Turkish Online Journal of Qualitative Inquiry (TOJQI)
Volume 12, Issue 6, July, 2021: 8719- 8736

Research Article

Assessing Fire Risk Reduction Behaviours among Residential Occupants: The Role of Cognitive Processes and Subjective Knowledge

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Abstract

The purpose of this study is to investigate the role of cognitive processes and subjective knowledge on behaviours towards fire risk reduction among residential occupants in Malaysia. A sample of 324 residential occupants was used to get the study outcomes following the cross-sectional study. SmartPLS 3.0 was used to analyse the collected data. Seven hypotheses were formulated in this study. Results confirm that risk information of residents has positive and significant relationships with cognitive processes and subjective knowledge. A positive and significant relationship is also found between cognitive processes and behaviours towards risk reduction. Results also confirm that there are no conventional relationships found between subjective knowledge and risk information with behaviours towards risk reduction. Moreover, a positive and significant relationship is found between risk information and behaviours towards risk reduction with the mediating effect of cognitive processes. However, our study claims that there is no mediation role of subjective knowledge on the relationship between risk information and behaviours towards risk reduction. This study contributes to boost the decision-making process of policy makers, governments and stakeholder regarding raising public awareness, enhancing organized reporting of fire-related incidents, facilitating community building enforcement, and improving the quality of household energy goods that are all examples of unique work on fire safety.

Keywords: *cognitive process, fire risk reduction behaviours, SEM, Malaysia, subjective knowledge*

1.0 Introduction

Fire plays an important role in culture and has become an important characteristic of human civilization from the perspectives of human security and economy (Liu & Jiao, 2018). As Malaysia's national economy grows rapidly, fire is a significant threat to life and property in both urban and rural areas (Champ et al., 2013; Larsen er al., 2021). Old Malaysian building complexes face a high risk of fire due to their unique construction and the thriving tourism industry (Xin & Huang, 2013; Chan et al., 2018). Fire spreads rapidly in these areas, resulting in substantial financial costs for residents, particularly given the historical significance of old buildings. Such fires are solely the product of human factors. As

a result, there are critical personal behavioural risk management measures to minimize risk damage (Ascher et al., 2013; Liu & Jiao, 2018). However, recent studies and literature have shown a lack of confidence in implementing preventive measures in advance of risks that threaten the health of persons and property (Martin et al. 2007). As a result, the researchers have paid special attention to promoting behavioural personal risk reduction (Martin et al. 2007; Champ et al., 2013; Larsen er al., 2021).

Many models have been developed to measure the fire risks in buildings. A variety of social cognitive models were applied to risk-reduction interpretation and prediction, including reasoned action (TRA) Theory (Ajzen and Fishbein 1977), the theory of planned behaviour (TPB) (Ajzen, 1991), and the protection motivation theory (PMT) (Rogers 1975). All these models have highlighted human cognitive processes to determine defensive behaviour (Brown et al., 2012). However, it was not provided a more general statement on the sources of coin driven awareness (Brown et al., 2012) which was used to investigate risk reduction activities due to multiple risks (e.g., flooding, storms, wildfires, infectious diseases, and terrorist attacks) (Bubeck et al. 2012). The call to fear generates a synaptic cycle that changes people's behaviour (Lê & Jarzabkowski, 2015). Individuals evaluate a risk threat and test risk reduction coping effectiveness based on knowledge received from cognitive processes (Sommestad et al., 2015). The action to minimize risk is the product of cognitive process evaluation and measurement (Lê & Jarzabkowski, 2015).

There has been a great deal of study done on the relationship between cognitive processes and behavioural risk reduction (Bubeck et al. 2012; Lê & Jarzabkowski, 2015). Although vulnerability evaluation was positively related to risk reduction activities, the observational results were incompatible with different natural danger risks. The majority of the beneficial effects were detected in wildfire risks (McFarlane et al., 2012), but none were noticed in flood danger (Bubeck et al. 2012) or earthquake hazard (Bubeck et al., 2012) We do know, however, that in residential fires, there is a connection between threat identification and risk management behaviour. Furthermore, risk information has been proposed as an important component in the communication of fear appeal that initiates cognitive processes (Herrmann et al., 2013). Risk information is input from attitude-behaviour change process information (Bubeck et al. 2012). People react differently to danger facts, which lead to unpredictable behavior (Herrmann et al., 2013; Lê & Jarzabkowski, 2015). People obtain risk information from a number of outlets with differing contents (e.g., local government, media, the Internet) and monitor others, especially close associates, enact risk-mitigation initiatives.

