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by Criminality And Disaster: The Case Of Forest Fires Ardiyan Saptawan1 , Muhammad Ammar2 , Lili Erina1

Submission date: 02-Dec-2021 10:22AM (UTC+0700)
Submission ID: 1718020692
File name: saster_the_case_of_forest_fires_in_Sumatra_Island,_Indonesia.pdf (341.3K)
Word count: 6463
Character count: 33542

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Criminality and disaster: the case of forest fires in Sumatra Island, Indonesia

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Abstract

This study examines the contribution of crime rate towards the likelihood of forest fires incidence in Sumatra Island, Indonesia. The authors used the 2018 PODES data (Village Potential Census or Sensus Potensi Desa) collected by the Central Bureau of Statistics for three provinces in Sumatra Islands: South Sumatera, Jambi and Riau. The sample of this study is all villages (6.699 villages) in Riau, Jambi and South Sumatra. This study has ten independent variables: drug, theft, gambling, fraud, rape, violence theft, persecution, murder, corruption and trafficking. The result of logistic regression analysis using STATA 15 show that only drug, theft and rape have significant relationship with Y (forest fires incidence).

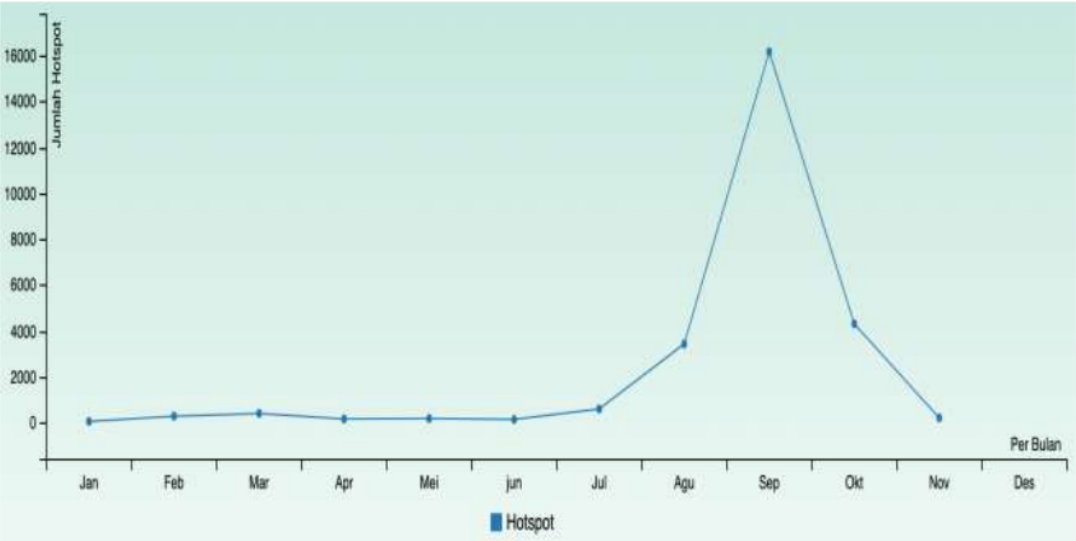
The final models of logistic regression can be estimated as much as 2 percent significant, X^2 (3) = 81.63, $p < 0.01$. The findings suggest that the lack of collective efficacy in Jambi, Riau and South Sumatra could contribute to forest fires incidence. This study recommends to the Government to revise district regulation on forest fires, accommodate conditional burning for small farmers and increasing collective efficacy at community level.

Keywords: Crime, criminality, delinquency, forest fires, Jambi, South Sumatra, Riau.

Introduction

In 2019, Indonesia has experienced forest fires again. On September 26, 2019, the area burnt was 328,722 hectares and the total number of hotspots was >16,000 hotspot (Figure 1). Although all provinces in Indonesia are observed to have hotspots, the distribution of hotspots is mostly in the provinces of Jambi (1,323), West Kalimantan (1,889), Central Kalimantan (3,202), Riau (399) and South Sumatra (919)[1]. This incident caused the number of sufferers of ARI (Acute Respiratory Infection) in September 2019 reach 919 thousand people[2]. Some wild animals also become victims. The police have set 185 individual suspects and 4 corporations as forest fires perpetrators[3].

