010–2014), especially the third Policy Direction (Forest Protection and Forest Fire Control). The establishment of a strategic plan for forest fire control as part of the Strategic Plan of the Ministry of Forestry (2010–2014) resulted in the following: the hotspots on Kalimantan, Sumatra and Sulawesi were to be reduced by 20 percent from the average annually (2010–2016); the burnt forest area was to be suppressed by 50 percent in five years compared to the average condition in 2010–2016; the capacity of government and community apparatus was to be increased to improve risk reduction, mitigation and forest fire hazard handling in 30 units in ten provinces prone to forest fires.

The identification of forest and land fires in Indonesia is monitored from the distribution of hotspots observed by NOAA-18, MODIS (Terra and Aqua) satellites, and other devices. This activity has been going on since 1997. The total number of hotspots in 2014, based on NOAA-18 satellite readings, was 31,424 points, of which 1,714 points were in the conservation area (*kawasan konservasi* or KK), 1,820 points were in the protected forest area (*hutan lindung* or HL), 8,385 points were in the production forest area (*hutan produksi* or HP), 2,178 points were in the convertible production forest area (*hutan produksi yang dapat dikonversi* or HPK), 2,281 points were in the limited production forest area (*hutan produksi terbatas* or HPT), 1,978 points were in the plantation area (*areal perkebunan*) and in other areas (*areal penggunaan lain* or APL) there were as many as 13,068 points. From these data, it can be seen that the hotspots are mostly found in APL. In 2014, there was also a weak *El Niño* phenomenon and the rain that began to fall in October 2014 meant that there was no large, catastrophic smoke effect from the fires.

In 2015, land and forest fires occurred again. The prolonged dry season and the *El Niño* phenomenon triggered land and forest fires in Indonesia. Land and forest fires occurred not only in Sumatra and Kalimantan, but also in Java and Sulawesi. Land and forest fires on peatland in Sumatra and Kalimantan caused fog on Kalimantan and Sumatra, which spread to Malaysia, Singapore and a small part of Thailand. Land and forest fires in 2015 up to September 30, 2015 had burned 1,697,002 hectares of land in Sumatra and Kalimantan. The number of hotspots throughout Indonesia was 21,450 points according to figures released for the period until December 31, 2016.

Indonesia is an archipelago rich in natural resources, especially forests. There are various types of forest in Indonesia, such as coastal forests, peat swamp forests, lowland forests and upland forests. Therefore, Indonesia has been referred to as the lungs of the world. Ironically, this label began to disappear and fade away due to the use of forest areas that did not fit their function as "lungs" and due to the repeated occurrence of forest fires over the last 17 years. Forest fires are a very serious problem that must be resolved by the government. The current forest fires already occur at a very alarming rate and, if this continues to happen, it is possible that in the next few years, the forests in Indonesia will be depleted irreversibly and they will continue to shrink.

Forest fires are an inevitable disaster for humans. When a forest fire occurs, we cannot stop it instantly. According to Herawati *et al.* (2006), forest fires are triggered by natural phenomena as well as by human actions that burn forestry for the accomplishment of certain activities.

Forest fires have a major, negative impact on local communities, neighboring countries and the overall sustainability of forest biodiversity. The health of the people is harmed because of the smoke they inhale. The smoke from forest fires contains a variety of toxic gases which can cause acute respiratory infections. This smoke can spread to other areas so that the fog disrupts the activities of communities in the form of transportation which will increase the probability of accidents in the area. People who live close to the fire areas also

risk substantial losses such as burned houses and properties. In addition, forest fires can cause losses in business units due to a temporary discharge of their business activities located near the scenes of fires. Large losses and the negative impacts of forest fires should encourage a positive and serious response from policymakers in Indonesia.

The enforcement of the law by the Ministry of Environment and Forestry is realized by using two approaches, namely: the application of multi-instrument law, namely, administrative law, criminal law and civil law; and the law enforcement of a multi-legal regime (multidoors) which is a lawsuit brought as one case consisting of law enforcement of environmental protection and management, law enforcement of the Forestry Law, law enforcement of the Plantation Law and other criminal law enforcement. The Ministry of Environment and Forestry has established a Special Task Force (*Satuan Tugas Khusus* or SATGASUS) as one effort to deal with forest and land fires. The work of this team is to supervise actions consisting of identification, clarification and verification concerning land and/or forest fire issues; creating and signing the News Event of Supervision; as well as gathering and delivering the results of supervisory work to the Provincial Coordinator. SATGASUS is a field team consisting of the Environmental Supervisory Official (*Pejabat Pengawas Lingkungan Hidup* or PPLH), the Forest Ecosystem Controller (*Pengendali Ekosistem Hutan* or PEH) and the Forest Police (*Polisi Hutan* or Polhut).

