Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar Es Salam Tanzania

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Abstract

This study investigates the effects of perceived vulnerability on the intention to prevent fire outbreaks in public markets located in Dar es Salaam, Tanzania. Employing rigorous quantitative research methods, the study conducted surveys with a total of 384 participants, comprising traders and market management personnel across various markets in the Dar es Salaam Region. The selection of participants utilized a simple random sampling technique, ensuring representation from 10 different markets. Data collected from these surveys were analyzed using a robust structural equation model. The findings from the analysis revealed a notable result: perceived vulnerability did not exert a statistically significant influence on the intention to prevent fire outbreaks in these public markets. Despite the lack of a direct impact, the study underscores the importance of addressing underlying factors that contribute to perceived vulnerability. By understanding and mitigating these factors, such as inadequate fire safety infrastructure or insufficient training in fire prevention measures, stakeholders can enhance the perceived vulnerability construct's relevance and effectiveness in shaping comprehensive fire prevention strategies. In conclusion, this research highlights the complexity of factors influencing fire prevention behaviors in public markets. It calls for targeted interventions aimed at bolstering the perceived vulnerability framework to better align with practical fire prevention efforts, thereby safeguarding public markets and promoting community safety in Dar es Salaam, Tanzania.

Keywords: Perceived Vulnerability, Prevention Intention of Fire Outbreaks, Public Markets

INTRODUCTION

Market fire outbreaks have become a significant concern in both developed and developing countries (Hatmoko and Larassati, 2021; Oneugubu *et al.,* 2021). Examples include the Sentul market fires in Malaysia in 2017 and

The Pan-African Journal of Business Management, Vol 8, Issue 2, 2024: pp 260-281
Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar Es Salam Tanzania
Billy J. Mwakatage, Gwahula Raphael and France Shayo

2019 (Pressreader, 2020; New Traits Times, 2019), the Daegu market fire in Korea in 2016 (The Korea Herald, 2016), and the Kolibo public market fire in the Philippines in 2019 (Panay News, 2019; Rappler, 2019). Other notable incidents are the Camden Lock market fire in England in 2017, the Sunrise Oriental market fire in the USA in 2017, the La Merced market fire in Mexico in 2019, and the Gariahat market fire in India in 2019 (Hatmoko and Larassati, 2021).

This trend indicates a continual increase in fire outbreaks over time (Bushesha and Ndibalema, 2017). For instance, Nigeria experienced 39 market fires from 2012 to 2013, causing significant property and capital losses for traders (Popoola *et al.,* 2016). Between 2015 and 2018, the country faced four additional market fire incidents (Hatmoko and Larassati, 2021). Uganda dealt with nine market fire cases from 2010 to 2022 (VOA, 2011; Daily Monitor, 2021; URN, 2022; The Independent, 2022), while Kenya recorded 12 market fire incidents from 2015 to 2022 (The Citizens, 2022; BBC News, 2018; Hilary *et al.,* 2020; NTV, 2016). In Tanzania alone, there were 28 market fire threats between 2010 and 2022 (URT, 2022; Mwidege and Rogath, 2014; Hilary *et al.,* 2020; The Citizen, 2020; The Citizen, 2021; The Citizen, 2021).

Given the evidence, it is evident that fire outbreaks in public markets pose a significant threat to traders, as these markets often serve as the primary source of income for many individuals. Various studies (Martin et al., 2007; Karemaker *et al.,* 2021; Jansen et al., 2020) have shown that factors derived from the Protection Motivation Theory (PMT) are highly predictive in determining intentions to adopt preventive measures for fire-related disasters, such as wildfires, residential fires, and bushfires (Kinateder *et al.,* 2015). Jansen et al. (2020) found that vulnerability is a predictor of prevention intention, while severity and self-efficacy have a weaker relationship with prevention intention. However, these findings do not specifically address public markets in Tanzania, particularly in the Dar es Salaam region.

The occurrence of fire outbreaks in Tanzanian public markets is on the rise. Nonetheless, the Tanzanian government has implemented various measures to mitigate the impact of these outbreaks by enacting laws and regulations aimed at improving fire safety (URT, 2007). The Fire and Rescue Force (FRF) conducts inspections, provides training, organizes fire awareness campaigns, and initiates programs such as "NINACHO NAJUA KUKITUMIA" to reduce the likelihood of fire outbreaks (URT-Fire incident report, 2017; ITV, 2020). There is a perception that public awareness and

The Pan-African Journal of Business Management, Vol 8, Issue 2, 2024: pp 260-281
Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar Es Salam Tanzania
Billy J. Mwakatage, Gwahula Raphael and France Shayo

preparedness campaigns have improved in recent years (Every *et al.,* 2015). However, there have been 16 reported incidents of market fires in Dar Es Salaam from 2010 to 2022, causing significant losses for traders in terms of property, financial capital, injuries, and even fatalities (URT, 2022). Therefore, the researcher will use PMT as the primary theory for this study, as it has proven effective in predicting prevention intentions related to various fire hazards, including wildfires, residential fires, and bushfires (Kinateder *et al.,* 2015; Martin *et al.,* 2009; Karemaker *et al.,* 2021; Jansen *et al.,* 2020). Additionally, self-efficacy has been found to predict prevention in market fires (Fitria *et al.,* 2020). Importantly, there is a lack of studies conducted in Tanzania on the impact of perceived vulnerability on the intention to prevent fire outbreaks in public markets. Thus, this study aims to explore the effects of perceived vulnerability on enhancing the intention to prevent fire outbreaks in public markets.