Meanwhile, the Ministry of Environment and Forestry has sealed 52 company concession areas (plantations and industrial timber plantations) that are suspected of being forestry abuser. Of this total, 14 of them are foreign private companies owned by Malaysians and Singaporeans[4]. Several factors were voiced by policy actors as the cause of forest fires in 2019, namely: corporate negligence[4], land clearing by farmers[5], longer El Nino duration[6], peatland damage[7] and weak law enforcement[7].



Source: http://sipongi.menlhk.go.id/hotspot/matrik_tahunan, accessed 01 November 2019

Figure 1: Distribution of hotspot in Indonesia, 2019

The logic of causality constructed by the mass media above does not differ greatly from scientific knowledge about forest fires built by scientists. According to the scientists, forest fires in Indonesia can be caused by land clearing practices by small farmers and plantation/forestry corporations[8–10], El Nino and peatland characteristics[11], weak law enforcement[12], patronage relations between plantation political and corporate elite[13]. Forest fire causes economic losses, air pollution, destroys biodiversity, deteriorates the quality of public health and has the potential to trigger tension or international cooperation in the Southeast Asian region. The impact of forest fires can be local national, regional and global[14–18].

This research uses a different perspective from previous researches on forest and land fires. Based on the fact that burning land, both by farmers and corporations, is a criminal act according to positive law in Indonesia, this study will examine the contribution of criminal types to the possibility of forest fires in Indonesia, especially in Jambi, South Sumatra and Riau. Researchers borrow theoretical arguments developed by the discipline of criminology, specifically social disorganization theory (SDT) to analyze types of crime and forest and land fires. According to SDT theorists, criminal acts are not caused by personal characteristics of perpetrators of crime but are caused by social disorganization at the community level.

The concept of social disorganization refers to the situation of the community's inability to realize shared values and goals and maintain effective social control at the community level. Conversely, communities that do not experience social disorganization have solidarity, cohesiveness and integration[19]. Researchers use various terms that represent social disorganization at the community level, for example: neighborhood disadvantage[20], neighborhood characteristics[21,22], neighborhood disorder[23], neighborhood context[24], neighborhood deprivation[25] and neighborhood disorganization[26].

Previous research has always placed various dimensions of social disorganization (for example, ethnic composition, number of poor households, social ties, population density) as independent variables. The dependent variable is very much varied, for example violence against women in the personal domain[20,24,27,28] and the domestic domain[22], activities in public spaces[23], aggressive actions of children[26], digital activity[29] and so on. This study will follow this trend by placing the type of crime as an independent variable and the occurrence of forest fires as the dependent variable. In this context, the phenomenon of crime is positioned as one of the attributes of neighborhood disorder.

The high crime rate indicates that social organizations have not been able to overcome serious problems in society and satisfy all human needs[30], including overcoming forest fires, either as an ecological disaster[31] or environmental crime[32]. The high crime rate indicates the low collective efficacy (CE) which is one of the key concepts in SDT[33]. CE can be interpreted as a situation where a community or community is cohesive and its members have the desire to realize a common goal at the community level[34]. CE is a group attribute, not an individual attribute. Some indicators used by previous researchers to explain CE are informal social control[35,36], mutual trust[37,38] and collective action[39].

However, the influence of CE on crime is indirect. There is research that shows that high CE will contribute positively to decreasing crime rates if moderated by environmental retardation[40]. Other research said that CE moderates the relationship between environmental backwardness and robbery victimization[37].

CE is negatively related to emotional and cognitive fear in society[38]. That is, if CE is low, emotional and cognitive fears in the community will be high and vice versa.

When CE is high (crime rates are low or social disorganization does not occur in the community), then citizens should ideally be able to actively participate in the prevention and control of forest fires based on voluntary mechanism. In fact, the involvement of community members in the prevention and control of forest fires is now more encouraged because of incentives, both from companies and from the central/regional government. Recent research has shown that incentive-based prevention and mitigation do not trigger voluntary-based citizen involvement, but only breeds obedience to regulations on the prohibition of forest and land burning[41].

