

Determining the Disaster Preparedness and Readiness of Filipinos based on Ergonomic Factors

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Abstract

The Philippines is one of the most vulnerable countries globally, mainly because of its geographic location. It is prone to natural disasters such as typhoons, earthquakes, volcanic eruptions, and even tsunamis. Hence, the Filipino people need to be ergonomically prepared for disasters. The study aims to determine the factors affecting the preparedness and readiness of Filipinos during the disaster. Factors considered in the study are based on the domains of Ergonomics such as physical, cognitive, and macro-ergonomics. The online survey was developed and distributed to 206 Filipinos residing in Mindanao, Philippines, to obtain their perception of disaster preparedness and readiness. Pearson correlation analysis was utilized in the study to determine the significant association between the ergonomic factors to the perceived disaster and the readiness of Filipinos. Results of the study proved that access to the media and other sources of information, being informed on the evacuation plan, trust in the government, LGU preparedness, and receiving financial support from the government has a significant relationship to the preparedness and readiness of Filipinos during disasters. As a result, better information on disaster safety measures, evacuation protocols, increased access to information, and government support is recommended. Because of this study, people will be more aware of disaster preparedness and response behavior.

Keywords

Disaster preparedness, disaster readiness, physical ergonomics, cognitive ergonomics, macro-ergonomics

1. Introduction

Belonging to the Pacific Ring of Fire, the Philippines was acknowledged as the third country most vulnerable to disaster risks. According to PAGASA (2014), an average of 20 tropical cyclones enter the Philippines in a year, five (5) of which are destructive. Along with these tropical cyclones are earthquakes. According to the Philippine Institute of Volcanology and Seismology (2019), an average of twenty (20) earthquakes occur daily. A total of one hundred to one hundred fifty are felt every year. These are just two types of disasters that hit the Philippines in a year, and many times, these occur in a year and cost the lives and livelihood of the Filipino people. Recalling all the natural disasters suffered by the Filipinos, thousands of lives had been lost, and millions of Filipino people had mourned their loved ones. They were displaced, and billions worth of the destruction and damages had been experienced due to all disaster events. This has led the government to provide more attention to disaster risk reduction.

Without any doubt, the Philippines has endured a lot of destructive calamities that have ruined places and even lives. That is why disaster preparedness and readiness must go beyond any emergency measures. According to Hyogo Framework for Action (2005), the number of recorded disasters went from 200 to 400 per year, and nine out of ten

are caused by climate change. To achieve an effective way of preparing for a calamity, the Hyogo Framework for Action outlined five important keynotes, and these are: making disaster risk reduction a priority; improving risk information and early warning; building a culture of safety and resilience; reducing the risks in key sectors; and strengthening preparedness for response. These five keynotes are applied internationally and must be used, especially in the Philippines.

According to disaster preparedness and local governance in the Philippines (2018), In a vulnerable country like the Philippines, the local government must be the core of a community, especially during a disaster. They are the ones who must be an example to the community, primarily in preparing and being ready in times of need. The local government sectors must conduct community activities such as drills and orientations to spread knowledge and awareness to the Filipino community. They must also be in charge of planning the evacuation plans and organizing and building evacuation centers.

1.1 Objectives

The study aims to determine the factors affecting the preparedness and readiness of Filipinos during the disaster. Factors considered in the study are based on the domains of Ergonomics such as physical, cognitive, and macro-ergonomics. The study results would help disseminate important information and educate the Filipinos about responding to and coping with disasters.

2. Literature Review

According to Asis et al. (2020), the Philippines is ranked second in terms of the danger of natural calamities. It is subject to humanitarian problems because of its constant population growth, the islands' geography, and its weak infrastructure. The Philippines is one of the most typhoon-affected, with an average of twenty each year, six of which are considered destructive because our country is in the northwestern Pacific Ocean. It is also situated just below the inter-tropical convergence zone, with northeast and southwest monsoons bringing flood and storm surge dangers throughout its area. These events result in thousands of deaths and pesos in property damage. The country is vulnerable to tsunamis, earthquakes, and volcanic eruptions due to its location in the Pacific Ocean's Ring of Fire.