This information not only increases citizens' awareness of fire risks, but also their experience of risk reduction techniques and their focus on risk reduction skills. Information is also an important factor in people's risk responses (Pollack et al., 2017). In reality, disseminating risk information is a crucial step for the government in leveraging individuals' voluntary acts to mitigate risk (Richter & Arndt, 2018). As a result, considering how risk awareness enables person-to-person risk management could shed new light on risk communication strategies (Hossain et al., 2020). The analysis approach, on the other hand, has not yet been extensively investigated in terms of risk specifics. Previous research has mainly focused on the relationship between information and risk evaluation (risk perceptions) (Brenkert-Smith et al., 2013). Informative media sources are just one aspect of news transparency (Morss et al., 2018). In general, the effect of information is determined by the consistency of the information received, the frequency at which information is transmitted through different networks, and individual observations (Morss et al., 2018).

Few studies investigated the effects of the information's consistency and the information observed. To the best of our experience, we have scarcely presented research into the systemic impact of risk information on the cognitive process. It is also essential to comprehend all information features that motivate beneficial actions in fire risks. Subjective knowledge is often proposed as a necessary variable

mediating expectations and behaviour (Bas & Grabe, 2015; Friedrich et al., 2020; Steelman & McCaffrey, 2013). What people think or feel they know is known as subjective knowledge (Martin et al. 2009; Xu et al., 2020). Individuals are reliant on their own analysis and comprehension of the facts as specific data and security techniques are gathered and examined (Zhu et al., 2016). They get their own set of experiences (subjective knowledge). Subjective knowledge has mediating implications in relation to risk information and behaviours towards risk reduction, cognitive processes has the mediating relationship between risk information and behaviour towards risk reduction (Wu et al., 2018), as both the Preventive Actions Model and the Risk Communication Paradigm (PADM) demonstrate. Furthermore, empirical study has shown that subjective knowledge is the guiding force for consumer purchasing behaviour and is positive about the implications of changing the risk of seismic hazard (Wu et al., 2018), extremism, and other risks (Zhu et al., 2016; Han, 2019). Nonetheless, it has not been empirically evaluated in the Residential Fires area how subjective knowledge mediates the relationship between risk information and behaviours towards risk-reduction.

This study seeks to fill the gaps in the current literature listed above. We are attempting to understand how risk information, cognitive processes, and subjective knowledge foster risk reduction behaviour in the context of old building complexes in Malaysia. In summary, all facets of risk information are carefully studied, as is the manner in which risk information motivates behaviour Furthermore, introduction into the model (Wu et al., 2017) and a theory of risk communication shapes the cognitive process's mediating roles (threat evaluations and coping assessments), relational interpretation of risk evidence, and action avoidance (Bourque et al., 2013; Kellens et al. 2013). Seven theories were formulated to clarify the interactions between risk knowledge, subjective, cognitive processes, and risk-reducing behaviours. A survey was conducted and data was collected in three old towns and villages in Malaysia.

This study is followed by introduction in section 1. We introduce literature review and hypotheses development in the section 2. Research methodology was addressed in the section 3. Our data results are presented in the section 4. Section 5 is introduced as discussion and conclusion of the study. Limitations and future studies are presented in the last.

2.0 Literature Review and Hypotheses Development

2.1 Risk information

In the first hypothesis, we assume that risk information has a positive and significant effect on cognitive processes. Risk knowledge is inconsistently defined in the risk communication literature. The government should distribute risk and preparedness information to civilians (Feldman et al., 2016). Its risk intelligence definition was focused on information given by residents. Kuss et al. (2013) and Brenkert-Smith et al. (2013) identified risk data in order to offer risk information to people. Their research mainly focuses on interpersonal risk-information relationships. These two risk information descriptions lacked a comprehensive explanation and evaluation of risk information. The risk information attributes include substance, density, and observation (Kundzewicz et al., 2014; Bhattacharjee et al., 2018). The rating not only displays the details about risk but also represents the outcomes of fire risk public education (Lindell, 2013; Kundzewicz et al., 2014; Polas et al., 2019). This ranking is of risk information. In this study, Lindell (2013) is used to define risk information. Information is classified as risk information obtained by individuals, typically described as risk, possible household harm and household risk mitigation recommendations and instructions (Yange et al., 2014; An et al., 2015). The density of information refers to the product of the repeated dissemination of information through many networks (e.g. municipal administration, media, friends and community

groups) (Lindell, 2013; Kundzewicz et al., 2014). The information observed refers to the information obtained in order to track and observe activities to reduce risk of others (Liu et al., 2014; Polas et al., 2019).

