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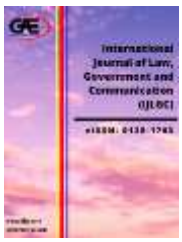

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THE ROLE OF LEADERSHIP AND COMMUNICATION IN DISASTER EVACUATION MANAGEMENT: A CASE STUDY OF THE 2014 YELLOW FLOOD IN KELANTAN

Safar Yaacob[1, *], Noor Azmi Mohd Zainol[2], Suzana Ali Hassan @ Ali[3] & Nora Ibrahim[4]

[1] Faculty of Defence Studies and Management, National Defence University of Malaysia
Email: safar@upnm.edu.my
[2] Faculty of Defence Studies and Management, National Defence University of Malaysia
Email: noorazmi@upnm.edu.my
[3] Faculty of Defence Studies and Management, National Defence University of Malaysia
Email: 3241864@alfateh.upnm.edu.my
[4] Faculty of Business & Accountancy, Universiti Poly-Tech Malaysia
Email: nora@uptm.edu.my
[*] Corresponding Author

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Abstract:

This study concentrates on the role of leadership and communication in the success of evacuation operations during the 2014 Yellow Flood in Kelantan. Poorly defined leadership and communication structures were reported to have affected coordination and supply delivery during the operation. This study used a quantitative approach by distributing questionnaires to 750 respondents from major disaster response agencies in Malaysia. IBM SPSS 29.0 and SmartPLS 4.0 software were utilized in the data analysis. Results revealed that leadership factors ($\beta = 0.430$, $p < 0.01$) and communication ($\beta = 0.520$, $p < 0.01$) positively and significantly affect disaster evacuation. This indicates that both these factors are crucial to the effectiveness of disaster evacuation. This study contributes to the knowledge of the facets of human management in disasters and has policy and training implications for disaster management in Malaysia.

Keywords:

Leadership, Communication, Disaster Evacuation, Disaster Management

Introduction

The record flood that struck Kelantan in December 2014, or the "Yellow Flood", was the most devastating disaster to have struck the state, claiming lives, levelling thousands of homes and severely affecting infrastructure. Based on the official Laporan Pasca Banjir 2014 by NADMA

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(2015), more than 202,000 people were evacuated. Among the worst-affected districts were Gua Musang, Kuala Krai and Pasir Mas. The disaster exposed serious shortcomings in the country's disaster management system, particularly in leadership of security forces and the standard of communication during the evacuation exercise.

Although an organizational framework was in place under the management of the National Security Council (MKN), the flood response revealed significant operational and systemic shortcomings, particularly in leadership coordination and communication. These failures were compounded by unclear leadership structures and breakdowns in inter-agency coordination, especially between civil and security bodies (Rosmadi et al., 2023; Nordin et al., 2024). This caused misconception between victims and rescue workers, no specific evacuation order in the rural and remote areas (Badi, 2019; Alias et al., 2020).

Communication challenges during the flood were acute. Power outages, poor cellular network coverage, and a lack of centralized communication protocols hampered timely warnings to affected populations. Van der Wal et al. (2021) and Ahmadi et al. (2022) note that inconsistent messaging led to uneven levels of compliance with evacuation instructions. While agencies had some form of communication infrastructure, there was insufficient integration across sectors, and local communities were often left uninformed or confused.

The Evacuation management is not only the issue happen in Malaysia but also others country throughout the world. For example, in the Kyushu Floods 2020 in Japan poor public compliance to evacuate orders was attributed to ambiguous messages and distrust on the part of the public against authority (Ikegai et al., 2024; Shibata, 2024). Similarly, the rural areas in Texas during 2017 Hurricane Harvey faced problems of timely evacuation updates because of weak coordination among agencies and lack of two-way communication (Kapucu et al., 2020). These examples illustrate effective evacuation processes. However, they also highlight that successful evacuation fundamentally relies on two key factors: responsive leadership and the provision of credible, consistent information.

The research on both variables empirically in Malaysia, especially in the security and emergency agencies such as the PDRM (Police), JBPM (Fire & Rescue Department) and APM (Civil Defence Force) by far has been few. Even though most of the local research have been focusing more on technical and infrastructural perspectives on flood management (Khan et al., 2023; Bakar et al., 2023). The human dimensions in dealing with crisis remain largely unexplored. Such a gap is also material to practice and yet under-recognized justice liaison officers.

Therefore, this study was conducted in efforts to depict the associations between communication and leadership with evacuations management effectiveness if disaster occurred by taking 2014 Yellow Flood in Kelantan as a case study. The results are intended to assist in national policy and standard operating procedures (SOPs) as well as disaster preparedness at the agency and local level. This aims to ensure that future disaster responses are more accurately targeted and better aligned with the needs of all segments of society.