The data source of burned land/forest is the LANDSAT imagery supplied by the Directorate General of Planology and Environmental Management of the Ministry of Environment and Forestry. Based on the data obtained, the supervision was done in stages. Based on the imagery, (Periods I and II), the oversight was conducted on 27 companies from September 16 to October 11, 2015, and 14 of them, consisting of six IUPHHK–HTI companies, six plantation companies, and two IUPHHK-HA companies, were imposed with administrative sanctions. In Periods III and IV (October 14–November 14, 2015), there were 41 companies (25 IUPHHK companies and 16 plantation companies) with an estimated burnt area of more than 1,000 Ha which had to be supervised in Riau, Jambi, South Sumatra, West Kalimantan, Central Kalimantan, South Kalimantan and East Kalimantan.

The efforts that have been made by related policymakers to protect against forest fires include taking preventive measures by alerting forest security officers and using hotspot data from NOAA_18 satellites and Terra and Aqua satellites to detect fire spots in areas with potential forest fires. However, it is not optimal enough to combat forest fire problems. The policymakers should also consider that fire prevention requires more optimal preventive measures especially in forest areas that are at great risk of burning.

The prevention and control of forest and land fires in plantation/forestry areas is relatively easy. The law implementation is clear so that any form of deviation will be relatively easier to be controlled. Moreover, the sanctions can be applied more assertively than is the case for fires on residential land or abandoned agricultural land. As for the cultivators, who are accustomed to clearing land by burning, they have been shown no alternative ways, so they will continue to use fire in every preparation of land for their agricultural activities. Given this situation, some participation from the community in forest fire prevention is needed.

The issue of forest fires, as explained previously, is related to their prevention and mitigation, which is the empirical problem raised by this research. As presented in the theoretical review, it appears that the implementation of public policy (in this case forest fire prevention policy) is influenced by the government's role as well as by the effect of good governance. Thus, in the case of this empirical problem, it is related to the theoretical and normative problems. This research raises the issue of the influence of the central and local government roles in the implementation of forest fire management policy in Indonesia along with the moderating influence of good governance.

The problem of forest fires and their relation to prevention and mitigation strategies can be translated into the empirical problems raised by this study. What has been presented in the theoretical review above shows that the public policy implementation (in this case the policy of forest fire management) is influenced by the role of government, and participation (by the public and stakeholders, in this case the company), as well as the effects of good governance. Thus, from the emergence of an empirical problem, associated with theoretical problems and normative problems, this study has raised the influence of the roles played by the central and local governments, on the implementation of forest fire prevention policy in Indonesia, which is moderated by the good governance variable.

Several previous studies have found partial relationships between variables as follows: good governance in the relationship between the role of central government directed to forest fire prevention policy by Quintero and Berkes (2010), Halachmi (2005), Myllylä and Takala (2011), Acevedo *et al.* (2016), Sihag (2007); good governance in the relationship between the role of local government directed to forest fire prevention policy by Barut *et al.* (2016), Quintero and Berkes (2010), Halachmi (2005), Myllylä and Takala (2011), Acevedo *et al.* (2016); the role of central government directed to forest fire prevention policy by Boustras and Boukas (2013), Czaja and Cottrell (2014), Quintero and Berkes (2010), Hammond (1996), Myllylä and Takala (2011); the role of local government directed to forest fire prevention policy by Aini *et al.* (2000), Boustras and Boukas (2013), Czaja. and Cottrell (2014), Kapotas and Maria (2017), Quintero and Berkes (2010).

2. Literature review
In connection with the implementation of forest fire regulation, this is a very serious problem that must be resolved by the government. Currently, forest fires occur already at a very alarming rate and if this continues to happen, it is possible that in the next few years, the forests in Indonesia will be depleted irreversibly and will continue to shrink. Forest fires are an inevitable disaster for humans. When a forest fire occurs, it cannot be stopped instantly. According to Herawati *et al.* (2006), forest fires are triggered by natural phenomena and by human actions that are taken to burn forestry in certain interests.