Consequently, when the flow of incentives is interrupted, it is very likely that citizens will not obey the existing regulations. This situation will be very different if the active participation of citizens is encouraged based on voluntary based due to high CE.

Material and Methods

This research uses a quantitative approach, specifically logistic regression. The data used comes from the 2018 Village Potential Census (Sensus Potensi Desa or PODES) data in three provinces (South Sumatra, Jambi and Riau). These provinces were chosen because they were the center of the forest and land fires in Sumatra Island in 2019. The research sample (N) was all villages in these provinces totaling 6,699 villages (Riau: 1,562 villages; Jambi: 1,875 villages and South Sumatra: 3,262 villages). The data analysis process follows two stages namely: bivariate analysis and multivariate analysis. In the bivariate analysis stage, only independent variables that have $p < 0.25$ will be included in the multivariate analysis stage.

Meanwhile, at the multivariate analysis stage, variable selection will adopt the Forward method. The final logistic regression model will be tested with the Hosmer-Lemeshow ($\hat{C}$) test[42]. Operationalization of research variables is visualized in table 1.

Results and Discussion

Research respondent: The respondent of PODES is village (urban village and rural village). The data source comes from the results of interviews with local village government officials (village head, village secretary, or others village apparatus).

The total number of villages involved in the study (N) is 6,699 villages (Riau: 1,562 villages; Jambi: 1,875 villages; and South Sumatra: 3,262 villages). Of this number, villages that experienced forest fires in 2016 - 2017 reached 913 villages (Riau: 468 villages; Jambi: 171 villages; and South Sumatra: 274 villages).

Based on the status of administration, 87.80% (5,882 villages) of the study sample were rural village governments and 12.20% (817 villages) is urban village government. The village sample has topography as follows: land (95.46% or 6,395 villages), slopes/peaks (3.34% or 224 villages) and valleys (1.19% or 80). A total of 4.58% (307 villages) of the sample villages are bordered by the sea and 95.42% (6,392) do not border the sea.

Table 1
Research variable

Research variable	Operationalization
Dependent variable	
The incident of forest fires (Y)	Are there forest fires in this village in the past 12 months? Answer options: Yes (1) and No (0)
Independent variable	
Theft (X_1)	Is there theft in this village in the past 12 months? Answer options: Yes (1) and No (0)
Violence theft (X_2)	Is there violence theft in this village in the past 12 months? Answer options: Yes (1) and No (0)
Fraud (X_3)	Is there fraud in this village in the past 12 months? Answer options: Yes (1) and No (0)
Persecution (X_4)	Is there persecution in this village in the past 12 months? Answer options: Yes (1) and No (0)
Rape (X_5)	Is there rape in this village in the past 12 months? Answer options: Yes (1) and No (0)
Drug (X_6)	Is there drug in this village in the past 12 months? Answer options: Yes (1) and No (0)
Gambling (X_7)	Is there gambling in this village in the past 12 months? Answer options: Yes (1) and No (0)
Murder (X_8)	Is there murder in this village in the past 12 months? Answer options: Yes (1) and No (0)
Human trafficking (X_9)	Is there human trafficking in this village in the past 12 months? Answer options: Yes (1) and No (0)
Corruption (X_{10})	Is there corruption in this village in the past 12 months? Answer options: Yes (1) and No (0)

Figure 2: Research area

The main sources of income of the population in the sample villages came from the agricultural sector (90.50% or 2,952), services (3.46% or 113 villages), wholesale/retail trade and restaurants (3.40% or 111), manufacturing industries (1.10% or 36 villages) mining and quarrying (0.34% or 11), transportation, warehousing and communication (0.06% or 2 villages) and others (1.13% or 37 villages). The three main commodities of the population in the sample villages are rubber (36.70% or 1,197 villages), rice (25.66% or 837 villages) coffee (16.74% or 546 villages), oil palm (6.99% or 228 villages) and secondary crop (1.38% or 45 villages). Other commodities whose proportion does not reach 1% are cocoa, coconut, pepper, cloves, tobacco, sugar cane, livestock, capture fisheries and aquaculture.