LITERATURE REVIEW
The Protection Motivation Theory (PMT)
The Protection Motivation Theory (PMT), introduced by Rogers in 1975, has been extensively used to predict behaviors aimed at reducing risks (Rogers, 1975; Sommestad et al., 2015). PMT posits that engaging in protective behavior is influenced by an individual's motivation for self-protection (Ezati *et al.,* 2021). The theory comprises two main appraisals related to behavior change. The threat appraisal involves an individual's belief in the severity of a threat (perceived severity) and the likelihood of being affected by it (perceived vulnerability) (Ezati *et al.,* 2021). The coping appraisal includes response efficacy, which is an individual's belief that the recommended behavior will effectively mitigate the danger, and self-efficacy, which is the confidence in one's ability to perform the behavior (Ezati *et al.,* 2021).

Rogers anticipated that PMT would be applied in various ways, a prediction that has been confirmed as it is now used across multiple disciplines for safety prevention (Rogers, 1975; Westcott *et al.,* 2017). Furthermore, the number of studies on PMT has tripled since 2014, demonstrating its growing utility and advancement in research (Mou et al., 2022). PMT is adaptable, allowing for modifications, and can serve as a tool for postmortem analysis of past disasters to identify gaps and inform future disaster management strategies (Mou et al., 2022; Kudejira et al., 2022). Additionally, PMT can explain individuals' behaviors in protecting themselves from danger and is applicable to various social issues and diverse fields (Westcott et al., 2017; Marikyan *et al.,* 2022).

The Pan-African Journal of Business Management, Vol 8, Issue 2, 2024: pp 260-281
Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar
Es Salam Tanzania
Billy J. Mwakatage, Gwahula Raphael and France Shayo

However, PMT has certain limitations. It does not fully consider a broad range of environmental factors, cognitive processes, and moderators that could influence protective motivation (Rogers, 1975; Marikyan and Papagiannidis, 2022). Additionally, PMT assumes that individuals make rational decisions, overlooking the fact that people can sometimes behave irrationally (Marikyan and Papagiannidis, 2022). Research by Martin *et al.* (2007) and Ezati *et al.* (2021) found that individuals consider risk mitigation when they perceive a vulnerability to the threat of wildfire. Moreover, perceived severity, vulnerability, response efficacy, and self-efficacy are associated with adaptive behavior, while an increase in rewards and response cost can hinder adaptive behavior (Inouye, 2014; Liu and Jiao, 2017; Pechmann, 2003; Scheithauer, 2012; Sheeran *et al.,* 2014; Westcott *et al.,* 2017). Specifically, Ezati *et al.* (2021) found that rewards and response costs specifically impede protective behavior. This theory is relevant to the study objective because perceived vulnerability, a key variable from PMT, is utilized in this study to examine its impact on enhancing the intention to prevent fire outbreaks in public markets.

Empirical Literature Review

Vulnerability pertains to the perceived likelihood of a risk occurring (Forbes-Mewett *et al.,* 2019). Dupey (2021) revealed that the perception of vulnerability to prevent fire risks is influenced by the type of residence. Peveglio *et al.* (2018) argue that vulnerability alone may not be adequate to establish comprehensive preventive measures for the risk of wildfires. Nonetheless, vulnerability is deemed to be a suitable approach for planning preventive efforts for firefighting resources, thereby reducing the cost of suppression (Fischer *et al.,* 2014). Fischer *et al.* (2014) also suggested that individuals experiencing fear and anxiety associate vulnerability with engaging in risk reduction behaviuor. It is essential to note, however, that these studies were conducted in developed countries, with many focusing on the USA and Australia, primarily in the context of wildfires and bushfires rather than public market fires.

On the contrary, Elenwo's (2020) study in Nigeria disclosed that a lack of awareness and preventive measures contributes to market fires, leaving traders susceptible to such incidents. The study also contended that traders who smoke cigarettes expose the entire market community to the risk and vulnerability of fire outbreaks. Additionally, the storage of flammable materials in markets emerged as a factor contributing to vulnerability in market fires (Elenwo, 2020; Oneugbu *et al.,* 2021). The vulnerability of market fires is frequently ascribed to building materials and insufficient

The Pan-African Journal of Business Management, Vol 8, Issue 2, 2024: pp 260-281
Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar
Es Salam Tanzania
Billy J. Mwakatage, Gwahula Raphael and France Shayo

preventive measures (Alabi *et al.*, 2021; Popoola et al., 2016). It was also revealed that the design of exit and entry points in markets, along with activities conducted within them, adds to their susceptibility to fires (Alabi *et al.*, 2021). Alkali (2022) determined that the presence of flammable materials such as timber heightens the perceived vulnerability among traders in markets. Additionally, religious beliefs regarding fire risks in markets were found to influence prevention and effective response (Abunyewah *et al.*, 2022), and market fires received comparatively less attention in terms of awareness (Aboagye *et al.*, 2018). However, it is essential to note that all these studies were conducted in Nigeria and Ghana, and they lacked a theoretical framework, raising questions about the reliability of the results in addressing the issue at hand. Therefore, this calls for further research on the topic. Therefore, this recommends for the study to be conducted. Based on the above explanations, it was hypothesized that: *H1: There is a positive relationship between perceived vulnerability and prevention intention on outbreaks of fire in public markets.*