Risk information is one of the fear appeal process programs. Risk information contains three elements of anxiety appeals: unflavoured consequences, risk control interventions recommended and the chance of a risk occurrence due to non-adoption of preventive measures. As a significant contribution to fear appeal, risk information has been suggested. A fire education program that describes fire threats and advice on fire risks reduction steps, for example, could generate a fear appeal (Yange et al., 2014; Liu et al., 2014). Moreover, repetitive facts about danger will increase the level of anxiety (Kundzewicz et al., 2014). The fear call requires risk evaluation and coping assessment (Feldman et al., 2016).

People's expectations about the risk of fires and the degree to which fires can cause harm to their property are used in threat assessment. Individuals' risk perceptions in the face of fire threats are influenced in part by the information they receive (Saeidi et al., 2019). Understanding likelihood and severity is important for risk management (Bojanc & Jerman-Blažič, 2013). Several studies have shown a positive association between risk information gained and risk reduction (Gaillard & Mercer, 2013; Alexander, 2014). People make risk assessments based on their opinions and emotions (Newman et al., 2017). When they have bad feelings about a chance, they choose to judge it as high. Individuals' thoughts and emotions may be influenced by their experience of risk (Oyao et al., 2015). Reboredo (2013) claimed that a few minutes of awareness sensitivity improved the perception of fire risk. We also anticipate that risk awareness would have a positive effect on hazard evaluation. The ranking necessitates confidence in management.

Coping evaluation presupposes that coping is effective and that coping strategies can be used (Kim et al., 2015). Danger awareness includes instructions and recommendations for household control interventions that advise people what to do and what to do it (Oyao et al., 2015). People who are exposed to this information would be more informed and positive about coping strategies (Newman et al., 2017). This knowledge and confidence are part of the coping decision (Newman et al., 2017) and give people the idea that household coping strategies are good at mitigating risk (Kim et al., 2015; Newman et al., 2017). Thus, we hypothesize that,

H1: Risk information has a positive and significant effect on cognitive processes.

H2: Risk information has a positive and significant effect on subjective knowledge.

H5: Risk information has a positive and significant effect on Behaviours towards Risk Reduction.

2.2 Cognitive processes

In the third hypothesis, we assume that cognitive processes have a positive and significant effect on behaviours towards risk reduction. The cognitive processes are psychological risk estimation and performance coping calculation after information about risk has been obtained and experienced. Risk and coping evaluations are all elements of the cognitive processes (Petty & Briñol, 2015; Hanus & Wu, 2016). The threat assessment refers to the person's understanding of the risk event (Morales, 2015; Hanus & Wu, 2016). A threat assessment combines risk (vulnerability) with risk incident magnitude (Liu et al., 2013). The likelihood perceived refers to the personal assessment of the chance that an individual is at risk. Perceived seriousness refers to the level of danger to oneself and others that is physical, psychological and economic. The individual who is exposed to a risk case, in which either his perceived likelihood or magnitude is high, is presumed to be more vulnerable (Orbell et al., 2020).

The management evaluation relates to the personal evaluation and evaluation of the capacity of a person to take the actions suggested (Orbell et al., 2020; Alshamsi, et al., 2019; Hanus & Wu, 2016). Coping with the assessment is a mixture of effectiveness and automatic response (Rabat et al., 2016). Answer effectiveness refers to the idea that the unwanted hazard is effectively decreased with an adaptive response (Hamilton et al., 2018). Self-efficacy means that you believe that you have the potential to execute prescribed reaction behaviour, such as experience, skills, energy, financial capital etc. (Larson et al., 2014).

The behaviour of the risk reduction is a function of cognitive process assessment and estimation (Hamilton et al., 2018). Defence motivation stems from the cognitive assessment, as severe and probable, of a threatening occurrence, and from the expectation that a suggested coping response can deter the event (Larson et al., 2014; Hamilton et al., 2018). Cognitive mechanisms, including hazard identification and management evaluation, greatly affect risk reduction behaviour. People's views of the threat and seriousness of risk incidents play a crucial role in motivating risk-deduction behaviours (Kellens et al., 2013; Jalal & Mahmood, 2019). Many experiments have shown that risk information (also known as risk perception) has a positive impact on risk-reduction behaviour (Jalal & Mahmood, 2019; Orbell et al., 2020). When people feel threatened, they are more likely to be alert and take precautionary steps to avoid risk (Mori et al., 2016). When a person perceives a high chance of an occurrence, the likelihood of taking is recommended adaptive behaviour increases (Lee & Yun, 2015). The more severe an individual takes the negative consequences of maladaptive behaviour, the more likely adaptive strategies are to be implemented (Lee & Cuijpers, 2013). As a result, we believe that threat identification would have a positive effect on behavioural risk reduction. Coping with evaluation of habits is the key (Hudson et al., 2020). Most research find a favourable impact on risk-reduction practices in various risk zones both for reaction effectiveness and self-efficacies (Shreve et al., 2016; Hudson et al., 2020). The more successful the response strategies are interpreted by the participant, the greater the chance of adaptive behaviour (Lee & Cuijpers, 2013). As people become more confident that they can adopt the risk avoidance behaviour they are encouraging and that the behaviours are not difficult, they will engage in these behaviours more often (Lee & Cuijpers, 2013). Thus, we hypothesize that,

H3: Cognitive processes have a positive and significant effect on behaviours towards risk reduction.

