

The Mediating Role Of Risk Perception In The Association Between Climate Change Awareness And Mitigation Effort On Riau Haze

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Abstract

Purpose: The purpose of this study is to see whether risk perception can mediate the relationship between climate change awareness and adaptive haze mitigation efforts in Pekanbaru.

Methodology: The subjects in this study were Pekanbaru people who were directly affected by the haze and had lived in Pekanbaru. Subjects in this study were 168 (47 men and 121 women). With an average age of 23.27 years. This study uses three scales. First, the smoke haze mitigation scale, second, the haze risk perception scale, and the third scale, the climate change awareness adaptation scale.

Results: The results showed that Risk Perception can mediate Climate Change Awareness with smoke haze mitigation efforts in Pekanbaru ($B = .4158$ $p = .000$).

Applications / Originality / Value: This study shows the correlation between the value of risk perception, the value of mitigation, and the value of climate change awareness. This study shows that risk perception can mediate the relationship between climate change awareness and mitigation. This study has implications for smoke haze mitigation efforts in Pekanbaru both by individuals, institutions and the government.

INTRODUCTION

Indonesia is one of the sources of smog in Southeast Asia. In 2015 Indonesia experienced 2.6 million hectares of forest and land fires which caused a loss of US \$ 16.1, equivalent to 221 trillion (World Bank, 2016). In Sumatra itself, there are areas that subscribe to the smog one of which is in Riau Province. Haze has been occurring since 1998 (Meiwanda, 2016). One year later, the smog returned and spread to neighboring countries, namely Singapore and Malaysia (Yulianti, 2018). In 2013 the haze came twice a year, ie more than one week had reached more than 3000 hotspots (Kusumaningtyas & Aldrian, 2016), this was an unusual event because the haze previously only occurred once a year (Yuliantony, 2014).

Hotspots again experienced a significant increase from July to September 2019 (Karhutla Monitoring System, 2019). As of September 2019 there were 49,266.00 hectares of fire (BMKG, 2019a). Hotspots detected by BMKG in one week, from 7 to 14 September 2019 increased from 244 to 367. The World Wide Fund for Nature (WWF) noted that in the last 25 years, Riau had lost 4 (four) million lands. Causes serious forest damage (BMKG, 2019b). This is compounded by a large amount of peatlands in Riau. Riau is one of the provinces that has peatlands that function as carbon trays in Southeast Asia (BNPB, 2013).

Haze also causes a decrease in air quality, air pollution, economic losses, and welfare (Yulianti, 2018). Impacts caused by haze include disrupting health and transportation (Cahyono, Warsito, Andayani, & Darwanto, 2015). The social impact felt by individuals who experience haze is the increase in crime, especially those involving aggression, workplace accidents, and traffic. High temperatures at night can also cause sleep deprivation (Asis De, De, & Pun, 2014). In terms of mental health, it affects the loss of social cohesion, anxiety, depression, and stress (Rataj, Kunzweiler, & Garthus-Niegel, 2016).

Mitigation needs to be done to reduce this impact. Mitigation is carried out to reduce the severity of disasters (Adetayo, 2013; Aiyuda & Koentjoro, 2018). The National Disaster Management Agency or BNPB (2013) states that mitigation can be in the form of efforts to reduce disaster risks through physical development and awareness. Mitigation is considered a long-term solution that can be done to reduce the risk of haze (Elum, Modise, & Marr, 2017). Mitigation must be done immediately because the longer the air pollution gets worse. Based on BMKG data on September 22, 2019 air pollution in Pekanbaru has reached 841. This shows that air quality is very dangerous (The World Air Quality Project, 2019) so people try to minimize outdoor activities. This is related to the community's assessment of the risk of haze.

This assessment process is related to risk perception. Slovic (2000) says that risk perception is an individual's assessment of an event related to fear of threats and the amount of knowledge possessed. Slovic, Fischhoff, and Lichtenstein (1985) also mentioned that risk perception has two factors: fear risk (risk fear) and unknown risk (risk of ignorance). Individuals who have a high risk perception will seek mitigation to reduce the risk that will occur. Conversely, individuals who have low-risk perceptions, there is no mitigation effort because it is caused by ignorance of disaster risk, making individuals think heuristics (Slovic, 2000). A survey conducted by Leiserowitz (2006) found that risk perception is influenced by several factors, one of which is experience in climate change.