METHODOLOGY

This study followed the positivism research philosophy, which emphasizes the belief in objective truth, facts, and laws, and uses hypotheses to draw conclusions (Mohajan, 2020). Positivism seeks to identify, measure, and evaluate phenomena, providing rational explanations to establish causal relationships between variables (Hair *et al.*, 2010). Due to its quantitative and positivistic nature, a deductive approach was used in this study to illustrate the relationship between theory and reality. An explanatory research design was chosen to gain a deeper understanding and to build, elaborate, extend, or test hypotheses (Rahi, 2017).

According to Saunders et al. (2012), explanatory studies use a survey strategy to collect and analyze data quantitatively through descriptive and inferential statistics. Additionally, these studies use a variety of data collection methods, including questionnaires, structured observations, and interviews (Taherdoost, 2020). This research was conducted in the Dar Es Salaam region, focusing on traders in public markets due to the high frequency of fire outbreaks in these areas. Dar Es Salaam experienced 16 market fire incidents between 2010 and 2022, compared to fewer incidents in other regions like Mbeya, Mwanza, Geita, Arusha, Kilimanjaro, and Songwe (URT, 2010-2022). Data were collected from individual traders and market management across various markets, including Mabibo Garment (7 traders), Simu 2000 (24 traders), Magomeni (17 traders), Kisutu (29 traders), Ferry (9 traders),

The Pan-African Journal of Business Management, Vol 8, Issue 2, 2024: pp 260-281
Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar Es Salam Tanzania
Billy J. Mwakatage, Gwahula Raphael and France Shayo

Kibanda (11 traders), Ilala (155 traders), Mchikichini (65 traders), Tazara Vetenari (21 traders), and Temeke Stereo (46 traders).

The sample size was determined using Cochran's formula (1977) to allow for a large sample size and reduce sampling error in social research, with a 5% margin of error considered acceptable (Taherdoost, 2020). However, a large sample size does not guarantee precision (Bell *et al.,* 2022). Thus, a sample size of 384 was chosen. The author used a probability sampling technique, incorporating multistage and random sampling, to obtain a representative sample for generalizing the findings (Acharya et al., 2013). The sampling frame consisted of 64,753 traders from public markets in Dar Es Salaam (URT, 2024). According to Krejcie and Morgan (1970), the required sample size for this population was calculated to be 381, which is practically equivalent to the 384 participants. This sample size justifiable for several reasons; the calculation of the sample size of 381 was based on a 5% margin of error and a 95% confidence level, which are standard parameters in social science research. A slight increase to 384 ensures that the margin of error remains within acceptable limits, providing a more precise estimate of the population parameters. Increasing the sample size slightly from 381 to 384 enhances the statistical power of the study. This means the study is more likely to detect a true effect or difference when one exists, thereby improving the reliability and validity of the findings. Ensuring a sample size of 384 helps achieve better representation of the population. This slight increase accounts for any potential non-responses or data that might occur, ensuring that the final analyzed sample closely mirrors the target population. Thus, according to Krejcie and Morgan's (1970) table for determining sample size, for a population of approximately 65,000 traders, a sample size of around 381 is recommended. Using 384 participants aligns with these guidelines, ensuring the sample is sufficiently large to generalize the findings to the broader population.

Multistage cluster sampling was employed to ensure a representative sample, covering Ilala, Kinondoni, Temeke, Ubungo, and Kigamboni. Trade officers assisted in obtaining necessary information about the traders. Primary data was collected using self-administered questionnaires to minimize costs. The data was analyzed using IBM SPSS software, with Structural Equation Modeling (SEM) conducted using IBM AMOS software. SEM was chosen for its comprehensive statistical approach to examining relationships among observed and latent variables, adopting a confirmatory approach that specifies inter-variable relationships (Hair et al., 2010).

The Pan-African Journal of Business Management, Vol 8, Issue 2, 2024: pp 260-281
Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar
Es Salam Tanzania
Billy J. Mwakatage, Gwahula Raphael and France Shayo

Ethical considerations were observed throughout the study, ensuring voluntary participation and maintaining anonymity and confidentiality, as recommended by Saunders et al. (2019). The researcher avoided data fabrication and falsification, properly cited published and unpublished documents, and acknowledged other researchers' work to prevent plagiarism. A clearance letter from the director of postgraduate studies at the Open University of Tanzania was obtained before data collection and submitted to government offices for data access. Additionally, an official permission letter from the respective municipalities was acquired to access traders in the public markets, ensuring the validity and reliability of the study.