H6: Cognitive processes mediate the relationship between risk information and behaviours towards risk reduction.

2.3 Subjective knowledge

In the fourth hypothesis, we predict that subjective knowledge has a positive and significant effect on behaviours towards risk reduction. Subjective knowledge is a structure that was first proposed to measure customer intelligence in the context of consumer behaviour and marketing. Customers claim to be aware of this this term in fire-prone areas (Hadar et al., 2013; Vigar-Ellis et al., 2015). Individuals view their risk perception through the interpretation of personal data. The information that has been self-reported is contextual knowledge (Khaled et al., 2019; Bas & Grabe, 2015). Subjective knowledge is a step in our study to learn what people believe they know about facts about the danger and how they deem a risk to be correlated with it (Vigar-Ellis et al., 2015). It was proposed that the process of developing core expectations prior to the decision-making mechanism was critical (Zhu et al., 2016). During the pre-decision cycle, people take care of, comprehend, and comprehend risk facts, as well as minimize risks (Bosschaart et al., 2013). This is the process by which people create their own qualitative risk intelligence assessment.

Subjective knowledge of customer behaviour has two components: experience and competence. Increased experience and competence contribute to a greater degree of situational awareness. In general, the act of sharing information enhances experience and competence, resulting in increased contextual awareness (Hadar et al., 2013). A high subjective awareness level raises dependency on previously acquired and stored information (Han, 2019). In the knowledge theory, Mileti and Fitzpatrick (1992) proposed that knowledge received by the public about specific threats can be better acquired and contextual understanding improved by being regularly communicated and repeated across different networks.

Individual risk knowledge perception is important for cognitive beliefs and actions (Bourque et al., 2013). People evaluate their susceptibility and risk reduction awareness thoroughly as they recognize threats and provide expertise on protection. Fischhoff et al. (2013) emphasized the importance of qualitative awareness of "what a risk is and how it functions" in shaping perceptions and behaviours (Babcicky & Seebauer, 2019). Many people who think they are more informed about risks are more aware of potential hazards and risk-reduction strategies (Steelman and McCaffrey 2013; Babcicky & Seebauer, 2019). Furthermore, people who have a stronger sense of risk should be adamant about engaging in risk-reduction behaviours (Zhu et al., 2016). Furthermore, contextual perception has been described as a strong motivator for behaviour in consumption and risk management (Vigar-Ellis et al., 2015; Han 2019). Thus, we hypothesize that,

H4: Subjective knowledge has a positive and significant effect on behaviours towards risk reduction.

H7: Subjective knowledge mediates the relationship between risk information and behaviours towards risk reduction.

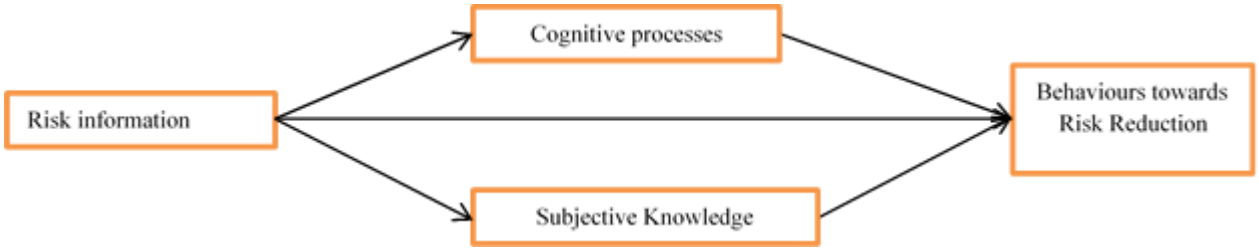

Figure 1: The Framework of the study

3. Methodology of the study

3.1 Data Collection and Sampling

We gathered data in Selangor, Malaysia, which is known for its classical architecture following cross sectional study. Convenience random sampling was adopted in this study. This architectural style is a valuable cultural asset. Three historic towns and villages were chosen as the subject of our study. They are perfect samples for this study due to a number of reasons. For instance, these are high-risk fire zones, and structures and decorations are found in homes, as well as on narrow roads and lanes. Second, they've all had flames. Third, the government has targeted fire risk coordination strategies. Governments have taken significant steps to protect old towns and villages from fire threats, such as installing fire control systems in public areas and providing residents with fire safety education.