The Philippines is notorious for being extremely vulnerable to natural catastrophes. It is currently ranked third out of 173 nations in disaster risk. The potential degradation of health and livelihoods, loss of life, and possible damage to services and assets due to the impact of an existing natural hazard are all measures of disaster risk. (Tuladhar et al., 2015). As a result, the country emphasized disaster risk reduction by adopting the Disaster Risk Reduction plans (DRR). DRR plan is a systematic strategy for assessing, identifying, and reducing disaster risk and avoiding negative consequences of natural calamities to promote long-term development. Furthermore, it contributes to disaster management by strengthening communities' resilience to natural catastrophe risks and unfavorable effects (Soriano, 2019).

Ferry (2017) stated that disaster preparedness refers to actions to reduce the disaster's worst outcomes. One of the goals of disaster preparedness is to lessen the impact of a calamity or disaster on a defenseless population. The community must know the activity inflow and devise a strategy to prevent waste of effort, time, and resources. Disaster readiness has the potential to save many lives and property, and the goal of disaster preparedness is to restore population normality as rapidly as possible.

Similarly, according to research, the time spent on risk reduction has been one aspect of our country's capacity to recover from natural calamities. To diminish the number of risks and losses, the Philippines' government must apply more strict physical risk-reduction measures and utilize more enhanced and advanced engineering technology, especially in areas prone to a natural disasters. As a result, a more considerable expenditure must be allocated for catastrophe preparedness. More calamities are predicted to occur in the years ahead as the climate changes pose a more significant hazard (Statista Research 2021). In addition, despite being aware of the problem, the government's effort to tackle climate change in the country and adequate money has not been given to combat climate change (Domingo & Manejar 2018).

3. Methods

The survey consists of 20-item questions. The respondent's demographic profile was determined in the first part of the questionnaire, including age, gender, educational level, and area of residence. The second part of the questionnaire

consists of the items based on ergonomics domains. This was used to measure the perceived preparedness and readiness of the respondents for the disasters. The survey consists of item questions, where all answers were on a 5-point Likert scale ranging from strongly disagree to strongly agree. Table 1 shows the summary of construct and measurement items used in the study.

Table 1. The constructs and measurement items

Construct	Items	Measure	Supporting Reference
Physical Ergonomics	PE1	I have a prepared disaster kit at home	Zafra et al. (2015); Wang et al. (2022); Sushanti et al. (2019); UNISDR (2015)
	PE2	I have the means of transportation to go to evacuation centers	
	PE3	The evacuation center in our area is comfortable	
	PE4	The facilities in the evacuation center in our area is properly designed	
Cognitive Ergonomics	CE1	I trust the government in the disaster response	Udwin et al. (2000); Cook & Bickman (1990); Berah & Valent (2009); Mason et al. (2010)
	CE2	I have access to the media and other sources of information during disaster	
	CE3	I have a way to communicate with my family during disaster	
Macro-ergonomics	ME1	I think our LGU has enough emergency responders for disaster	Matunhay (2018); Tizon & Comighud (2020); Stewart (2015); Yang et al. (2018)
	ME2	I think our LGU is prepared to respond to disasters	
	ME3	I think our LGU can properly allocate relief goods for disasters	
	ME4	I think I will receive financial support from the government during disasters	
Perceived Preparedness & Readiness	PP1	I know the significance of sharing knowledge and information about preparation for disasters	Henning et al. (2004); Taludhar et al. (2015); Lekalakala (2011)
	PP2	I recognize the importance of making preparations about disasters with family, friends and relatives	
	PP3	I have enough knowledge on how to prepare for disasters from experts in disaster reduction	
	PP4	I have sufficient information about disaster adaptation from the government	

After which, a Pearson correlation analysis was used in the study to determine the ergonomic factors that have a significant relationship to Filipinos' perceived preparedness and readiness for the disasters. The data gathered from the questionnaire were analyzed using Minitab version 20. The test statistic Pearson's correlation coefficient evaluates the statistical relationship, or association, between two continuous variables. Because it is based on the method of covariance, it is known as the best method for quantifying the relationship between variables of interest. It provides information on the magnitude and direction of the relationship's association or correlation. The study was conducted using a 95% confidence level, and the results of $p < 0.05$ were considered significant.