The prevention and control of forest and land fires in plantation/forestry areas is relatively easy. The law's implementation is already clear so that any form of deviation will be relatively easier to control. Moreover, the sanctions can be applied more assertively than for fires on residential land or abandoned agricultural land. As for the cultivators who are accustomed to clearing land by burning, they have been shown no alternative ways to work so they will continue to use fire in every preparation of land for their agricultural activities. Given this situation, some participation from the community in the achievement of forest fire prevention is needed.

Largely speaking, the area from Sabang to Merauke is a vast tropical forest area. This is what has caused Indonesia to be referred to as the lungs of the world. It is known that forests are able to absorb the carbon emitted by factory fumes around the world. However, in recent years, the ecological balance has changed as the forests in Indonesia have continued to decrease in size. This has been caused by several things such as forest clearances and fires. Forest fires are caused by many things, both intentional and unintentional. The intentional factors take the form of opening the land up by burning the forest, while the unintentional factors might be experienced as a result of discarding cigarette butts or global warming. However, the largest contributor to forest fires is the implementation of land clearing by large companies. According to the data from the Ministry of Forestry, the area of fire-affected land was approximately 1,000 squared meters in 2013. It is predicted that such numbers will increase in the next few years. Therefore, it is necessary to make a policy that regulates the handling of forest fires.

Some theories have been developed as the framework for the concepts in this research, such as the theory of policy, the theory of governance, the theory of good governance, the theory of dynamic governance, the theory of regional autonomy, the theory of role and the theory of participation. In the theory of role, the partnership between government (central and local), the private sector and society are important because that leads to good forest governance. From the function of the government (central and regional), the terms of planning (the process of determining the objectives to be achieved and efforts to achieve those goals), organizing (the activity of grouping and determining important activities and providing the power to implement those activities), staffing (the activity to determine human resource requirements, mobilization, screening, training and labor development), motivating (the activity of mobilizing or transmitting human behavior toward predetermined goals) and controlling (the activity of measuring the implementation with objectives, determining the causes of deviations and taking corrective action if necessary) are able to achieve good governance, which in this case is forest fire management.

Unlike the case with the role of central government, in the theory of regional autonomy, referring to Law No. 23 of 2014, the role of local government is divided into two authorities: provincial government has the authority to regulate and manage provincial governmental affairs (cross-district/cities) based on the NSPK established by the central government; and the local government of the regency/municipality is authorized to regulate and administer district or governmental affairs based on the NSPK established by the central government. The existence of Law No. 23 of 2014 on this form of regional government is expected to improve the system of local government. In addition, the change of orientation from one power to public service should encourage the improvement of the people's welfare in the region. In terms of public policies in regional autonomy, the local government is required to be more transparent and accountable to the public.

If it is associated with the theory of participation, the theory of the stakeholder, and the theory of good governance, the role of the central government, local government, community and company is determined by external demands, that is, the influence of globalization has forced us to apply good governance. Good governance has become the new ideology of states and international donor agencies in encouraging countries to respect the principles of the market economy and democracy in international relations. The term "good governance" began to emerge in Indonesia in the late 1990s in consequence of the interaction between Indonesia and foreign countries and donor agencies, which highlighted the objective conditions of Indonesia's domestic economic and political development situation. In the theory of good governance, it appears that the actors governed by a government consist of three parties, which are the state/government, the community and the private sector. This relationship is commonly known as the state, civil society and market that is able to bridge the implementation of good governance. The five theories above point out the relationships that exist between central or local governments, public participants or companies involved and good governance.

Furthermore, in the theory of governance, a government is "The authoritative direction and administration of the affairs of men/women in a nation, state, city, etc." If it is viewed from the semantic side, governance means a "good government system." On the one hand, the term "good governance" can be interpreted differently. This term can be translated as the performance of an institution, such as the performance of government, companies, communities or organizations. In the theory of dynamic governance, governance plays an important role in the modern economy and society by providing rules to facilitate the changes in institutions and by offering opportunities to improve the outcome of market failures arising from imperfect information, public goods and externalities (Nye, 2004). On the other hand, market power is widely accepted as the cornerstone of an efficient economy. A country's economic performance is determined primarily by the quality and type of its institutions that support the market. The meaning of performance here is defined

in the form of forest fire prevention performance. Thus, there is a relationship between the role of central/local government, community/company participation and governance in the matter of forest fire prevention.