Data was collected by door-to-door survey with four local trained research assistants in the three target locations. The survey was completed in December 2020. A local residential committee was contacted prior to the start of the investigation. All participants agreed to participate in the survey. We have distributed 450 questionnaires among respondents. Twenty minutes per questions was allotted for respondents. We received 324 complete and usable sets of responses from respondents. The response rate was 72 per cent. Probably, a lack of faith is towards the survey behind this response. English version of questionnaire was translated to local language by English-Malay language expert. English version of questionnaire was distributed among those who wish to respond in English. Malay version of questionnaire was distributed among those who wish to respond in Malay.

3.2 Measurement

Reflective constructs were used adopted from existing literatures. The constructs contained in the questionnaire were risk information, cognitive processes, subjective knowledge, and behaviours towards risk reduction. Five Likert scale was used ranging from strongly disagree to strongly agree (strongly disagree-1, disagree-2, neutral- 3, agree - 4, and strongly agree- 5). Three items were used to measure behaviours towards risk reduction adopted from Martin et al. (2009), and Kobayashi et al. (2010). Three items were used to measure risk information adopted from Wood et al. (2012) and Brenkert-Smith et al. (2013). Then, three items were used to measure cognitive processes adopted from Lwin et al. (2012) and Lee (2011). Finally, three items were use used to measure subjective knowledge adopted from Martin et al. (2007).

3.3 Data Analysis

The data was analysed using SmartPLS 3.0. Structural equation modelling was run to get the study outcomes. Since all of the data is perceptual and derived from a single source at the same time, we recognized that common method bias might jeopardize the validity of our study (Polas and Raju, 2021). There are two reasons why we should use Smart PLS 3.0 applications. To begin, a paradigm of formative and reflective constructs can be investigated (Wynne, 1998). Second, sample size necessitates limited criteria (Polas & Afshar Jahanshahi, 2020). As a result, we used Harman's one factor test to define possible common method bias on the measurement items. The results showed that the method's common bias is low.

4.0 Data Analysis Results

4.1 Respondent's Demographic Profile

Table 1 depicts the demographic profile of the respondents. The study findings were derived from a survey of 324 Malaysian respondents. According to Table 1, 68.21 per cent of respondents were male, 35.80 per cent were between the ages of 35 and 39, 68.21 per cent were married, 52.16 per cent had a high school or vocational school degree, and 41.36 per cent had a monthly income of USD 500-1000.

Table 1: Respondent's Demographic Profile

Characteristics	Frequency	Percentage	Characteristics	Frequency	Percentage
Gender			***Education Level***		
Male	221	68.21	Elementary school	28	8.64
Female	103	31.79	Junior high school	89	27.47
Age			High school or vocational school	169	52.16
25-29 Years	44	13.58	College or university education	38	11.73
30-34 Years	107	33.02	***Monthly Income (US Dollar)***		
35-39Years	116	35.80	500-1000	134	41.36
40-44 Years	36	11.11	1001-1500	89	27.47
45 Years or above	21	6.48	1501-2000	44	13.58
Marital Status			2001-2500	38	11.73
Single	88	27.16	2501 or above	19	5.86
Married	221	68.21			
Divorced	15	4.63			
Total-324					

4.2 Measurement of Model Assessment

Table 2 shows that the AVE value of each variable is greater than 0.50, the CR and Cronbach's Alpha values are greater than 0.70, and the factor loadings value is greater than 0.60, both of which are greater than the indicated or agreed range (Hair et al., 2014; Polas and Raju, 2021). If there is some variation in the interactions, the R square value of behaviours towards risk reduction (0.787 or 78.70%), cognitive processes (0.751 or 75.10%), and subjective knowledge (0.811 or 81.10%) is illustrated by a large effect of exogenous variables.