PRESENTATION OF FINDINGS AND DISCUSSION

Out of the 384 participants surveyed, 57.6% were male and 42.4% were female, as shown in Table 1. This reflects the inclusion of both genders in the study. Despite a higher number of male participants, the results indicate a balanced gender representation in the data collection process. Consequently, the findings provide insights into the factors affecting the intention to prevent fire outbreaks from the perspectives of both male and female participants in public markets in Tanzania.

Regarding the age distribution of the 384 participants, detailed in Table 1, 34.6% were between 18 and 30 years old, 30.5% were within the 31-40 years range, 26.8% were aged 41-50 years, and 8.1% were 51 years or older. The majority of respondents, totaling 65%, fell within the 18-40 years age bracket. This demographic includes young and active individuals known for their hard work and energy. They are seen as capable of providing assistance and taking prompt action during fire outbreaks in the market. This age group is perceived as being able to quickly respond to and mitigate fire incidents.

In terms of educational background among the 384 respondents, 33.3% had completed primary education, 47.7% had secondary education qualifications, and 19.0% had attained college or higher education levels. The predominant educational levels among respondents were secondary and primary education, with these groups mainly employed in the market. Those with higher education qualifications tended to seek employment in other sectors, including government institutions, as outlined in Table 1.

The Pan-African Journal of Business Management, Vol 8, Issue 2, 2024: pp 260-281
Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar Es Salam Tanzania
Billy J. Mwakatage, Gwahula Raphael and France Shayo

Table 1 Demographic Characteristics of Respondents

Gender of respondents	Frequency	Percent
Gender		
Female	221	57.6
Female	163	42.4
Age		
18-30 Years old	133	34.6
31-40 years old	117	30.5
41-50 years old	103	26.8
Education Standard VI	128	33.3
Secondary	183	47.7
Collage and above	73	19.0
Total	**384**	**100.0**

Source: Field Data (2024)

Measurement Model for Vulnerability (VR)

The vulnerability measurement model was initially specified with the observed variables VR2, VR3, VR1, and VR4 for conducting confirmatory factor analysis. IBM AMOS 20, employing maximum likelihood estimation, was used for the analysis. Following the analysis of the vulnerability measurement model, the model fit indices indicated the following results: CMIN/df = 4.150, GFI = 0.989, AGFI = 0.944, CFI = 0.982, and RMSEA = 0.091. These findings suggested a poor fit of the model based on established fitness criteria, as detailed in Table 4.

According to Schumacker and Lomax (2004) and Hooper *et al.* (2008), a well-fitting model should achieve a CMIN/DF of 3 or less, indicating an acceptable fit, a CFI greater than 0.90 indicates good fit, an RMSEA less than 0.08 indicates acceptable fit, and a GFI of at least 0.9 indicates acceptable fit. To enhance the model fit during the confirmatory stage, one item, namely eL1VR2, was removed. After the removal of eL1VR2, the confirmatory factor analysis was rerun, and the findings for model fit indices were as follows: CMIN/df ratio = 2.66, p = 0.070, GFI = 0.998, AGFI = 0.987, CFI = 0.999, and RMSEA = 0.025, as illustrated in Figure 1.

Based on these results of model fit indices, a vulnerability model with three items was deemed fitting. The remaining items, VR1, VR2, and VR4, were then moved to the covariance level.
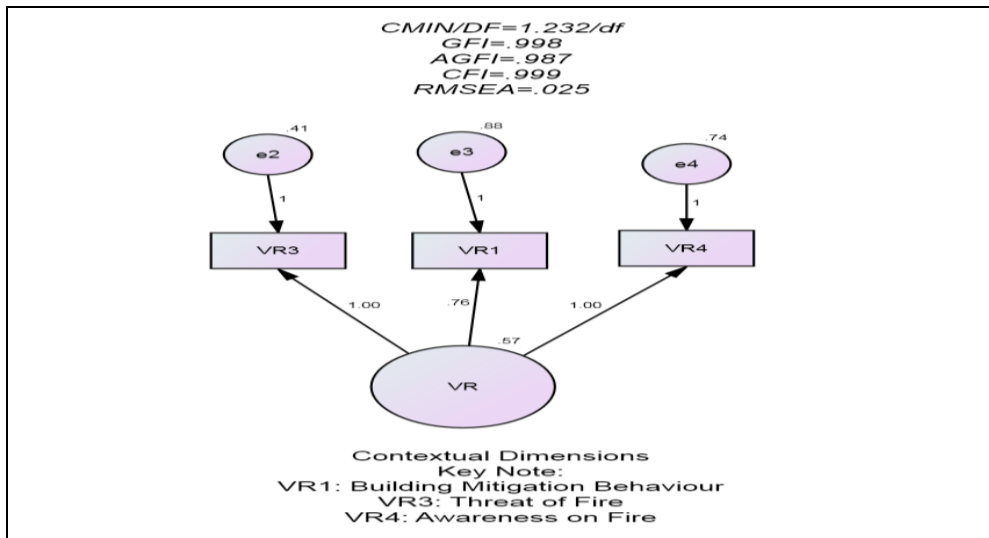
The Pan-African Journal of Business Management, Vol 8, Issue 2, 2024: pp 260-281
Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar Es Salam Tanzania
Billy J. Mwakatage, Gwahula Raphael and France Shayo

Figure 1: Vulnerability measurement Model
Source: Researcher (2024)