There are 13 previous studies which support this research, such as the research by Yu *et al.* (2011), Larson and Petkova (2011), Diaz and Pons, Nayak *et al.* (2011), Leite *et al.* (2011), Bullinger and Haug (2012), Ramadhani, Russell *et al.* (2013), Weiguo *et al.*, Collins *et al.* (2013), Poudyal *et al.* (2013), Bhusal *et al.* (2014) and Milledge (2014).

The hypotheses of this study are:

H1. The role of central government significantly affects forest fire prevention policy.

H2. The role of local government significantly affects forest fire prevention policy.

H3. Good governance is a moderator variable in the relationship between the role of central government and forest fire prevention policy. A higher level of good governance will affect the strong relationship between the role of central government and forest fire prevention policy.

H4. Good governance is a moderator variable in the relationship between the role of local government and forest fire prevention policy. A higher level of good governance will affect the strong relationship between the role of local government and forest fire prevention policy.

Based on the framework of the relationships among the variables in Figure 1, it is necessary to implement policies for fire management and prevention. According to Lane (1991) and the National Coordination Meeting of Forest and Land Fire Prevention in 2016, there are six guidances based on the measurement (policy recommendation) such as prevention and early warning, reward and punishment, ecosystem improvement and arrangement, field review, law enforcement and synergy centers, as well as regions. In relation to good governance, good forest governance is determined by accountability, oversight, responsiveness, professionalism, efficiency and effectiveness, transparency, equity, foresight, participation and legal adherence (Saifuddin, 2004). On the other hand, to support the government's participation, there are five aspects of measurement: planning, organizing, staffing, motivating and controlling (Terry *et al.*, 1991).

3. Methodology
This study uses a quantitative approach with survey methodology. The study has aimed to assess the populations of both large and small areas by selecting and reviewing a carefully chosen sample of the overall population to find the incidence, distribution and relative interrelation of the variables examined (Kerlinger and Lee, 2000). It was located in forested
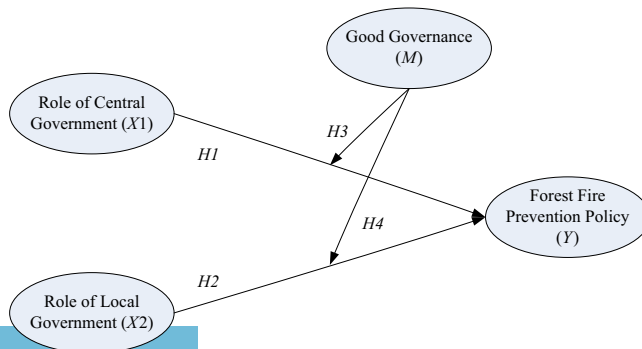
Figure 1.
Conceptual framework

areas that have a high level of vulnerability to forest fires in Indonesia. There are currently several provinces in Indonesia – Riau, Jambi, South Sumatra, West Kalimantan, East Kalimantan and South Kalimantan – that have the highest intensity of forest fires. The study population was 105 villages in six provinces, using a longitudinal study with an unbalanced panel total of 399 observations over four years from 2014 to 2017.

To measure the variables, distributing questionnaires were sent to the respondents. For each answer, a score obtained using the Likert scale was given. The scores or weighting values used were "strongly agree (5)" to "strongly disagree (1)." The validity and reliability instrument was confirmed using SPSS (Gaur and Gaur, 2009). We used panel structural equation modeling (SEM) estimation in the models, predicting the relationship between the role of central and local government toward forest fire prevention policy, and also for good governance as a moderator. We preferred a panel SEM over pooled OLS regression due to the important assumptions of homoscedasticity and an absence of serial correlation in pooled OLS (Wooldridge, 2002). Panel SEM is more suitable in that it corrects itself for the omitted variable bias, and due to the presence of autocorrelation and heteroscedasticity in pooled time series data.