One factor that can increase risk perception is climate change awareness (Anilan, 2014). Individuals will try to reduce and overcome the adverse effects of climate change, through awareness of climate change, (Luis, Vauclair, & Lima, 2018). However, people tend to have a limited understanding of climate change and the risks that will occur (Choon, Ong, & Tan, 2018). This is caused by the low-risk perception that is associated with the danger of haze.

Lebel, Whangchai, Chitmanat, Promya, & Lebel (2015) state that a good understanding of risk perception can improve risk management and adaptation to climate change. The solution that can be done to increase awareness of climate change is the need for an understanding of climate change itself (Adetayo, 2013; Luís, Vauclair, & Lima, 2018). Drummond, Hall, Sauer, and Palmer (2018) revealed that individuals who believe that climate change poses a danger will make individuals more concerned with their environment. This is in line with research conducted by Adetayo (2013) that only a few individuals understand the causes and what needs to be done, even some are not aware of climate change.

Knight (2016) said that climate change has a negative impact on society. The results of research conducted by Ochieng and Koske (2013) that individual perceptions about climate change as a threat will make individuals support mitigation efforts. Individuals who have experience with the threat of climate change tend to have high-risk perceptions so that mitigation efforts are high (Karsperson, 1988). Several other studies have found that the level of awareness of climate change varies from country to country (Knight, 2016; Lee, Markowitz, Howe, Ko, & Leiserowitz, 2015b). This shows that culture in a country also influences individual awareness of climate change. Aiyuda (2018) said that individuals who have low-risk perceptions will influence the mitigation efforts undertaken.

The results of research conducted by Connor, Richard, & Fishel (1999) that the perception of risk is related to mitigation in climate change. In line with research conducted by Bergstra, Brunekreef, and Burdorf (2018) that risk perception can mediate the effects of pollution exposure with high public concern about health. However, research conducted by Choon et al. (2018) shows that risk perception cannot be a mediation between environmental awareness in supporting mitigation efforts. From this research inconsistency, the writer wants to do this research. 1) Is there

a relationship between climate change awareness and mitigation 2) Is there a relationship between climate change awareness and risk perception 3) Is there a relationship between risk perception and mitigation 4) Is there a relationship between mitigation and climate change awareness through risk perception.

RESEARCH METHODS

Sample

The subjects in this study were Pekanbaru people who were directly affected by the haze and had lived in Pekanbaru. Sampling is done using non-probability sampling with a purposive sampling technique. Data is collected online through Google forms and then distributed using social media. The subjects in this study were 168 (47 men and 121 women). With an average age of 23.27 years.

Measurement Tools

This study uses three scales. First, the smoke haze mitigation scale by Aiyuda (2017) based on the type of air pollution mitigation from Skov et al. (1991) with three forms of mitigation namely mitigation to reduce smoke haze, mitigation to reduce the impact of smoke haze exposure for individuals and mitigation related to prevention. There are 14 item scales (for example, item scales: Share information about the impact of the haze with those closest to you. Participate as a participant in counseling about the impact of the haze, use an N95 mask when exiting). The scale measured from 1 = never to 5 = ever with Cronbach α 0.811 reliability.

Second, the risk perception scale by Aiyuda & Koentjoro (2017) is based on Paul Slovic's risk perception dimensions, namely the Unknown Risk and Dread Risk dimensions (Slovic, 1993b; Slovic, Fischhoff, & Lichtenstein, 1980, 1986, 2000; Slovic, Flynn, Mertz, Poumadere, & Mays, 2000). There are 14 scale items (for example item scale: Haze causes slow death, I experience direct health problems, after being exposed to the smog, I know the risk of being exposed to the smog). The scale measured from 1 = strongly disagrees to 5 = strongly agrees with the reliability of Cronbach α 0.835.