Measurement Model for the Prevention Intention (PI)

In the confirmatory factor analysis, the measurement model for assessing prevention intention included the observed variables PI4, PI3, PI2, and PI1. The confirmatory factor analysis was conducted using IBM AMOS 20 with maximum likelihood estimation. The results following the analysis indicated the following findings: CMIN/df = 2.430, GFI = 0.993, AGFI = 0.967, CFI = 0.965, and RMSEA = 0.065, as illustrated in Figure 2.
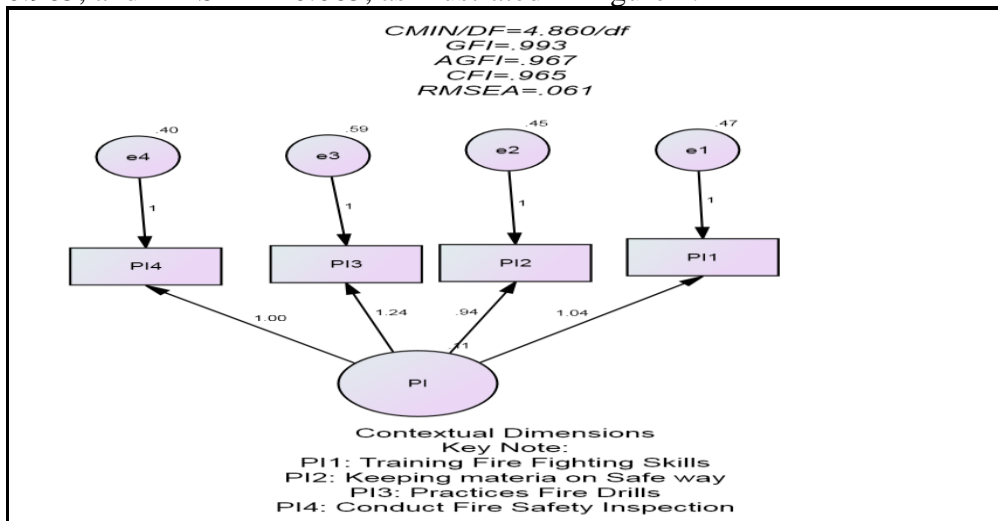

Figure 2: The PI Mesurement Model
Source: Researcher (2024)

The Pan-African Journal of Business Management, Vol 8, Issue 2, 2024: pp 260-281
Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar
Es Salam Tanzania
Billy J. Mwakatage, Gwahula Raphael and France Shayo

Summary of Measurement Model on CFA

The confirmatory factor analysis presented a summary of the measurement model for all variables under study. The results indicated that some variables were fitted during the initial run, while others were fitted during the second run. According to Hoe's (2008) recommended threshold levels, the model's fitness was considered acceptable if the Comparative Fit Index (CFI) was greater than 0.90, suggesting a good fit. Additionally, the Root Mean Square Error of Approximation (RMSEA) should be less than 0.08, indicating an acceptable fit, and the commonly used χ^2 statistic should have a ratio of 3 or less (χ^2/df ratio). The accepted results based on these criteria are detailed in Table 2.

Table 2: Summary of Measurement Model on CFA

Items	Initial Stage of CFA Indicating Unsatisfactory Measurement Model Fit					Final Stage of CFA Indicating Good Measurement Model Fit					Remarks
	CMID/Df	GFI	AGFI	CFI	RMSEA	CMID/Df	GFI	AGFI	CFI	RMSEA	
VR	4.150	0.989	0.944	0.912	0.091	2.66	0.998	0.987	0.999	0.025	Accepted in 2nd run
PI	2.430	0.993	0.967	0.965	0.065	-	-	-	-	-	Accepted in 1st run

Source: Researcher (2024)

Testing the Relationship between Perceived Vulnerability and PI of Fire

Analysis was conducted using Structural Equation Modelling (SEM) to ascertain the positive influence of perceived vulnerability on prevention intention regarding fire outbreaks in public markets, as outlined in Table 6. The path leading from perceived vulnerability on prevention intention on outbreaks of fire in public markets in Table 6 is used to examine the relationship between perceived vulnerability and prevention intention on outbreaks of fire in public markets. A positive standardized path coefficient ($\gamma = 0.037$) using standardized estimate results in Table 3 indicates that perceived vulnerability had positive influence which is on prevention intention on outbreaks of fire in public markets. As argued by Hoe (2008) who argued that a standardized path coefficient (γ) should be at least 0.2 in order to be considered significant and meaningful for discussion. The results in the current study confirm a poor relationship between perceived vulnerability on prevention intention on outbreaks of fire in public markets.