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Literature Review

Leadership in Disaster Response Organizations

Leadership is also crucial in action coordination and in building trust during crises. Disaster response organization leaders need to combine elements of transformational leadership and situational leadership to allow teams to work successfully in a dangerous and uncertain environment. Transformational leadership, as discussed by Bass and Riggio (2006), emphasizes motivation, inspiration, and the ability to bring about change through shared vision and charismatic leadership. Meanwhile, situational leadership theory is concerned with the ability of the leader to adjust leadership style based on the needs of the team along with the maturity level of followers (Northouse, 2023). Within the organizational security context of the Malaysian Civil Defence Force (APM), the Royal Malaysian Police (PDRM), and the Malaysian Fire and Rescue Department (JBPM), adaptable and field-responsive leaders have been found to be more capable of improving team morale, effectiveness and overall operational ability (Kapucu & Garayev, 2011). Leadership performance is also measured by the ability to make decision and act quickly, issue clear instructions, coordinate resources and people, and safeguard the public in adverse situations (Boin et al., 2013).

In the 2014 Yellow Flood in Kelantan, weaknesses in operational leadership were quoted as among the factors contributing to the confusion and delay in evacuating the population of risk areas. Ahmadi et al. (2022) stated that, due to the lack of guidance and coordination between agencies, efforts were duplicated, and some of the residents had not received evacuation information in advance. Besides, due to the unimaginable scale of the disaster, most of the leaders in the sector failed to adapt their leadership styles effectively, especially in managing operational pressure and complex inter-agency coordination (Lee, 2019 & Weston, 2010). Effective leaders are also effective inter-agency and local community liaison strategists. As Waugh and Streib (2006) explained, leaders who understand the local context and maintain ties close to the community can mobilize residents more quickly during crises. This was seen in several areas in Kelantan during the Yellow Flood, where community leaders who were active were able to organize evacuations earlier and in a more orderly fashion than areas that relied on central directives alone (Alias et al., 2020).

Thus, it can be said that there is a significant connection between leadership and the success of evacuation. Leaders who possess good communication skills, who make strategic decisions in a timely manner and who understand the needs of the field can make evacuation operations run smoothly, hence saving more lives and reducing the impact of the disaster.

Communication in Disaster Contexts

Successful communication during disaster incidents is important for the purpose of ensuring that information of critical nature can be shared rapidly, in a correct manner, and via credible sources. During evacuation, information concerning the safe places to go, evacuation procedures, and existing hazards must be communicated promptly and uniformly to the affected populace. Kapucu et al. (2023) emphasized that coordination effectiveness between disaster response agencies greatly depends on horizontal (inter-agency) and vertical (inter-management) communication. If failed, duplication of efforts and blending of information can be generated, thus hindering the process of rescue (Du et al., 2020; Comfort et al., 2004). In addition to sharing information, communication in the case of disasters must be two-way, where leaders not just give orders, but also hear reports from the ground. Interactive risk

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communication, in the opinion of Schwarz et al. (2025) & Seeger et al. (2020), can build public trust and reducing panic. This is important since the effectiveness of the evacuation process is dependent on how well the residents understand and accept the information shared (Panagiotou & Nikezis (2024).

During the 2014 Kelantan Great Flood, better known as "Bah Kuning", communication frailties were cited as a cause of delays in evacuation and operating irregularities. Van der Wal et al. (2021) analysis found that inconsistent evacuation messages and the absence of official communication channels resulted in conflicting messages sent to residents, while some did not know that their area had to be evacuated. Besides that, Ahmadi et al. (2022) also stated that power outages and communication network disruptions during disasters caused breaks in the flow of information between operations center and community. Khan et al. (2022) noted in recent research the necessity for an integrated communication system that can respond to changing circumstances in the field. They advocated the use of digital platforms and community-based warning systems to enable more inclusive, real-time communications.

Therefore, communication not only serves a purpose in agency coordination but is also a critical vehicle in influencing community conduct towards evacuation and compliance with safety orders.

Theoretical Framework

Disaster Leadership Theory by Fiedler's (1967)

Fiedler (1967) Situational Leadership Theory states that the effectiveness of the leader depends on a large extent on the congruence between the style of leadership and environmental context and the level of maturity of the followers. In the event of a disaster whose nature is not definite, the style of leadership needs to change from autocratic to participative based on the level of ability and preparedness of the field team (Northouse, 2023 & 2018). In addition, charismatic leadership theory (Conger & Riggio, 2012; Conger,1996) views leaders as agents of change who can fundamentally restructure organizations by possessing clear vision and tons of motivation. Charismatic leaders usually play a significant role in guiding action in times of crisis and fostering trust among members in crisis situations (Bass & Riggio, 2006).