The third scale is the adaptation scale for Climate Change Awareness by Millicent A. (2014) there are 20 items (for example item scale: Climate change is a serious threat to Indonesia, Burning fossil fuels cause climate change, climate change causes food shortages/food sources). The scale measured from 1 = strongly disagrees to 5 = strongly agree with the Cronbach α reliability of 0.859.

RESULT

Mediation analysis in this study uses a Script For Simple Mediation from Preacher and Hayes (2004).

Table 1. Descriptive Statistics

Variable	Hipotetik					Empirik				
	Range	Min	Max	μ	SD	Range	Min	Max	μ	SD
Risk Perception	56	14	70	42	9.3	56	14	70	53,10	9,40
Mitigation	56	14	70	42	9.3	56	14	70	35,63	10,44
Climate Change Awareness	80	20	100	60	13.3	80	20	100	68,84	9,36

From table 1. Above can be seen that the perception of hypothetical risk has an average of 42, while empirical has an average of 53.10. Normatively the perception of empirical mean risk is higher than the hypothetical mean (mean) ($\mu = 53.10$ SD = 9.40). thus it can be said that research subjects have a high-risk perception. Mitigation has a hypothetical mean (mean) 42, whereas empirical averages (mean) have a lower value with an empirical mean of 35.63 ($\mu = 35.63$ SD = 10.44). thus it can be said that research subjects have lower mitigation than they should. while Climate Change Awareness has a hypothetical average (average) of 60 while empirical averages (mean) have a higher value of 68.84 ($\mu = 68.84$ SD = 9.36). thus it can be said that the awareness of climate change in this study is high.

Table 2. Mediation of Risk Perception and Mitigation through Climate Change Awareness

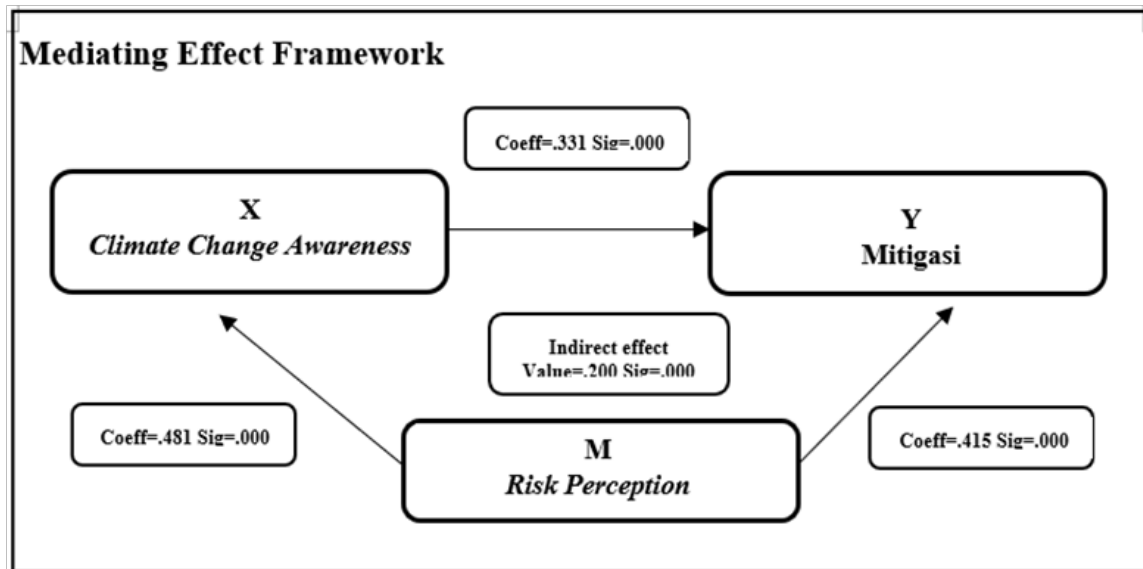
Variable	Coeff	s.e.	T	Sig(two)
Direct effect				
Climate Change Awareness to Mitigasi	.331	.091	3.625	.000
Climate Change Awareness to Risk Perception	.481	.075	6.362	.000
Risk Perception to Mitigasi	.415	.097	4.259	.000
Indirect effect				
Mitigation and Climate Change Awareness through Risk Perception	Value	s.e	Z	Sig(two)
	.200	.057	3.510	.000

Through table 2. The results of the mediation analysis can be seen that: First, there is a positive relationship between awareness of climate change and mitigation efforts. With a coefficient value of $B = .331$ and a significance value of $p = .000$. This means that the higher the awareness of climate change, the higher the smog mitigation efforts undertaken by the people in Pekanbaru. Thus, hypothesis 1 is accepted.