Apart from standardized coefficient, further analysis was done using critical ratio and p-value to determining the influence of perceived vulnerability on prevention intention on outbreaks of fire in public markets. Findings from this study revealed a critical value (C.R = 0.188 which is <1.96) and higher

The Pan-African Journal of Business Management, Vol 8, Issue 2, 2024: pp 260-281
Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar
Es Salam Tanzania
Billy J. Mwakatage, Gwahula Raphael and France Shayo

significance level of p=0.851. Hox and Bechger (2007) argued that a relationship, which has yielded a critical ration greater than 1.96 and p-value less than 0.05 is considered significant. Due to these findings the alternative hypothesis (Ha) which state ***Alternative Ha****: There is a positive relationship between perceived vulnerability and prevention intention on outbreaks of fire in public markets rejected while the **Null Ho***: *There is no positive relationship between perceived vulnerability and prevention intention on outbreaks of fire in public markets accepted.*

Table 3: Basic Model Un-standardized and SRW

Path			Estimate	S.E.	C.R.	P	SRW	Remarks
PI	<---	VR	.018	.094	.188	.851	.037	Not accepted
VR1	<---	VR	.670	.085	7.848	***	.527	Accepted
VR3	<---	VR	.775	.089	8.724	***	.683	Accepted
VR4	<---	VR	1.000				.745	accepted

Source: Researcher (2024)

Discussion of Findings on the Relationship between Perceived Vulnerability and PI of Fire

The research investigated the correlation between Perceived Vulnerability and the Prevention Intention regarding Fire Outbreaks in Public Markets. The study sought to determine whether Perceived Vulnerability has positive effects on the Prevention Intention for Fire Outbreaks in Public Markets. Both exploratory and confirmatory factor analyses were employed to establish the model fit for items strongly associated with perceived vulnerability. The fitting items, namely building mitigation behavior, the threat of fire, and awareness of fire incidence, were utilized to assess the effects of perceived vulnerability on the prevention intention for fire outbreaks in Public Markets.

In this context, the path leading from perceived vulnerability to prevention intention for outbreaks of fire in public markets displayed a positive standardized path coefficient ($\gamma = 0.037$). However, the standardized estimate revealed that perceived vulnerability had positive but insignificant effects on the prevention intention for fire outbreaks in public markets. This finding contrasts with Mou, *et al.* (2022) assertion that a standardized path coefficient (γ) should be at least 0.2 to be considered significant and meaningful for discussion. The current study's results confirm a weak relationship between perceived vulnerability and prevention intention for fire outbreaks in public markets. Additionally, the findings exhibit a value (C.R = 0.188, which is <1.96) and a higher significance level of p = 0.851. Mou, *et*

The Pan-African Journal of Business Management, Vol 8, Issue 2, 2024: pp 260-281
Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar
Es Salam Tanzania
Billy J. Mwakatage, Gwahula Raphael and France Shayo

al. (2022) a relationship yielding a critical ratio greater than 1.96 and a p-value less than 0.05 is considered significant. This implies that perceived vulnerability currently has positive but insignificant effects on the Prevention Intention for outbreaks of fire in public markets. This indicates that the perceived vulnerability is not motivating individuals to engage in prevention intentions for fire outbreaks in public markets. This lack of influence may be attributed to the inadequate development of mitigation behavior in people's minds, resulting in low explanatory power. Additionally, individuals possess limited experience with the threat of fire, perceiving it as a normal occurrence without taking proactive measures. Moreover, there is insufficient awareness of fire incidents, leading to a lack of knowledge about signs of fire outbreaks in marketplaces and awareness of actions to suppress fire outbreaks. These findings suggest that factors contributing to perceived vulnerability, such as building mitigation behavior, the threat of fire, and awareness of fire incidents, have low explanatory power or are influenced by other factors, making it challenging to achieve positive effects on prevention intentions for fire outbreaks in public markets.

This study's findings align with empirical research conducted in other contexts, emphasizing the broader relevance and applicability of the results. However, the current study presents notable differences compared to Kusonwattana *et al.* (2022). Their research utilized 366 valid responses gathered through convenience sampling. They employed a combination of structural equation modeling (SEM) and an artificial neural network (ANN) hybrid approach to analyze various factors under the extended and integrated protection motivation theory and the theory of planned behavior. These factors included geographic perspective, fire perspective, government response, perceived severity, response cost, perceived vulnerability, perceived behavioral control, subjective norm, and attitude, all assessed simultaneously to gauge individuals' intentions to prepare for fire disasters. This comprehensive approach allowed for a nuanced understanding of the multiple influences on fire disaster preparedness.

This research represents the first comprehensive investigation into the behavioral intention to prepare for mitigating human-made fire disasters in the Chonburi Province region of Thailand. The study revealed a significant indirect impact of perceived vulnerability on the intention of fire prevention (β: 0.020; $p = 0.014$). This suggests that individuals who perceive themselves, their location, family, and friends as vulnerable to fire are more likely to take preventative measures. These findings are consistent with the research by Bushesha and Ndibalema (2017), who evaluated the effects of

The Pan-African Journal of Business Management, Vol 8, Issue 2, 2024: pp 260-281
Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar Es Salam Tanzania
Billy J. Mwakatage, Gwahula Raphael and France Shayo

perceived vulnerability on fire awareness and safety in public universities in Tanzania, focusing on The Open University of Tanzania and the University of Dar es Salaam.