4. Analysis result
The first phase tested assumptions in the model SEM. The assumptions that had to be met prior to SEM analysis were the assumption of normality, the absence of outliers and linearity. The multivariate normality assumption was tested with the help of AMOS 6 software. Normality test results obtained a critical value ratio of 1.375 to the critical value and, for Z-stat, 5 percent was equal to 1.96. Because the absolute value of CR for the multivariate amounted to $1.31 < 1.96$, then the multivariate normality assumptions were met. To test whether there was an outlier, the Mahalanobis distance (MD) was sought. The Mahalanobis distance was evaluated using a value of 32.168. The Mahalanobis distance with the most distant observation point had the value: $Md = 68.148$. This compared with the value of 23.17, so the furthest Md value < 68.148, meaning there were indications of there being a multivariate outlier, but basically outliers cannot be removed if the outliers of data are describing the condition of the data (i.e., there are not any errors in the input data). Testing was conducted by the assumption of linearity curve fit. Linearity test results showed that all significant linear models for the Sig < 0.05, thus it was concluded that the assumption of linearity had been met.

The second phase was testing the goodness of fit models. Results of testing the overall goodness of fit models, according to the results of the SEM analysis, to determine if a hypothetical model was supported by the empirical data, are given in Table I.

The test results, based on the goodness of fit overall model of Table I, show that both criteria showed a fit model that was χ^2, CMIN/df, RMSEA, GFI, TLI and CFI. Therefore, the model SEM in this study was accepted for being a fit model, so it can be done in order to discuss further interpretations. In the following section, the results of the hypothesis-testing SEM analysis of direct effect and moderation effect are presented. The hypothesis was significant if there was a p-value of < 0.05.

Criteria	Cut-off value	Result	Conclusion
χ^2	Small	90.784	Fit model
p-value	$\geqslant 0.05$	0.198	
CMIN/df	$\leqslant 2.00$	1.112	Fit model
RMSEA	$\leqslant 0.08$	0.033	Fit model
GFI	$\geqslant 0.90$	0.936	Fit model
AGFI	$\geqslant 0.90$	0.903	Fit model
TLI	$\geqslant 0.95$	0.971	Fit model
CFI	$\geqslant 0.95$	0.977	Fit model

Table I.
Goodness of fit
overall model

Based on Figure 2, the structural model test results are presented as follows:

(1) The effect of Role of Central Government (X1) directed to Forest Fire Prevention Policy (Y) shows a structural coefficient of 0.125, and a p-value of 0.101 > 0.05, indicating that there is not a significant effect between Role of Central Government (X1) directed to Forest Fire Prevention Policy (Y).

(2) The effect of Role of Local Government (X2) directed to Forest Fire Prevention Policy (Y) shows a structural coefficient of 0.125, and a p-value of 0.101 > 0.05, indicating that there is not a significant effect between Role of Local Government (X2) directed to Forest Fire Prevention Policy (Y).

(3) The moderation effect of Good Governance (M) in the relationship between Role of Central Government (X1) directed to Forest Fire Prevention Policy (Y) shows a structural coefficient of 0.442, and a p-value of 0.001 < 0.05 and a positive coefficient indicates that there is a significant and positive moderating effect between Role of Central Government (X1) to Forest Fire Prevention Policy (Y). The higher value of good governance will affect the strong relationship between Role of Central Government to Forest Fire Prevention Policy.

(4) The effect of Role of Central Government (X1) directed to Forest Fire Prevention Policy (Y) shows a structural coefficient of 0.125, and a p-value of 0.101 > 0.05 and there is a positive coefficient, indicating that there is a significant and positive effect between Knowledge Management (X) and Product Innovation (Y1). The higher the Knowledge Management (X), the higher the Product Innovation (Y1). The higher value of good governance will affect the strong relationship between the role of central government and forest fire prevention policy.