Second, there is a positive relationship between awareness of climate change and risk perception with the coefficient $B = .481$ and the significance of $p = .000$. This means that the more aware of climate change, the greater the risk perception of people affected by the haze in Pekanbaru. Thus Hypothesis 2 is accepted.

Third, there is a positive relationship between risk perception and mitigation which has a coefficient of $B = .415$ and a significance value of $p = .000$. That is, the higher the risk perception a person has, the higher the mitigation efforts undertaken. Thus hypothesis 3 is accepted.

Fourth, Risk Perception can mediate Climate Change Awareness with smoke haze mitigation efforts in Pekanbaru with a coefficient value of $B = .200$ and a significance value of $p = .000$. That is, Risk Perception can mediate the relationship between Climate Change Awareness and smoke haze mitigation efforts in Pekanbaru. Thus, hypothesis 4 in this study was accepted.



DISCUSSION

As predicted, this study shows that Risk Perception can mediate the relationship between Climate Change Awareness and smoke haze mitigation efforts in Pekanbaru. This is in line with the view that risk perception can link climate change awareness with mitigation behavior (Connor et al., 1999; Spence, Poortinga, Butler, & Pidgeon, 2011; van der Linden, 2015). Research Kasperson et al. (1988) found that perceptions of risk to climate change can increase if individuals experience direct experience with risks, thus bringing up mitigation efforts. Previous research related to the role of risk perception in mediating the relationship between climate change awareness and mitigation efforts found that individual and public risk perception can be mediated by psychological factors (Leiserowitz, 2006). One psychological factor that influences mitigation is awareness of climate change Lee et al. (2015) (Drummond et al., 2018). In addition, Leiserowitz (2006) found that awareness of climate change is driven by perceptions of the dangers of climate change that cause actions to reduce their impact. In other words, the findings in this study are in line with several previous studies related to the role of risk perception in mediating the relationship between awareness of climate change and mitigation efforts.

This finding is contrary to the findings of Choon et al. (2018) who found that environmental awareness showed a significant relationship with risk perception. High awareness of climate change leads to lower risk perception. However, high social trust will lead to high-risk perceptions that can significantly influence how public responses address and support mitigation. Xie, Brewer, Hayes, McDonald, and Newell (2019) added that risk perception is highly dependent on the experience process, while mitigation will be driven by social culture. Socio-cultural factors have a direct influence on mitigation behavior without being fully mediated by risk perception. However, several studies show that risk perception can mediate social factors such as social norms, social amplification and social trust (Bergstra et al., 2018; Kasperson et al., 1988; Lo, 2013). Contrary to the findings, several previous studies have found other factors that can mediate the relationship between awareness of climate change and mitigation efforts.

The mediation findings in this study were also followed by indirect findings of the relationship between awareness of climate change and mitigation efforts. This means that the higher the awareness of climate change, the higher the mitigation efforts undertaken. This is in line with the research of

Luís et al. (2018b) which states that Climate Change Awareness has a relationship with mitigation efforts undertaken by individuals and institutions. Previous research has found that awareness of threatening situations such as climate change will increase mitigation strategies to minimize perceived risk as a way to overcome psychological threats (Lima, 2004; Lima, Barnett, & Vala, 2005; Luís et al., 2016; Parkhill, Pidgeon, Henwood, Simmons, & Venables, 2010). Sacchi, Riva, Brambilla, & Grasso (2014) found that a sense of individual responsibility such as environmental awareness also influences climate change mitigation efforts.