Bushesha and Ndibalema's (2017) study aimed to investigate individuals' awareness and knowledge of the causes of fire incidents, identify those who had witnessed fire incidents, assess knowledge of essential firefighting and safety facilities, evaluate individuals' ability to combat fire incidents using locally available firefighting gear, examine their capacity to use modern firefighting equipment and safety facilities, and measure the universities' efforts to enhance community awareness of firefighting appliances and safety measures. The research adopted a phenomenological qualitative research design, employing questionnaires, in-depth interviews, focus group discussions (FGDs), and observation approaches to collect data from 76 respondents obtained through purposive and random sampling. The collected data were analyzed both quantitatively, using simple descriptive statistics with SPSS software, and qualitatively, using content analysis. The study found that community awareness on fire outbreaks and safety was low, indicating that perceived vulnerability had no positive and significant effects on fire incidence. This lack of awareness was attributed to inadequate training for facility users, insufficient enlightenment on fire prevention, and poor fire outbreak management.

In contrast, Kurata et al. (2022) examined factors influencing the perceived effectiveness of Typhoon Vamco (Ulysses) flood disaster response among Filipinos in Luzon, Philippines. They found that perceived vulnerability had a low-significance effect on people's behavior, suggesting that other factors may be more influential in shaping disaster response behaviors. Conversely, Kusumastuti *et al.* (2022) demonstrated that, despite its low significance, people still proactively take action to mitigate the negative impact of disasters, highlighting the complex relationship between perceived vulnerability and proactive disaster preparedness. Additionally, Weichselgartner and Pigeon (2015) emphasized that knowledge and experience of a disaster may lead to low perceived vulnerability but result in a better understanding of disaster risks and mitigation strategies.

The findings differ from those of Mweetwa (2018), who investigated fire incidence preparedness by the Mazabuka municipal council in urban markets. Mweetwa's research focused on establishing human capacity and equipment, determining major preparedness projects undertaken, and identifying challenges faced by the fire department. Using a descriptive research design

The Pan-African Journal of Business Management, Vol 8, Issue 2, 2024: pp 260-281
Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar
Es Salam Tanzania
Billy J. Mwakatage, Gwahula Raphael and France Shayo

with a qualitative approach, the study employed purposive, convenience, and simple random sampling techniques. Fire officers and market committee members were interviewed through focus group discussions to gather current information on fire incidence preparedness, while the chief fire officer and market master were administered questionnaires and interviews. The findings indicated that the majority of the personnel at the Mazabuka municipal council fire department were still mere fire officers, with only four officers holding higher ranks. The department had a water tender with modern equipment, a well-conditioned ambulance, and a utility van. The study suggested that perceived vulnerability had positive impacts on fire prevention, driven by the availability of modern equipment and trained personnel.

Similarly, Mubita et al. (2023) examined the effectiveness of fire safety management strategies in selected markets in Lusaka city. The study employed a descriptive research design involving qualitative data collection and analysis. Using purposive sampling, the researchers selected markets and participants, including 10 marketeers and 2 market managers from each of two markets. Data were collected through Focus Group Discussions (FGDs) and in-depth interviews. The findings indicated that effective fire safety management in markets required a combination of proactive measures and emergency preparedness. The study underscored the importance of perceived vulnerability in ensuring that fire safety strategies remain effective and relevant in preventing fire incidents.

These findings support the argument that perceived vulnerability does not positively influence prevention intention regarding outbreaks of fire in public markets in Tanzania. This lack of influence may be attributed to the fact that most people have not experienced or been exposed to market fires, which diminishes their proactive engagement in fire suppression. According to Kachenje *et al*. (2010), many public buildings, including public markets, exhibit limited fire management capacity, particularly low public vulnerability, awareness, and the availability of means and facilities for firefighting. Therefore, special attention is required in developing countries such as Tanzania to ensure that perceived vulnerability plays a more significant role in prevention intention during fire outbreaks in public markets.

Furthermore, these findings align with the results of Kihila (2017), who discovered significant gaps in fire safety knowledge and preparedness among

The Pan-African Journal of Business Management, Vol 8, Issue 2, 2024: pp 260-281
Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar
Es Salam Tanzania
Billy J. Mwakatage, Gwahula Raphael and France Shayo

the respondents. Specifically, approximately 51% of the respondents were unable to operate installed firefighting facilities. This lack of operational knowledge poses a significant barrier to effective fire response during emergencies. Additionally, about 80.7% of the respondents had never received any training on firefighting and prevention. Training is crucial for equipping individuals with the skills and confidence needed to respond effectively to fire incidents. Moreover, an alarming 95.6% of respondents had never participated in fire drills. Fire drills are essential for practicing evacuation procedures and ensuring that individuals know how to react swiftly and safely during an actual fire emergency. The absence of such drills indicates a serious gap in preparedness. Furthermore, 81.5% of respondents were unaware of the contact details for fire responders, highlighting a critical communication breakdown that could delay emergency response and exacerbate the consequences of a fire outbreak. These statistics collectively indicate that a majority of individuals were not adequately prepared or equipped to handle fire incidents, making the containment of a fire outbreak in public places exceedingly challenging.

On the contrary, the findings of this study indicate that perceived vulnerability to fire incidents is not significantly correlated with the intention to prevent outbreaks of fire in public markets. This suggests that simply feeling vulnerable or at risk does not necessarily translate into proactive preventive measures. However, individual components of vulnerability, such as building mitigation behavior, the perceived threat of fire, and awareness of fire incidents in the marketplace, exhibit a positive and significant association with the intention to prevent fire outbreaks. These components highlight that specific, actionable factors related to vulnerability can influence prevention intentions.