Crisis Communication Theory by Coombs (2007)

The Situational Crisis Communication Theory (SCCT) formulated by Coombs (2007) emphasizes the use of appropriate communication strategies based on the type of crisis and the perception of responsibility assigned to the organization. Communication during a disaster involves not only the rapid and accurate dissemination of information, but also how the message is communicated to maintain public trust and reduce panic. SCCT dictates that organizations ought to choose a communication approach based on the phase of the crisis, either low responsibility (e.g., natural disasters) or high responsibility (e.g., human fault). During massive flood disasters such as the 2014 Yellow Flood, a sympathetic communication style and active supply of information are imperative to inform the public about the activities of the agency and facilitate greater compliance with evacuation orders (Coombs, 2022 & Austin et al., 2016). The theory provides an important foundation for developing successful risk communication in disaster management (Karis & Cochran, 2019).

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Conceptual Framework

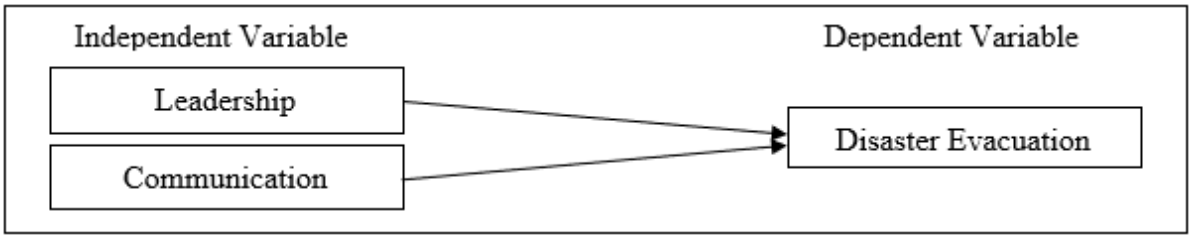

Figure 1: Conceptual Framework

Source: Illustrated by Authors

Based on the framework above, the following are the proposed research hypotheses:

H1: There is a positive relationship between Leadership and Disaster Evacuation
H2: There is a positive relationship between Communication and Disaster Evacuation

Methodology

This study has taken a cross-sectional study approach in quantitative research. This study follows a quota sampling technique whereby the respondents were selected based on a set quota from the participating agencies in the disaster operations, i.e., PDRM, JBPM, APM, and ATM. The targeted population is those directly involved in participating in the disaster operations which are carried out in Malaysia. The sample size used is 750 respondents, which is selected to ensure adequate representation from each agency. The sample distribution is done based on the percentage of members of each agency to ensure that the data obtained represent the entire population. The study instrument consists of items in the constructs of leadership, communication, and effectiveness in disaster evacuation. Reliability and validity tests of the constructs have been shown to achieve the desired levels of CR, AVE, and Cronbach's alpha (Hair et al., 2019). Descriptive analysis is conducted using IBM SPSS version 29.0, and structural equation model (SEM) analysis is conducted using SmartPLS version 4.0.

Findings

Discussion of Construct Levels

The level of inter-agency leadership is at a high level with a mean value of 3.53 and standard deviation of 0.618. The shape of normal distribution (skewness -0.473) indicates positive perception of agency leadership in evacuation operations. Disaster evacuation is, however, estimated to be at moderate to high level. The mean is 3.47, indicating moderate to positive perception of evacuation operation effectiveness, with a standard deviation of 0.607. Therefore, overall, these findings consider the fact that the moderate mean and mild negative skewness values indicate the respondents' tendency to agree with items within each construct, but not to extremes. This finding presents an impression that the perception rate of leadership and communication in times of disaster is still not at its optimum level. Similarly, the rate of perception for the effectiveness of disaster evacuation is still not at an optimum level. This finding implies disaster management institutions should improve the enforcement of crisis leadership training and improve emergency communication systems to ensure the degree of trust and effectiveness can be maximized in the future. **Table 1** and **Figure 2** show the analysis of descriptive statistics which shows that all three constructs are at a moderate level based on mean and skewness:

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Table 1: Descriptive Analysis of Main Constructs

Construct	Mean	Standard Deviation (SD)	Skewness	Level
Leadership	3.53	0.618	-0.473	Moderate
Communication	3.60	0.590	-0.450	Moderate
Disaster Evacuation	3.47	0.607	-0.430	Moderate