The majority of sample villages have enjoyed electricity provided by State Electricity Company (Perusahaan Listrik Negara or PLN). There are 2,218 households using non-PLN electricity (Jambi: 453 households; Riau: 917 households; and South Sumatra: 848 households). Meanwhile, households in the sample villages that did not enjoy electricity reached 2,926 households (Jambi: 704 households; Riau: 845 households; and South Sumatra: 1,377 households). The availability of electricity is a key word for villagers to use various electronic devices in their daily lives (for example television, refrigerators, washing machines, irons, computers and cell phones).

Bivariate analysis: According to table 2, all independent variables in this study have a relationship with Y (forest fire incidence). This is indicated by the calculated X^2 number greater than X^2 table (3.84) at the 0.01 significance level. The relationship of all these variables is statistically significant because p value is smaller than 0.10 or p <0.01. However, all independent variables have a weak relationship with Y as indicated by the value of *phi* (ϕ) which is between 0.02 - 0.09. These results are the basis of researchers to include all independent variables in the multivariate analysis stage with logistic regression. Table 1 has been sorted by X^2 score (from the largest number to the smallest number) and is a guideline for researchers to enter the independent variables one by one into the logistic regression formula with STATA 15.

Multivariate analysis: Multivariate analysis was performed in 11 stages. There are several stages where several independent variable are not significant related to *Y*, so they must be excluded from the next stage namely: gambling/X_7 (not significant at stage 3), fraud/X_3 (not significant at stage 4), violent theft /X_2 (not significant at stage 6), persecution/X_4 (not significant at stage 7), murder/X_8 (not significant at stage 8), corruption/X_{10} (not significant at stage 9) and trafficking/X_9 (not significant at stage 10). Practically, the final logistic regression model only contains three independent variables namely: drug/X_6, theft/X_1 and rape/X_5. These three independent variables were able to explain Y (the incident of forest fires) as much as 0.0153 (2%) significantly, X^2 (3) = 81.63, p <0.01 (Table 3). The remaining 98% is explained by other independent variables not included in this logistic regression model.

Among the independent variables that significantly affected Y, X_6 (drug) had the highest contribution, which was 55.2% (Table 3) and significant at the level of p <0.01 (Table 4). The second position is occupied by X_5 (rape) with a contribution of 43.1% (Table 3) and significant level of p <0.01 (Table 4) whereas X_1 (theft) had the smallest contribution, amounting to 42.6% (Table 3) and significant at p <0.05 (Table 4). These three independent variables have a positive relationship with Y (forest fires incident). That is, in villages that have cases of drug, theft and rape, the probability of forest fires incidents is 55.2% (X_6), 43.1% (X_5) and 42.6% (X_1).

This positive relationship also means more and more cases of drug use, theft and rape; the chances of forest and land fires are also higher. Conversely, if the number of drug use, theft and rape decreases, the chances of forest and land fires will also decrease.

Table 2
Summary of bivariate analysis

S.N.	Bivariate analysis	X^2	*df*	*p*	ϕ
1.	Drug (X_6) and Y	60.19	1	0.01	0.09
2.	Theft (X_1) and Y	41.56	1	0.01	0.07
3.	Gambling (X_7) and Y	28.28	1	0.01	0.06
4.	Fraud (X_3) and Y	17.83	1	0.01	0.05
5.	Rape (X_5) and Y	14.16	1	0.01	0.04
6.	Violent theft (X_2) and Y	10.67	1	0.01	0.03
7.	Persecution (X_4) and Y	9.59	1	0.01	0.03
8.	Murder (X_8) and Y	8.03	1	0.01	0.03
9.	Corruption (X_{10}) and Y	7.99	1	0.01	0.03
10.	Trafficking (X_9) and Y	4.95	1	0.01	0.02