Table 2: Measurement of Model Assessment

Constructs	**Items**	**Loading**	**AVE**	**CR**	**Alpha**	**R-Square**
Risk Information (RI)	RI1	0.952	0.854	0.946	0.914	
	RI2	0.936				
	RI3	0.882				
Cognitive Processes (CP)	CP1	0.900	0.779	0.914	0.858	0.751
	CP2	0.898				
	CP3	0.850				
	SK1	0.930				

Subjective Knowledge (SK)	SK2	0.934	0.85	0.944	0.912	0.811
	SK3	0.903				
Behaviours towards Risk Reduction (BRR)	BRR1	0.874	0.787	0.917	0.865	0.787
	BRR2	0.917				
	BRR3	0.869				

Table 3: Predictive Relevance

Latent Variables	**BRR (f^2)**	**CP (f^2)**	**RI (f^2)**	**Q^2**
Behaviours towards Risk Reduction				0.571
Cognitive Processes	0.443			0.553
Risk Information	0.035	0.556	0.667	
Subjective Knowledge	0.045			0.649

Large effect > 0.34; Medium effect > 0.14; Small effect > 0.01 (Cohen, 1988)

Table 3 shows the predictive relevance of the model. To figure out the Q^2 cross-validated redundancy was applied. The Q^2 value for all endogenous is greater than zero which means the predictive relevance of the model. To know the effect size, f^2 effect size was figured out based on the SEM analysis. The f^2 effect size of risk information on behaviours towards risk reduction, cognitive processes and subjective knowledge are indicated by small effect, large effect and large effect respectively. Then, f^2 effect size of cognitive processes on behaviours towards risk reduction is indicated by large effect. Furthermore, f^2 effect size of subjective knowledge is indicated by small effect. Above all, it means that our proposed model reflects the predictive relevance.

4.3 Discriminant validity: Fornell-Larcker criterion

Table 4 shows to evaluate discriminant validity for evaluating the model using the Fornell-Larcker criterion (1981). Furthermore, within a range of 0.887-0.924, the square root of the AVE (in bold) of all variables describes the highest. As a result, it is understandable that discriminant validity is maintained between variables and recognized for this study's predictable model.

Table 4: Discriminant Validity- Fornell-Larcker Criterian

		1	2	3	4
1	Behaviours towards Risk Reduction	0.887			
2	Cognitive Processes	0.674	0.883		
3	Risk Information	0.632	0.767	0.924	
4	Subjective Knowledge	0.643	0.658	0.601	0.922

*The diagonal are the square root of the AVE (in bold) of the latent variables and indicates the highest in any column or raw

4.4 Structural Model Assessment

The Figure 2 shows the structural model assessment. Using the bootstrapping process with a resample 5000 was also implemented to figure out the t-values and R square. The outer loading for each item seems good which are in accepted range (Hair et al., 2014; Polas and Jahanshahi, 2020).