Source: Describe from IBM SPSS 29.0 by Authors

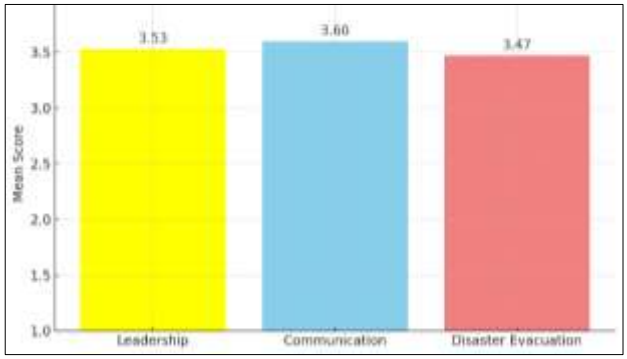

Figure 2: Levels of Disaster Leadership, Communication and Evacuation

Source: Describe from IBM SPSS 29.0 by Authors

Discussion of Measurement Model Findings

Measurement model assessment using metrics such as Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE) is illustrated from analysis using SmartPLS. According to **Table 2**, evidence is shown that all constructs in this research model, i.e., Leadership, Communication, and Disaster Evacuation, have satisfactory levels of reliability and validity. The internal reliability is strong with the Cronbach's Alpha and Composite Reliability (CR) values above 0.7 and 0.8, respectively (Hair et al., 2019). The Average Variance Extracted (AVE) values are above 0.5, which is an indication of adequate convergent validity (Fornell & Larcker, 1981). It ensures that all the variables are stable and valid to apply in the analysis model.

Table 2: Findings of Validity and Reliability Analysis

Construct	Cronbach's Alpha (CA)	Composite Reliability (CR)	AVE
Leadership	0.789	0.872	0.695
Communication	0.826	0.889	0.728
Disaster Evacuation	0.803	0.873	0.697

Source: Describe from SmartPLS 4.0 by Authors

Discussion of Structural Model Findings

The analysis results indicated that leadership ($\beta = 0.430$, $p < 0.01$) and communication ($\beta = 0.520$, $p < 0.01$) variables significantly affected the success of evacuation. Communication was highly correlated with disaster evacuation, a finding that confirmed the study hypothesis. These results are consistent with the crisis organization action model (Pearson & Hallgren, 2023; Pearson & Clair, 1998) which emphasizes leadership and communication as key driving forces of effective response. **Table 3** displays the structural model constructed using SmartPLS 4.0 software to test the relationship between the independent variables (Leadership and Communication) and the dependent variable (Disaster Evacuation). The beta (β) and R^2 values as well given in the model for measuring relationship strength and model explanatory power.

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These results demonstrate that communication is a stronger predictor of effective evacuation compared to leadership, emphasizing the importance of reliable inter-agency and public communication.

The result of analysis showed that Leadership has a positive moderate correlation with Disaster Evacuation with a value of β = 0.430. It means the higher the level of leadership, the higher the process of disaster evacuation can be conducted. Then, communication also showed a moderate and positive relation with Disaster Evacuation with a value of β = 0.520. In the meantime, the R^2 value of 0.646 means that 64.6% of the variability of the Disaster Evacuation variable is accounted for by the two independent variables in this research, namely Leadership and Communication. This means that this model has high explanatory power. Overall, this model supports the hypothesis that both leadership and communication factors play an important role in contributing to the effectiveness of disaster evacuation. Besides the path coefficient value (β) and the value of R^2, this model also reports a Q^2 value = 0.413, which is the predictive relevance of the model. Q^2 in SmartPLS analysis is estimated according to a blindfolding procedure and is used to verify the extent to which the model can accurately predict the dependent variable (Disaster Evacuation). According to Hair et al. (2019), $Q^2 > 0$ indicates that there is predictive relevance, if > 0.35 indicates high predictive relevance. So, the Q^2 value = 0.413 in the current model proves the model to be reliable and of good predictive power, thereby supporting the validity and strength of the relationship between independent variables, Leadership and Communication, and the dependent variable, Disaster Evacuation.