5. Discussion

Based on the analysis, it is known that there is no significant effect felt between the role of the central government and regional forest fire prevention. However, the results found that there is a significant interaction effect between the role of central and local governments and the governance of forest fire prevention. Even though the direct effect is not significant, the interaction effect significantly influences the forest fire prevention governance variable, which is a pure moderator. This study found that the role of central government has no effect on forest fire prevention. The role of the central government is high, but it will not impact on the
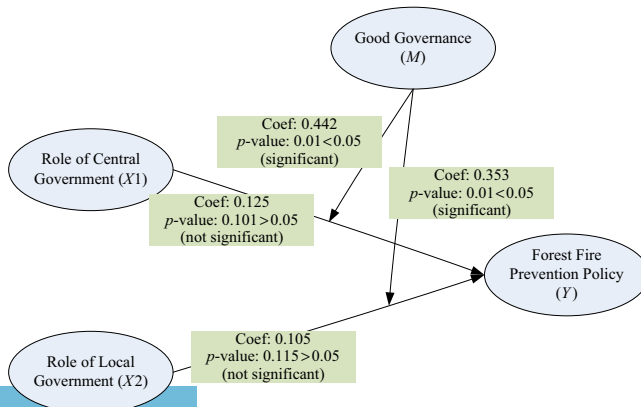

Figure 2.
Result of the SEM
structural model

high forest fire prevention, which is reflected in the aspects of prevention and early warning, reward and punishment, the improvement and management of ecosystems by reviewing courts, law enforcement and national and regional synergy. This study is not in line with the theory of roles, the theory of dynamic governance, and the theory of public policy and the breaking studies of Diaz and Pons, Russell *et al.* (2013), Weiguo *et al.*, Collins *et al.* (2013) and Milledge (2014). But the results found that there is a significant interaction effect between the role of the central government ($X1$) with governance (M) to the Forest Fire Prevention ($Y2$). The result supports the role of theory, the dynamic theory of governance and public policy theory. Moreover, it also supports research by Diaz and Pons, Russell *et al.* (2013), Weiguo *et al.*, Collins *et al.* (2013) and Milledge (2014).

The same results were found for the role of local governments influencing the forest fires prevention which were also not significant. The role of local governments is high, so it will not impact on the high forest fire prevention, which is reflected in the aspects of prevention and early warning, reward and punishment, the improvement and management of ecosystems by reviewing courts, law enforcement and national and regional synergy. The result is not in line with the theory of regional autonomy (decentralization) and the theory of public policy and it weakens the results of research by Diaz and Pons, Russell *et al.* (2013), Weiguo *et al.*, Collins *et al.* (2013) and Milledge (2014). But there is a significant interaction effect between the Role of Local Government ($X2$) and Governance (M) to the Forest Fire Prevention ($Y2$). So, the results of this study may be in line with the theory of regional autonomy (decentralization), and the theory of public policy and strengthen the research of Diaz and Pons, Russell *et al.* (2013), Weiguo *et al.*, Collins *et al.* (2013), Milledge (2014), Yu *et al.* (2011), Larson and Petkova (2011), Leite *et al.* (2011), Bullinger and Haug (2012), and Bhusal *et al.* (2014).

6. Conclusion and implication

Based on the analysis, it is known that there is no significant effect of the role of the central government on regional forest fire prevention. However, the results found that there is a significant interaction effect between the role of central and local government with the governance of forest fire prevention. Even though the direct effect is not significant, the interaction effect significantly influences the forest fire prevention governance variable, which is a pure moderator. As the value of the coefficient of the interaction effect is positive, then the variable of governance is said to be strengthening. It means that the higher the value of governance is, the more it affects the role of the increasing influence of central and local government areas on forest fire prevention.

The theoretical implications of this study recommend the need for a combination of theories in forest management, particularly in forest fire management. The public policy theory (policy implementation and policy evaluation), theory of governance and the theory of good governance require the accompaniment of regional autonomy theory, role theory and stakeholder theory, where the results of this study show the role of government (central and local) is crucial to the success of fire prevention and control policies in forests in Indonesia.

References

Acevedo, E.C., Turbay, S., Hurlbert, M., Barco, M.H. and Lopez, K.J. (2016), "Governance and climate variability in Chinchiná River, Colombia", *International Journal of Climate Change Strategies and Management*, Vol. 8 No. 5, pp. 632-653, available at: https://doi.org/10.1108/IJCCSM-04-2015-0038

Aini, M.S., Razi, A.F., Daud, M., Ham, M. and Wahid, M.H. (2000), "Transnational forest fire fighting: the Malaysian experience", *Disaster Prevention and Management: An International Journal*, Vol. 9 No. 4, pp. 282-287.