Risk perception can be mediated when showing the relationship between awareness of climate change and risk perception. The more aware of climate change, the greater the perception of positive risk in people affected by haze in Pekanbaru. This is in line with previous research which states that awareness of climate change is positively correlated with risk perception (Leiserowitz, 2006; McCright & Dunlap, 2011; Spence et al., 2011; Tobler, Visschers, & Siegrist, 2012; Wolf & Moser, 2011). Other research shows that strong risk perceptions can increase awareness of climate change (Connor et al., 1999; Peacock, Brody, & Highfield, 2005; Siegrist & Gutscher, 2006; Sjöberg, 2000; Taylor, Thieken, Kreibich, Müller, & Merz, 2002; Zaalberg, Midden, Meijnders, & Mccalley, 2009). Previous research identified that awareness and knowledge about climate change are predictors of risk perception (eg Hornsey, Harris, Bain, & Fielding, 2016; Kaiser, 2003; Milfont, 2012). Choon et al. (2018) found that individual risk perceptions of climate change are greater when risks are caused by humans than when risks are caused by nature. Connor et al. (1999) added that risk perception can lead to awareness of climate change. Lee et al. (2015b) found that developing countries such as Indonesia considered climate change a far greater threat compared to developed countries in the World.

This study also shows the relationship between risk perception and mitigation efforts. This is consistent with research by Martin, Martin, and Kent (2009) which revealed that there is a relationship between perceptions and experiences of the perceived risk of individuals with mitigation behavior. Other research says that the increased perceived risk is related to a greater desire to take mitigation actions (eg Connor et al., 1999; Spence et al., 2011; van der Linden, 2015). Research by Higginbotham, Connor, and Baker (2014); Bickerstaff et al. (2004) found that individuals will feel the experience that has been felt so that they make mitigation efforts when faced with the same situation. Previous research also found that risk perception plays a major role in mitigation decision making (Connor et al., 1999; Grothmann & Patt, 2005; Mase, Gramig, & Prokopy, 2016). The high risk of individual haze perceptions in Pekanbaru affects the mitigation efforts undertaken to be even greater. conversely, individual perceptions of risk are low on haze so that mitigation efforts undertaken are also low (Aiyuda & Koentjoro, 2017).

Previous research by Lee et al. (2015b) revealed that increasing knowledge, climate literacy, and community understanding of climate change is very important for community involvement and support for climate change mitigation efforts. Other research states that low-risk perceptions indicate that people are not good enough in seeking mitigation, this is due to lack of information and knowledge related to the risk of haze disasters (Aiyuda & Koentjoro, 2017). The more information held to assess risk allows individuals to assess risk well so that it refers to awareness to reduce (Dickinson, Brenkert-Smith, Champ, & Flores, 2015). This finding contradicts previous research which found that higher knowledge about climate awareness will lead to lower risk perceptions which can significantly influence the way people respond and seek mitigation (Choon et al., 2018). Other studies show that the longer an individual feels a threat such as the haze disaster, then the individual will eventually get used to the existence of the threat so that mitigation efforts are carried out lower (Lima, 2004; Luís et al., 2016; Parkhill et al., 2010).

Climate change mitigation efforts vary by country. This is influenced by experience, geography, culture and social norms (Haden, Niles, Lubell, Perlman, & Jackson, 2012; Spence et al., 2011). In the United States, the government studies how Americans see the risks of climate change and how further mitigation efforts are carried out because they have consequences for the world (Gardiner, 2009; Wilbanks & Kates, 1999). In Denver, Las Vegas, Nevada, and Arizona, extreme weather experiences that more often affect the perception of high risk and mitigation efforts undertaken. According to Lee et al., (2015) the highest level of awareness of climate change is in developed countries, including North America, Europe, and Japan. In contrast, the majority in developing countries from Africa, the Middle East, and Asia report that knowledge of climate change is still low, so awareness of climate change is lower. However, developing countries such as Indonesia consider climate change as a far greater threat compared to developed countries in the World (Lee et al., 2015a). This is related to prevention efforts undertaken by the government. Research by Aiyuda & Koentjoro (2017) found that people's distrust of the competence, integrity, and virtue of the government and the police affected the mitigation efforts undertaken.

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