Table 3
Summary of multivariate analysis

Stage	Independent variable	Model				Variable			
		X^2	*df*	*p*	*Pseudo R2*	*b*	*z*	*p*	%
Stage 1	X_6	56	1	0.01	0.0107	0.57	7.68	0.01	77.2
Stage 2	X_6	77.41	2	0.01	0.0145	0.46	5.93	0.01	23.0
	X_1					0.36	4.46	0.01	43.8
Stage 3	X_6	78.14	3	0.01	0.0146	0.42	4.84	0.01	53.3
	X_1					0.35	4.28	0.01	42.3
	X_7					0.08	0.85	0.39	8.4
Stage 4	X_6	79.32	3	0.01	0.0149	0.43	5.48	0.01	55.1
	X_1					0.34	4.19	0.01	41.3
	X_3					0.15	1.39	0.16	4.8
Stage 5	X_6	81.63	3	0.01	0.0153	0.43	5.57	0.01	55.2
	X_1					0.35	4.35	0.01	42.6
	X_5					0.35	2.11	0.03	43.1
Stage 6	X_6	82.82	4	0.01	0.0155	0.43	5.42	0.01	53.8
	X_1					0.34	4.17	0.01	41.0
	X_5					0.33	1.97	0.04	40.1
	X_2					0.13	1.10	0.26	14.8
Stage 7	X_6	81.98	4	0.01	0.0154	0.43	5.40	0.01	54.0
	X_1					0.35	4.27	0.01	41.9
	X_5					0.34	2.00	0.04	41.0
	X_4					0.08	0.59	0.55	8.8
Stage 8	X_6	82.96	4	0.01	0.0156	0.42	5.41	0.01	53.7
	X_1					0.35	4.29	0.01	42.0
	X_5					0.33	1.96	0.04	39.9
	X_8					0.20	1.17	0.24	23.1
Stage 9	X_6	83.25	4	0.01	0.0156	0.43	5.43	0.01	53.8
	X_1					0.35	4.32	0.01	42.3
	X_5					0.32	1.89	0.05	38.5
	X_{10}					0.37	1.31	0.19	44.8
Stage 10	X_6	83.00	4	0.01	0.0156	0.43	5.52	0.01	54.7
	X_1					0.35	4.34	0.01	42.5
	X_5					0.33	1.92	0.05	39.2
	X_9					0.68	1.22	0.22	98.6
Stage 11	X_6	81.63	3	0.01	0.0153	0.43	5.57	0.01	55.2
	X_1					0.35	4.35	0.01	42.6
	X_5					0.35	2.11	0.03	43.1

Table 4
The final model of logistic regression

Independent variable (X)	The likelihood of forest fires (Y)
Drug (X_6)	0.440***
	(-0.0789)
Theft (X_1)	0.355***
	(-0.0815)
Rape (X_5)	0.358**
	(-0.17)
Constant	-2.233***
	(-0.0658)
Observations	6,699

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

This study indicates that crime rates in South Sumatra, Jambi and Riau, especially drug abuse, theft and rape have a positive relationship with the occurrence of forest and land fires on the island of Sumatra. The theoretical implications of this finding are: first, SDT could be applied to understand the phenomenon of forest fires. If forest fires are an environmental crime, then various types of crimes (drug abuse, theft and rape) in South Sumatra, Jambi and Riau that represent neighborhood disorder will contribute to the odds of forest fires even though as this study indicates - only 2 percent. This finding corroborates the results of previous research which confirms the influence of neighborhood disorder on various events that occur at the community level such as violence against women[20,22,24,27,28] activities in public spaces[23], aggressive actions of children[26] and so on.

Cases of drug abuse, theft and rape in South Sumatra, Jambi and Riau indicate that CE levels in these three provinces are weak. As a result, forest fires continue to occur every year and citizen participation in prevention and mitigation is due to incentives, not because of collective awareness that sees forest fires as a shared problem that threatens the shared values and goals that the community wants to achieve. The findings of this study provide new scientific evidence and complement knowledge about the causes of forest fires in Indonesia that researchers have previously identified, for example land clearing by smallholders and plantation/forestry corporations[8–10], El Nino and characteristics of peatlands[11] and weak law enforcement[12].