4. Data Collection

With the use of the social networking platforms like Facebook, Twitter, Messenger, and other online platforms, a total of 206 Filipino respondents currently residing in the Philippines were selected to answer the questionnaires. These individuals are 18- 60 years of age, both male and female. They were chosen to answer the survey questionnaires randomly to ensure that the researchers could get answers from people who live in different parts of the Philippines that probably experience different types of calamities in a year. The researcher utilizes convenience sampling, which is a form of nonprobability sampling.

5. Results and Discussion

A total of 206 study participants were surveyed, composed of 51% females and 49% males, with the majority age ranging from 21-40 years old (72%) and having attended college (63%). Since the target respondents are individuals living in the most affected areas by the typhoon, it could be seen that most of the respondents are from the Mindanao

region, particularly in Region XI (84%). In terms of household income, the majority of respondents (52%) have a total household income of less than 40,000 a month, have a household size of four or more people (43%), and live in the city (68%).

5.1. Descriptive Statistics of Measurement Items

Table 2 shows the result of descriptive statistics of the measurement items for the perceived preparedness and readiness for disaster and the physical, cognitive, and macro-ergonomic domains of ergonomics. For the measurement of perceived preparedness and readiness, it was shown that the item with the highest mean is PP2 (recognizing the importance of preparing for disasters with family, friends, and relatives) and PP1 (knowing the significance of sharing knowledge and information about preparation for disasters), followed by PP3 (having enough knowledge on how to prepare for disasters from experts in disaster reduction) and PP4 (having sufficient information about disaster adaptation from the government). For the physical ergonomics, an item with the highest mean score is PE2 (having the means of transportation to go to evacuation centers), followed by PE4 (properly designed facilities in the evacuation center), PE3 (having a comfortable evacuation center), and PE1 (having a prepared disaster kit at home). For the cognitive ergonomics, an item with the highest mean is CE3 (having a way to communicate with my family during a disaster), followed by CE2 (having access to the media and other sources of information during a disaster), and CE1 (trusting the government in the disaster response). Finally, for the macro-ergonomics, an item with the highest mean is ME4 (receiving financial support from the government during disasters), followed by ME1 (LGU has enough emergency responders for disaster), and ME3 (LGU can properly allocate relief goods for disasters), and ME2 (LGU is prepared to respond to disasters).

Table 2. Results of Descriptive Statistics

Construct	Items	Mean	Std. Dev.	Range	Agreement
Physical Ergonomics	PE1	3.06	1.33	1-5	agree
	PE2	4.23	1.28	1-5	agree
	PE3	3.57	1.07	1-5	agree
	PE4	3.65	1.01	1-5	agree
Cognitive Ergonomics	CE1	3.14	1.27	1-5	agree
	CE2	4.04	1.22	1-5	agree
	CE3	4.36	1.09	1-5	agree
Macro-ergonomics	ME1	3.37	1.09	1-5	agree
	ME2	3.17	1.1	1-5	agree
	ME3	3.35	1.19	1-5	agree
	ME4	3.42	1.14	1-5	agree
Perceived Preparedness & Readiness	PP1	4.31	0.91	1-5	agree
	PP2	4.40	0.89	1-5	agree
	PP3	3.91	0.95	1-5	agree
	PP4	3.60	1.21	1-5	agree

5.2. Result of Correlation Analysis

Table 3 shows the result of the Pearson correlation analysis. Results proved that access to the media and other sources of information, trust in the government, LGU preparedness, and receiving financial support from the government has a significant relationship to Filipinos' preparedness and readiness during disasters. Access to the media and other sources of information resulted in a high correlation ($r=0.521$, $p\text{-value}<0.001$) to individuals' perceived preparedness and readiness during the disaster. The media plays a crucial role in disaster mitigation. The media is a direct link between the public and emergency response organizations, and it is critical in disseminating critical information to the public before, during, and after disasters. During a disaster, the media is a critical response partner in rapidly

disseminating warnings and information, particularly to vulnerable communities that will be the most affected by the disaster.