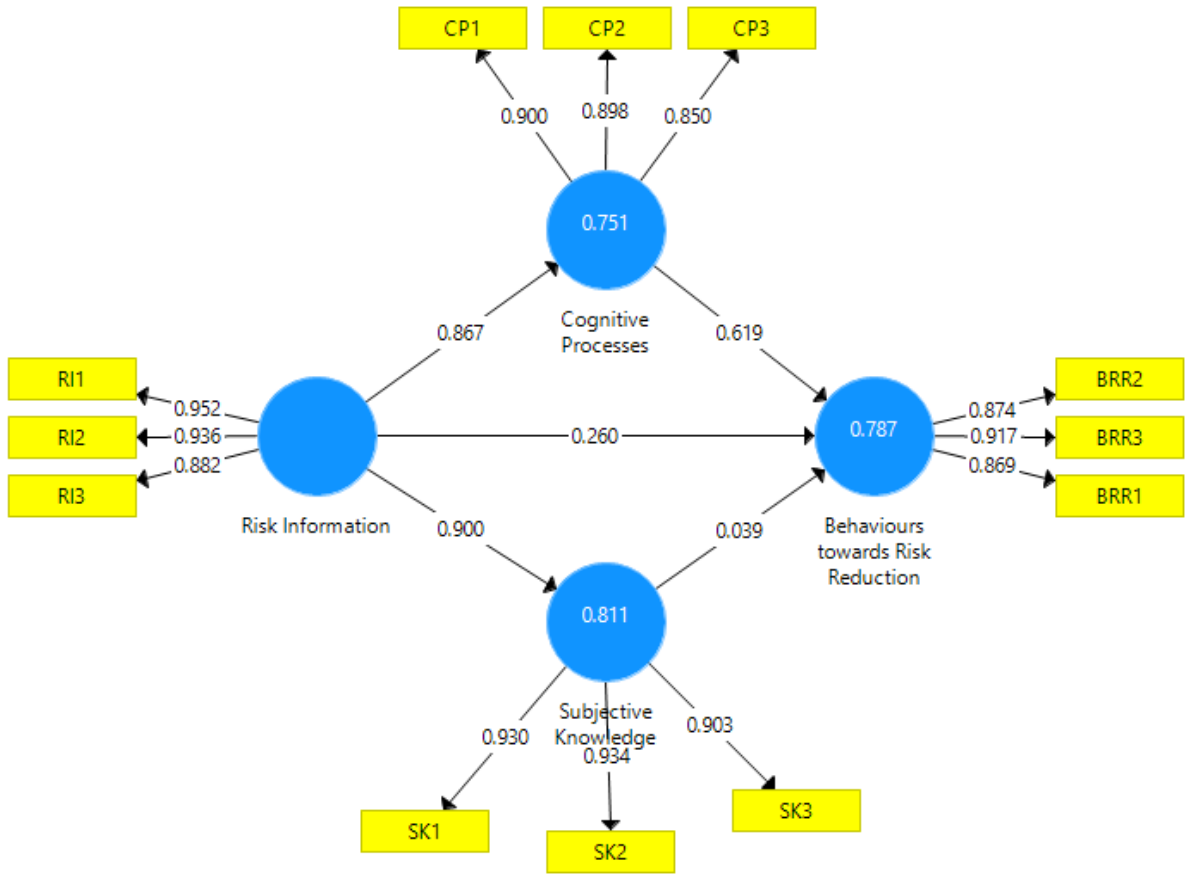

Figure 2: Standardized SEM Estimation

4.5 Direct and Indirect Effects (Hypotheses Testing)

Table 5: Results of Direct and Indirect Effect Hypotheses

Hypotheses	Relationship	Std Beta	Std Error	t-value	p-value	Decision
H1	Risk Information → Cognitive Processes	0.868	0.025	34.285	0.000	Supported
H2	Risk Information → Subjective Knowledge	0.903	0.017	52.898	0.000	Supported

H3	Cognitive Processes → BRR	0.636	0.138	4.501	0.000	Supported
H4	Subjective Knowledge → BRR	0.036	0.110	0.353	0.724	Rejected
H5	Risk Information → BRR	0.247	0.172	1.511	0.131	Rejected
H6	Risk Information → Cognitive Processes → BRR	0.553	0.127	4.236	0.000	Supported
H7	Risk Information → Subjective Knowledge→ BRR	0.033	0.100	0.350	0.726	Rejected

BRR: Behaviours towards Risk Reduction

Table 5 presents the outcomes of the hypothesis testing using SEM. To continue, we hypothesize a positive and significant relationship between an individual's risk information and cognitive processes. As seen in table 5, a positive and significant association between risk information and cognitive processes was revealed (β=0.868, t=34.285, p<0.001). As a result, hypothesis 1 is admitted. Then, we hypothesize a positive and significant relationship between an individual's risk information and subjective knowledge. As seen in table 5, a positive and significant association between risk information and subjective knowledge was revealed (β=0.903, t=52.898, p<0.001). As a result, hypothesis 2 is admitted.

Then, we hypothesize a positive and significant relationship between an individual's cognitive processes and behaviours towards risk reduction. As seen in table 5, a positive and significant association between cognitive processes and behaviours towards risk reduction was revealed (β=0.636, t=4.501, p<0.001). As a result, hypothesis 3 is admitted. Furthermore, we hypothesize a positive and significant relationship between an individual's subjective knowledge and behaviours towards risk reduction. As seen in table 5, a positive and significant association between cognitive processes and behaviours towards risk reduction was not found (β=0.036, t=0.353, p>0.05). As a result, hypothesis 4 is rejected. Furthermore, we hypothesize a positive and significant relationship between an individual's risk information and behaviours towards risk reduction. As seen in table 5, a positive and significant association between risk information and behaviours towards risk reduction was not found (β=0.247, t=1.511, p>0.05). As a result, hypothesis 5 is rejected.

Moreover, we hypothesize that cognitive processes mediate the relationship between risk information and behaviours towards risk reduction. As seen in table 5, risk information has a positive and significant effect on behaviours towards risk reduction with the mediating effect of cognitive processes (β=0.553, t=4.236, p<0.001). After that, we hypothesize that subjective knowledge mediates the relationship between risk information and behaviours towards risk reduction. As seen in table 5, risk information does not have a positive and significant effect on behaviours towards risk reduction with the mediating effect of subjective knowledge (β=0.033, t=0.350, p>0.05).