The practical implication of this finding is that it is very important for the government and citizens to reduce crime rates in South Sumatra, Jambi and Riau, especially drug abuse, theft and rape. These variables are positively related to forest fires. Of course, the causes of drug abuse, theft and rape are very complex. The solution is very varied and situational. In the context of this study, one such solution is to strengthen CE at the community level which can be focused on three phenomena namely: informal social control, mutual trust and collective action.

According to research instruments used by Sampson, Raudenbush and Earls[34], the essence of informal social control is a sense of care that is realized by intervening citizens towards the behavior of citizens or the environmental conditions of their homes which are considered not in line with the norms or values that are believed to be a local citizen. Do residents dare to reprimand when, for example, there are students who skip school and hang out on the side of the road; there are vandalism facilities on public facilities; there are children who do not respect their parents and so on. If so, it means there is informal social control in the community and vice versa.

As a religious nation, informal social control is no stranger to the Indonesian people. In the Koran, for example, there are commands to do good, prevent evil (QS. Luqman [31]: 17) and advise one another for truth and patience (QS. Al-Asr [103]: 3). Similar messages can also be found in the Bible, for example asking and receiving advice (Tobit [4]: 18) and doing good. Thus, religion functions as an intrinsic motivator to carry out informal social control functions at the community level.

Mutual trust or social capital is like glue that is able to glue two things together. Various social interactions with various motives in the political sector and economic sector will never occur if there is no trust between the two parties. In fact, a variety of modern scientific knowledge was developed through empiricism and positivism approaches and presupposes scientists' trust in the knowledge they produce. Belief and confidence are very old concepts taught by all religious institutions. It transcends the approach of empiricism and positivism because it believes and trusts in the God who exists even though it cannot be seen with the eyes.

Religious institutions that teach trust, religious institutions must also know when trust begins to fade. To borrow Fukuyama's argument[43], efforts to strengthen mutual trust or social capital can be done in several ways, for example: protecting private property rights through transparent law enforcement, designing development programs that will strengthen group solidarity and must not harm the community.

In the context of the prevention and control of forest fires, local and central government institutions have hurt the community through local regulations that prohibit burning of land by small farmers. In Jambi, through the Jambi Provincial Regulation Number 2 of 2016 concerning Prevention and Control of Forest and Land Fires, the Jambi Provincial Government "prohibits any person and/or legal entity to clearing forests and land using burning method" (Article 5 Paragraph 1). The same editorial can also be found in the South Sumatra Provincial Regulation Number 8 of 2016 concerning Forest/Land Fire Control (Article 3 Paragraph 1); the South Kalimantan Provincial Regulation Number 1 of 2008 concerning Forest/Land Fire Control (Article 3 Paragraph 1).

This prohibition not only has the potential to reduce the level of community welfare (for example decreased income, decreased purchasing power, reduced nutritional intake etc.), but it also destroys local knowledge-based land clearing practices. Therefore, this study recommends that local governments that have local forestry regulations revise their local regulations and include conditional burning clauses for small farmers. For the people of Indonesia, farming is not only economic activity, but also socio-cultural activity full of meaning. The Government must recognize the existence of local traditions being a source of social capital.

Finally, the Indonesian people have a tradition of mutual cooperation which represents collective action based on voluntary. The source of the norms can come from religious

teachings (for example, QS. Al-Ma'idah [5]: 2) or a variety of cultural rhetoric (for example: *sepi ing pamrih rame ing gawe*/ quiet in the crowded scene at work, *berat sama dijinjing ringan sama dipikul*/as heavy as carrying the same weight as carried) handed down from generation to generation. However, the habit of mutual cooperation is also increasingly fading.

According to BPS[44], the proportion of the population aged 10 years and over who had participated in mutual cooperation only reached 42.13%. That is, the level of citizen participation is not up to half of the total population. It could be that, as statistics show, the Indonesian nation is becoming more prosperous[44], but that well-being is in a fragile, arid and vulnerable space of social life.