Barut, M., Raar, J. and Azim, M.I. (2016), "Biodiversity and local government: a reporting and accountability perspective", *Managerial Auditing Journal*, Vol. 31 No. 2, pp. 197-227, available at: https://doi.org/10.1108/MAJ-08-2014-1082

Bhusal, A., Jamarkattel, N., Shrestha, A., Lamsal, N. K., Shakya, S. and Rajbhandari, S. (2014), "Evaluation of antioxidative and antidiabetic activity of Bark of Holarrhena Pubescens Wall", *Journal of Clinical and Diagnostic Research*, Vol. 8 No. 9, p. HC05.

Boustras, G. and Boukas, N. (2013), "Forest fires' impact on tourism development: a comparative study of Greece and Cyprus", *Management of Environmental Quality: An International Journal*, Vol. 24 No. 4, pp. 498-511, available at: https://doi.org/10.1108/MEQ-09-2012-0058

Bullinger, C. and Haug, M. (2012), "In and out of the forest: decentralisation and recentralisation of forest governance in East Kalimantan, Indonesia", *Austrian Journal of South-East Asian Studies*, Vol. 5 No. 2, pp. 243-262.

Collins, R.D., Richard, N., Joao, C., Tiago, O. and Abilio, P.P. (2013), "Forest fire management to avoid unintended consequence: a case study of Portugal using system dynamics", *Journal of Environmental Management*, Vol. 130, pp. 1-9.

Czaja, M. and Cottrell, S.P. (2014), "Integrating social science research into wildland fire management", *Disaster Prevention and Management*, Vol. 23 No. 4, pp. 381-394, available at: https://doi.org/10.1108/DPM-10-2013-0193

Dye, S.F. (1987), "An evolutionary perspective of the knee", *The Journal of Bone and Joint Surgery. American Volume*, Vol. 69 No. 7, pp. 976-983.

Gaur, A.S. and Gaur, S.S. (2009), *Statistical Methods for Practice and Research: A Guide to Data Analysis using SPSS*, 2nd ed., Sage, New Delhi.

Halachmi, A. (2005), "Governance and risk management: challenges and public productivity", *International Journal of Public Sector Management*, Vol. 18 No. 4, pp. 300-317, available at: https://doi.org/10.1108/09513550510599238

Hammond, H. (1996), "Norfolk and Norwich central library: the emerging phoenix", *New Library World*, Vol. 97 No. 6, pp. 24-31, available at: https://doi.org/10.1108/03074809610127219

Herawati, H., Santoso, H. and Forner, C. (2006), "Forest Fires and climate change in Indonesia", background document for the Southeast Asia kick-off Meeting of the Project Tropical Forests and Climate Change Adaptation (TroFCCA), Bogor, p. 5.

Kapotas, P. and Maria, E.A. (2017), "Livestock grazing, forest protection and law in Greece", *Management of Environmental Quality: An International Journal*, Vol. 28 No. 1, pp. 57-69, available at: https://doi.org/10.1108/MEQ-03-2015-0037

Kerlinger, F.N. and Lee, H.B. (2000), "Survey research", *Foundations of Behavioral Research*, pp. 599-619.

Lane, R.E. (1991), *The Market Experience*, Cambridge University Press.

Larson, A.M. and Petkova, E. (2011), "An introduction to forest governance, people and REDD+ in Latin America: obstacles and opportunities", *Forests*, Vol. 2 No. 1, pp. 86-111.

Leite, F.F., Antonio, B.G. and Antonio, V. (2011), "The Recurrence interval of forest fires in Cabeco da Vaca (Cabreira Mountain-northwest of Portugal)", *Environmental Research*, Vol. 111 No. 2, pp. 215-221.

Milledge, G.A. (2014), "A revision of Rhodomantis Giglio-Tos, 1917 (Mantodea: Mantidae: Mantinae)", *Zootaxa*, Vol. 3797 No. 1, pp. 39-64.

Myllylä, S. and Takala, T. (2011), "Leaking legitimacies: the Finnish forest sector's entanglement in the land conflicts of Atlantic coastal Brazil", *Social Responsibility Journal*, Vol. 7 No. 1, pp. 42-60, available at: https://doi.org/10.1108/17471111111114530

Nayak, B.P., Kohli, P. and Sharma, J.V. Dr (2011), "Livelihood of local communities and forest degradation in India: issues for REDD+", a police brief, The Energy and Resources Institute, Bali.

Nye, J.S. (2004), "Soft power: the means to success in world politics", *Public Affairs*.