Table 3: Summary of Key Findings

Hypothesis	Relationship	β	t-value	p-value	R^2	Result
H1	Leadership → Disaster Evacuation	0.43	4.142	0.001**	0.646	Supported
H2	Communication → Disaster Evacuation	0.52	3.277	0.000**		Supported

Source: Describe from SmartPLS 4.0 by Authors

Discussion in the Context of the Bah Kuning 2014

The mega flood known as "Bah Kuning" in Kelantan in 2014 provided a stark picture of weaknesses in the realms of field leadership and disaster risk communication. The prolonged period of adverse weather cut off many areas, supply chains of food items were broken, and evacuation-related information was not communicated to the victim community in a holistic fashion. Several official and media reports indicated that during the event, there was confusion of information, delays in action by agencies involved and doubts in evacuating victims to temporary shelters (NADMA, 2015; Chan, 2014). These indirectly illustrate structural vulnerabilities in terms of command delivery structure and inter-agency coordination and the two-way relationship between authorities and affected communities.

The findings of the study that identified communication (β = 0.52) and leadership (β = 0.43) as significant variables in the prediction of disaster evacuation effectiveness provide direct evidence in support of the hypothesis that lack of these two variables is largely responsible for paralyzing the response capacity during a disaster. For "Bah Kuning", failures in communication entailed not spreading early warning messages to rural communities, the lack of a rapid response mechanism and the lack of standardized communication channels between

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departments. Badi (2019) similarly noted in their research that most residents in areas such as Kuala Krai and Gua Musang were not accorded any official evacuation warning before their areas got flooded, referring to a yawning communication gap. From a leadership perspective, confusion of command structure between the state and central governments slowed the provision of relief and evacuation exercises (Waugh & Streib, 2006). Lack of crisis training and role confusion between agencies led to duplication of functions and uncoordinated responses (Nordin et al., 2024 & Lee, 2019). This study supports the need to advance leadership in disaster management at the local level with continuous training and frequent simulations so that community leaders can make quick and strategic decisions during times of crises. Provided that local leadership is equipped with good crisis management training and is supported by a well-established and reliable two-way communication system, it is hoped that evacuation in the case of "Bah Kuning" can be carried out more systematically, smoothly and quickly. Therefore, lessons from this experience need to be used as a powerful basis to build future capabilities not only in terms of technical and logistical aspects but also in leadership psychology, risk perception and public involvement in preparedness measures. The findings of this study provide empirical evidence that can be used to support future disaster management policymaking and planning and strategies, especially for high-risk areas in Malaysia.

Conclusion and Recommendations

The results of this study suggest that it was successful in fulfilling its main objective to empirically investigate the relationship between leadership, communication and disaster evacuation operation effectiveness. The statistical analysis with path coefficients of $\beta = 0.43$ for leadership and $\beta = 0.52$ for communication and an R^2 value of 0.621, indicates that these two constructs account for over 62% of the variance in evacuation effectiveness. These findings provide strong empirical support for the hypothesised relationships, thereby validating the proposed model.

Theoretically, the study adds to the literature by confirming that Fiedler's Situational Leadership Theory and the Situational Crisis Communication Theory (SCCT) can serve as suitable theoretical frameworks in examining disaster evacuation situations. Thus, the empirical support offered by this study demonstrates the importance of adaptive leadership and context-sensitive communication strategies during crisis situations. Practically, the study offers policy-relevant insights for improving evacuation protocols in Malaysia. It underscores the importance of ongoing crisis leadership training for frontline officers, the institutionalisation of two-way communication systems and the adoption of decentralised command structures that enable local agencies to respond rapidly during emergencies.

This study also suggest that the findings have meaningful implications for national disaster policy and operational planning. According to them, evacuation procedures are more effective if leadership development is included in the disaster preparedness frameworks of national governance and investment on reliable communication systems that can still function during infrastructural failures. It is also crucial that cooperative communication mechanisms between federal, state and community-level actors are developed so that information flows quickly across levels of government during large-scale disasters to avoid confusing evacuation decisions from being made.

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However, the study has a few limitations. It is of cross-sectional design, so dynamic or causal relationships between the variables are poorly established. This may be a valuable method to allow for generalisability of the findings, but it overlooks the perception and lived experiences that inform victims of disaster and field officers. In addition, the current study investigates only two central constructs of leadership and communication without considering a range of other potential covariates like overall public risk perception, infrastructure conditions or inter-agency trust. Furthermore, the case study was used in this research and the result of this case study occurred limited to 2014 Kelantan flood thereby it could restrict the generalisability.

Therefore, mixed-method or longitudinal research methods would be valuable to gain a more nuanced understanding of how people respond to disasters. Additional indicators or variables could be included in future model to better represent the disaster awareness or readiness of logistic availability in remote areas, community resilience and psychosocial preparedness. It is encouraged that similar studies to be conducted in other high-risk states like Pahang, Sabah, and Sarawak allowing a nationwide disaster evacuation framework that reflects the geographical as well as administrative diversity of Malaysia.

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