In the same way, the government trust resulted in a moderate correlation ($r=0.445$, $p\text{-value}<0.001$) to the perceived preparedness and readiness for a disaster. Prior research has proved that people with higher trust in government perceive lower consequences of potential disaster impact (Han et al., 2016). According to Wachinger et al. (2013), trust has been discovered to be a significant predictor of risk perception, particularly when people have limited time, knowledge, cognitive capacity, or motivation to evaluate disaster risk deliberately. Trust in government reduces disaster survivors' perceptions of the consequences of natural disaster risks and their preparedness for future disasters. Thus, this highlights the importance of determining the effects of various dimensions of trust for various types of hazards to increase the preparedness and readiness of individuals for future disasters.

Preparedness of local government units (LGU) was also found to have a moderate correlation ($r=0.412$, $p\text{-value}<0.001$) to the perceived preparedness and readiness of individuals for disasters. In 2010, Republic Act (RA) 10121 was enacted to strengthen the country's DRRM for safer, adaptive, and disaster-resilient Filipino communities on the path to sustainable development (Dariagan et al., 2021). Hashemipour et al. (2017) stated that LGU and other local volunteers could assist emergency managers in effectively coordinating available community resources to reduce the number of casualties and the time it takes to complete an operation response. Thus, funding the establishment of a functional Barangay (village) DRRM Office allows for a more rapid and community-based disaster response.

Lastly, it was also proved that receiving financial support from the government had a moderate correlation ($r=0.398$, $p\text{-value}=0.002$) to individuals' perceived preparedness and readiness for a disaster. When a disaster strikes, humanitarian needs emerge immediately and rapidly. An immediate response to a large-scale disaster is possible, most notably in the form of emergency assistance provided by the government and another civil service provider. According to OECD (2017), better financial preparedness for risks is a critical component of a comprehensive disaster management approach; funds arrive sooner, aid is delivered faster, and efficiency improves. Thus, to mitigate the impact of a disaster, the government must improve its overall disaster risk financing program.

Table 3. Pearson Correlation Result

Relationship	Pearson correlation (r)	p-value	Remarks	Strength of correlation
having a prepared disaster kit at home > disaster preparedness and readiness	0.014	0.845	Not significant	Low correlation
having the means of transportation to go to evacuation centers > disaster preparedness and readiness	0.175	0.012	Significant	Low correlation
comfortable evacuation center > disaster preparedness and readiness	0.244	<0.001	Significant	Low correlation
properly designed facilities in the evacuation center > disaster preparedness and readiness	0.131	0.061	Not significant	Low correlation
trusting the government in the disaster response > disaster preparedness and readiness	0.445	<0.001	Significant	Moderate correlation
having access to the media and other sources of information during disaster > disaster preparedness and readiness	0.521	<0.001	Significant	High correlation
having a way to communicate with my family during disaster > disaster preparedness and readiness	0.289	0.032	Not significant	Low correlation
LGU has enough emergency responders for disaster > disaster preparedness and readiness	0.265	0.024	Not significant	Low correlation
LGU is prepared to respond to disasters > disaster preparedness and readiness	0.412	<0.001	Significant	Moderate correlation

LGU can properly allocate relief goods for disasters > disaster preparedness and readiness	0.242	0.047	Not Significant	Low correlation
receiving financial support from the government during disasters > disaster preparedness and readiness	0.398	0.002	Significant	Moderate correlation

6. Conclusion

Natural Disasters are indeed unavoidable and unpredictable. Even if years pass, the risk, danger, and fear brought by these unfortunate events will always be there. No one can stop a natural phenomenon from happening. Hence, it is imperative to spread awareness, education, and preparedness to reduce the vulnerability brought by these unwanted events. In this study, the knowledge of the Filipinos regarding the role of ergonomics in the perceived preparedness and readiness during the disaster was determined. It was proved that access to the media and other sources of information, being informed on the evacuation plan, trust in the government, LGU preparedness, and receiving financial support from the government was the most critical factors affecting the preparedness and readiness of Filipinos during disasters. As a result, better information on disaster safety measures, evacuation protocols, increased access to information, and government support is recommended. Because of this study, people will be more aware of disaster preparedness and response behavior.

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