Poudyal, B.H., Govinda, P. and Harisharan, L. (2013), "Enhancing REDD+ outcomes through improved governance of community forest user groups", *Journal of Forest and Livelihood*, Vol. 11 No. 2, pp. 14-26.

Quintero, A.O. and Berkes, F. (2010), "Role of linkages and diversity of partnerships in a Mexican community-based forest enterprise", *Journal of Enterprising Communities: People and Places in the Global Economy*, Vol. 4 No. 2, pp. 148-161, available at: https://doi.org/10.1108/17506201011048059

Russell, R.C., Tian, Y., Yuan, H., Park, H.W., Chang, Y.Y., Kim, J. and Guan, K.L. (2013), "ULK1 induces autophagy by phosphorylating Beclin-1 and activating VPS34 lipid kinase", *Nature Cell Biology*, Vol. 15 No. 7, p. 741.

Saifuddin, A. (2004), "US Patent No. 6,801,759", US Patent and Trademark Office, Washington, DC.

Sihag, B.S. (2007), "Kautilya on institutions, governance, knowledge, ethics and prosperity", *Humanomics*, Vol. 23 No. 1, pp. 5-28, available at: https://doi.org/10.1108/08288660710725109

Suharto, E. (2010), CSR & COMDEV Investasi kreatif perusahaan di era globalisasi, Alfabeta, Bandung.

Terry, R.D., Masliah, E., Salmon, D.P., Butters, N., DeTeresa, R., Hill, R. and Katzman, R. (1991), "Physical basis of cognitive alterations in Alzheimer's disease: synapse loss is the major correlate of cognitive impairment", *Annals of Neurology*, Vol. 30 No. 4, pp. 572-580.

Wooldridge, J. (2002), *Econometric Analysis of Cross Section and Panel Data*, MIT Press, Cambridge, MA.

Yu, Y.P., Rosli, O., Rhett, D.H., Mohan, K.S. and Abdul, R. (2011), "Pattern clustering of forest fires based on meteorological variables and its classification using hybrid data mining methods", *Journal of Computational Biology and Bioinformatics Research*, Vol. 3 No. 4, pp. 47-52.

Further reading

Buckley, P.J., Clegg, L.J., Cross, A.R., Liu, X., Voss, H. and Zheng, P. (2007), "The determinants of Chinese outward foreign direct investment", *Journal of International Business Studies*, Vol. 38 No. 4, pp. 499-518.

Gaur, A.S., Ma, X. and Ding, Z. (2018), "Perceived home country supportiveness/unfavorableness and outward foreign direct investment from China", *Journal of International Business Studies*, forthcoming.

Jamarkattel, B.K., Dhungana, S.P., Baral, S., Rana, B. and Dhungana, H. (2009), "Democratising Terai forestry governance: emerging innovations in the Western Terai region of Nepal", *Journal of Forest and Livelihood*, Vol. 8 No. 2, pp. 27-38.

Judge, W.Q., Douglas, T.J. and Kutan, A.M. (2008), "Institutional antecedents of corporate governance legitimacy", *Journal of Management*, Vol. 34 No. 4, pp. 765-785.

Liu, J., Sun, Y.Q., Huo, Y., Zhang, H., Wang, L., Zhang, P. and Guo, W. (2013), "Simultaneous fluorescence sensing of Cys and GSH from different emission channels", *Journal of the American Chemical Society*, Vol. 136 No. 2, pp. 574-577.

Milledge, S. (2009), "Getting Reddy in Tanzania: principles, preparations and perspectives", *The Arc Journal Issue*, Vol. 24, pp. 3-6.

North, D.C. and Thomas, R.P. (1973), *The Rise of the Western World*, Cambridge University Press, Cambridge.

Ramadhani, A. (2010), "Promoting good forest governance for sustainable livelihood improvement: a Tanzanian example", *Organizing Forest Development*, Theme 6, Vol. 61 No. 5, pp. 234-235.

Singh, D. and Gaur, A.S. (2013), "Governance structure, innovation and internationalization: evidence from India", *Journal of International Management*, Vol. 19 No. 3, pp. 300-309.

Singh, D.A. and Gaur, A.S. (2009), "Business group affiliation, firm governance and firm performance: evidence from China and India", *Corporate Governance: An International Review*, Vol. 17 No. 4, pp. 411-425.

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