5.0 Discussion and Conclusion

This paper assesses the fire risks reduction behaviour of residents in residential buildings on the basis of SEM analysis. While various factors impact the fire risks, the likelihood of the fire event and the effects of the fire may usually be limited to a product. In order to express the risk level of residential buildings, the risk of occupant death and the risk of immediate property damage are used. In comparison to previous studies, our results on the influence of risk information, cognitive processes, and subjective

knowledge include new empirical findings on the interaction of risk information with cognitive processes and subjective knowledge in the behaviours towards risk reduction. This study contributes to the growth of research skills and has implications for the inspiration for risk coordination in the old Malaysian building fireplace in risk reduction behaviour. People have a deep confidence in the importance of risk-reduction behaviours and their ability to adopt them (Hossain et al., 2020). Politicians should also emphasize the importance of communicating fire safety strategies in terms of effectiveness and enforcement procedures. Residents should be informed of the practical actions they should take and how they can profit from the proposed fire-relief plans. Our findings suggest that subjective knowledge is an effective mediator of risk information and risk reduction behaviours. What people think they know about fire risk is important. More training programs, such as community fire knowledge contests and fire safety drills, can be made available in order to improve your subjective knowledge by increasing your knowledge and expertise.

Furthermore, different aspects of information characteristics are in the recognition of habits. Given the importance of content, policymakers should expand the quantity and variety of risk information exchanged with the public. Observed awareness is often important in indicating the need to focus and encourage persons who have already planned to share what they have done in the field of fire safety programs. On the basis of the community fire education scheme, the local residential committee and the maintenance departments of the old building complexes can also encourage people to speak, interact, and share interactions with one another. Furthermore, it is important to disseminate dense knowledge in order to increase subjective knowledge. Information is dense if it is compatible, dependable, and distributed across several networks (Alshamsi, et al., 2020; Wachinger et al., 2013). Communication services should ensure information consistency and accuracy when disseminating risk information through multiple public media channels.

Although the results of this study provide a thorough understanding of how risk information influences risk reduction behaviour through cognitive processes and subjective knowledge, some limitations on potential research opportunities are established. To begin, this study focuses solely on saving Malaysia's historic building complexes; no cross-cultural comparisons have been made with other countries. The cultural and social characteristics of ancient Malaysian-owned building complexes vary substantially from those of ancient foreign complexes, such as building type and materials (Huang et al., 2014). Furthermore, the causes of fires in various old buildings differ by region. In the United Kingdom, arson was blamed for 41 per cent of fires between 1994 and 2003, and unregulated use of fire was responsible for 30.78 per cent of fires between 1949 and 2004 (Huang et al., 2014).

6.0 Implications of the study

From a theoretical perspective, the present understanding of drivers of events relating to fire risk is extended. In particular, the detailed characteristics of fire risk information were identified. Different risk information profiles have varying effects on prevention behaviours based on subjective knowledge and coping evaluation. Receiving (content) fire risk information and observational risk information are the primary motivators for people to prepare for risks, even though this information is less dense for motivating behaviours. These factors affect human attitudes toward fire risk reduction by increasing individuals' subjective knowledge, the resilience of the response, and the self-efficacy of preparedness measures. Subjective knowledge and coping assessment can help people prevent fire. This investigation demonstrates that risk information is essential in mitigation behaviour and should be used in risk management research. This study adds to the risk control literature by using risk coordination and the principle of opportunity protection in the case of fires in old building complexes in Malaysia.

The practical implications of this study should be highlighted for fire risk communication. Empirical analysis has been conducted to investigate the significant influence of risk information on risk reduction behaviour. We also have detailed information on which risk coordination and educational practices can be prioritized. It is important to understand and consider how risk information influences human risk reduction behaviour. In view of recent directives issued by Malaysia's Fire Department, training programmes and cooperation in the field of fire risk protection for historical buildings are proposed. The government has invested millions of RM. However, it is unknown if these investments would achieve their maximum efficiency. Politicians must therefore correctly exchange risk information in order to motivate behaviours of personal risk reduction. In view of recent directives issued by Malaysia's Fire Department, training programmes and cooperation in the field of fire risk protection for historical buildings are proposed. The government has invested millions of RM. However, it is unknown if these investments would achieve their maximum efficiency. Politicians must therefore correctly exchange risk information in order to motivate habits of personal risk avoidance.

7.0 Limitations of the study

This study has faced some limitations like other studies. Comparative analyses can help to enrich and broaden the scope of fire safety research. The data was gathered first hand at just one state. Researchers can use a longitudinal approach to investigate how risk information influences risk-reduction behaviour, and may provide accurate findings about individual attitudes and behavioural changes. We based our research on the main variables and relationships in the knowledge-to-action model. Potential research replacements, such as demographic characteristics (e.g., age, gender, education) (Polas et al., 2020; Akter et al., 2019), people's perspectives on knowledge risk precision, reputation, understanding of fire safety efforts (Badida et al., 2019), and historical background, should be regarded as explanatory variables and connections (Badida et al., 2019). Research on these subjects will help you understand risk-reduction behaviours, and will provide policymakers with additional implications. Future researches will address the shortcomings of this paper.

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