The study suggests that perceived vulnerability may gain more significance when considered alongside other factors not included in the present research. For instance, factors such as community education, availability of firefighting resources, institutional support, and cultural attitudes towards fire safety might interact with perceived vulnerability to influence prevention intentions. Therefore, the central perspective derived from this study is that perceived vulnerability, in isolation, was deemed insignificant in influencing the prevention intention regarding fire outbreaks in public markets.

It is possible that unexplored dimensions, not measured in this study, exist in real-life scenarios, affecting the efficacy of perceived vulnerability in shaping prevention intentions for fire outbreaks in public markets. These dimensions

The Pan-African Journal of Business Management, Vol 8, Issue 2, 2024: pp 260-281
Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar
Es Salam Tanzania
Billy J. Mwakatage, Gwahula Raphael and France Shayo

could include elements such as social cohesion, trust in local authorities, past experiences with fires, and the perceived effectiveness of existing fire safety measures. These factors could potentially enhance the effect of perceived vulnerability on the prevention intention concerning fire outbreaks in public markets. Understanding and integrating these dimensions into future research could provide a more comprehensive view of how perceived vulnerability influences fire prevention behaviors and lead to more effective fire safety strategies.

CONCLUSION

This study examined the impact of perceived vulnerability on the intention to prevent fire outbreaks in public markets in Tanzania. Utilizing quantitative research methods, the study surveyed 384 participants, including individual traders and market management in the Dar es Salaam Region. The analysis employed standardized estimates and critical ratios within Structural Equation Modeling (SEM) to evaluate the relationship between perceived vulnerability and the intention to prevent fire outbreaks. The findings revealed a positive but insignificant standardized path coefficient ($\gamma = 0.037$), indicating that perceived vulnerability had a negligible effect on prevention intentions. According to Hoe (2008), a standardized path coefficient (γ) should be at least 0.2 to be considered significant and meaningful. The study's results also showed a critical value (C.R = 0.188 and p = 0.851), underscoring the insignificance of the relationship. Bechger (2014) noted that a relationship is significant if the critical ratio exceeds 1.96 and the p-value is below 0.05, criteria that the findings did not meet. Consequently, the study concludes by rejecting the alternative hypothesis (Ha) that posited a positive relationship between perceived vulnerability and prevention intention regarding fire outbreaks in public markets, while accepting the null hypothesis (Ho) which states there is no positive relationship.

RECOMMENDATION

The results demonstrated a positive yet statistically insignificant effect of perceived vulnerability on the intention to prevent fire outbreaks in public markets. This finding suggests that while individuals may feel vulnerable to fire hazards, this perception does not significantly translate into a stronger intention to take preventive measures. Several underlying factors could contribute to this lack of significance, warranting further investigation.

For instance, it is essential to explore whether other variables, such as lack of awareness, insufficient access to resources, or cultural attitudes towards risk and prevention, may moderate or mediate the relationship between perceived

The Pan-African Journal of Business Management, Vol 8, Issue 2, 2024: pp 260-281
Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar
Es Salam Tanzania
Billy J. Mwakatage, Gwahula Raphael and France Shayo

vulnerability and prevention intention. Additionally, psychological factors such as fatalism, complacency, or distrust in the effectiveness of preventive measures could also play a role. Understanding these dynamics could provide valuable insights into why perceived vulnerability alone is not a strong predictor of preventive behavior in this context.

Moreover, the study's scope was limited to a single region in Tanzania, specifically the Dar es Salaam region. This geographical limitation raises questions about the generalizability of the findings. Different regions may have varying levels of infrastructure, access to firefighting resources, community awareness programs, and cultural attitudes, all of which could influence the relationship between perceived vulnerability and prevention intentions. Therefore, it is crucial to extend the research to multiple regions within Tanzania and potentially other countries to determine whether the observed patterns hold true across different contexts.

Conducting similar studies in various regions would help validate the model and provide a more comprehensive understanding of the factors influencing fire prevention intentions. Such comparative research could highlight regional differences and commonalities, offering a broader perspective on the adoption of fire prevention measures. This expanded scope could also identify best practices and tailored interventions that are effective in diverse settings, ultimately enhancing fire safety in public markets globally.

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The Pan-African Journal of Business Management, Vol 8, Issue 2, 2024: pp 260-281
Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar
Es Salam Tanzania
Billy J. Mwakatage, Gwahula Raphael and France Shayo

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Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar
Es Salam Tanzania
Billy J. Mwakatage, Gwahula Raphael and France Shayo

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The Pan-African Journal of Business Management, Vol 8, Issue 2, 2024: pp 260-281
Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar Es Salam Tanzania
Billy J. Mwakatage, Gwahula Raphael and France Shayo

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Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar
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Billy J. Mwakatage, Gwahula Raphael and France Shayo

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The Pan-African Journal of Business Management, Vol 8, Issue 2, 2024: pp 260-281
Effects of Perceived Vulnerability on Enhancing Prevention Intention of Fire Outbreaks in Public Markets in Dar
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Billy J. Mwakatage, Gwahula Raphael and France Shayo

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