The narrative on the above confirms that normatively, the Indonesian nation as a religious nation, has a clear source of values that allows the community to have strong informal social control, mutual trust and collective action. The problem is, these values do not flow to far and color the thoughts and behavior of citizens. These religious values began to experience erosion. In fact, as stated by Fukuyama[45], various modern political and economic institutions will function better if they are connected to religion as a source of values. At this point, political, social and economic development must go hand in hand with religious development. If the goal of political development is a healthy and dynamic democracy; the goals of socio-economic development are welfare, happiness and social justice, the aim of religious development is good behavior and peace and peace of mind.

It is a religion that teaches the concepts of trust, voluntary, doing good, honesty, patience, upholding justice, mutual respect, not being greedy, not damaging the environment and other positive attitudes that form the foundation of the building of liberal democracy and market mechanisms. Upholding religious teachings, whatever be their religion, with the philosophy of salt[46] as recommended by Muhammad Hatta will automatically maintain the continuity of liberal democracy and market mechanisms. If the Jokowi-Ma'aruf government continues to continue the mental revolution that has been underway in the Jokowi-JK era, then development in the religious sector is a necessity because of its ability to strengthen CE at the community level.

Finally, this research has several advantages and disadvantages. The advantage of this research lies in the application of SDT to understand the phenomenon of forest fires in Indonesia. Research findings that show a statistically significant relationship between drugs, theft and rape on the possibility of forest fires are a novelty, both for the forestry and SDT literature. For forestry literature and disaster management, this research shows the importance of paying attention to community level crime factors as forest fires contributors. For the SDT literature, the results of this research confirm that SDT which was born from data in urban areas, can also be applied to rural areas. As explained earlier, most of the sample villages in this study were in the form of rural villages.

The weakness of this research lies in three things. First, the PODES data is data collected using a regional approach, not a household approach, so it does not allow research to use some of the variables commonly used by SDT researchers (for example, family disruption, residential instability, social capital, neighborhood disadvantage, etc.). Second, the PODES data do not contain CE instruments. Typically, researchers will modify the CE instrument used by Sampson, Raudenbush and Earls[34] in their research. Third, not all PODES data can be accessed by researchers because there is an internal policy regarding restrictions on data dissemination at Central Bureau of Statistic (*Badan Pusat Statistik* or BPS).

In the future, there are still many things that need to be explored about forest fires, especially if related to SDT. If forest fire is an environmental crime, then the influence of family disruption, residential instability, social capital, neighborhood disadvantage can be re-tested together with a variety of statistical techniques by involving a larger sample (for example, involving several provinces on Kalimantan Island that are also subscribed to experiencing forest fires). The SUSENAS data, especially the socio-cultural module and the social resilience module, can be integrated to obtain all the variables commonly used by previous researchers when applying SDT. In addition, because most of the sample villages are plantation villages, changes in prices of plantation commodities, especially rubber and palm oil, can be integrated into SDT.

Conclusion

Forest fire is seasonal global public problem in Indonesia. Based on empirical research, this study concluded that drug abuse, theft and rape have a positive relationship with the occurrence of forest and land fires on the island of Sumatra. As an environmental crime, various types of crimes (drug abuse, theft and rape) in South Sumatra, Jambi and Riau that represent neighborhood disorder will contribute to the odds of forest fires as much as 2 percent. It implies that forest fire is not only caused by the climate (for example, El Nino), culture (for example, slush-and-burn practice), economy (for example, forestry and oil palm plantations), but also by social context as representing the low of community efficacy in research sample.

In the future, it is important for the Government to reduce crime rates and strengthen CE at the community level as an integral part of forest fires mitigation in Sumatra Islands.

Acknowledgement

The Rector of Sriwijaya University fully funded this research based on contract number: 0149.136/ UN9/ SB3. LP2M. PT/ 2019, 27 June 2019.

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(Received 08th November 2019, accepted 20th December 2019)

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