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Functional Clothing During Flood Disaster in Pasir Mas, Kelantan: Understand Challenges and Identify Areas to Support

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Abstract

In Malaysia, wearing a life jacket is essential to prevent drowning during a flood disaster but there are others who enter the flood waters without it and many people continue to engage in these risky behaviors. This paper aims to identify the key challenges faced by life jackets during flood disasters and identify strategies for producing functional clothing that responds to risky behaviors during flood disasters. By using a literature review methodology, general and specific keywords are also used, namely "flood disaster in Kelantan", "flood disaster in Malaysia" and "life jacket" on Scopus to analyzes existing works and publications. One key challenge emerged as a theme from past studies: This research highlights the important role of understanding the life saving product used during flood disaster to support risky behaviour flood victims. This paper propose a descriptive conceptual framework and strategies to help produce functional clothing in the face of the challenges identified that are (i) An understanding of risky behaviors (ii) To better understand the different types of design needs (iii) The design of an appropriate process strategy. This strategy has the potential to be a major prevention of injuries and deaths during flood disasters.

Keywords: Flood in Kelantan, Flood disaster in Malaysia, Literature Review Method, Life jacket, Functional Clothing

Introduction

Floods have been a continuous natural disaster in Malaysia since 1971. Floods are common in Malaysia, especially on the east coast of the peninsula during the monsoon season, floods that occur on the east coast especially in Pasir Mas distric in Kelantan. Flooding can be defined as high flows that dominate natural or artificial banks in any part of a river system. Therefore, when the river bank is cut off, the water spreads to the floodplain and is generally harmful to the community (Ching et al., 2013). The phenomenon of flood disasters is increasing and

affects victims in flood-prone areas (Shafiai & Khalid, 2016). Life jackets are an important asset to save lives during floods in the Pasir Mas district and are widely used by people involved in floods.

This paper offers an exhaustive examination to identify the key challenges faced by the selection of life jackets as life saving clothing product during flood disasters. The research accentuates the pivotal an important strategy for producing functional clothing that responds to risky behaviors during flood disasters. By engaging in a comprehensive literature review, the research casts a wide net of academic papers, books, and digital repositories to look at the relationship between flood disaster impacts and risky behaviors during flood disasters. The primary findings unveil there are problems in the functional elements and previous studies have also found that consumer behavior and environmental factors affects the effectiveness of life jackets. The results emphasised the importance of design development strategies in life-saving products, showcasing lasting relevance through their ability to meet consumer needs while saving lives during flood disasters. This work enriches academic understanding of risky behaviors and emphasizes the importance of producing appropriate functions that can be used during flood disasters.

Enhanced research will aid in understanding the role of risky behaviours influencing function in life-saving clothing during flood disasters, contributing to its protection and needs. In addition, this paper requires attention to product designers, the economy, and governments to facilitate a comprehensive understanding of the importance of necessary functions in life-saving measures. The proper multiplication of functions in life-saving clothing is essential because flood disasters occur in a global world.

Literature Review

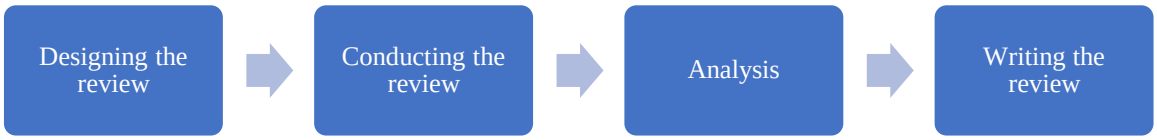
In the context of Malaysia, flooding is something that happens traditionally especially on the East Coast of the Peninsula during the monsoon season. Because of this, the floods on the East Coast, especially in Kelantan, have led to various devastation which is very sad and caused many flood victims to lose their homes, lives, property and others (Chan, Ngai Weng, 2015) and daily necessities such as food, water, electricity and transportation will be cut off (Hua, 2015). Based on the ebanjir.kelantan.gov.my portal, Pasir Mas is a flood disaster area that resulted in high deaths in Kelantan in 2022 with 3 deaths, in 2021 with 4 deaths and in 2017 with 4 deaths. According to Diakakis, (2020), three-quarters of victims exhibited behavioral risks associated with intentional flooding, among the statistically significant correlations found between behavior, victim demographics and the type of environment showing that certain situations and certain individuals are more likely to engage in risky behavior for others. Certain unsafe behaviours can be addressed with existing drowning prevention interventions, such as the provision and use of life jackets... (Queiroga et. Al., 2022).

Methods

In this paper, we used a literature review method, focusing on collecting and analysing existing works and publications related to the flood disaster in Pasir Mas, Kelantan. In the following, the basic steps and important options involved in conducting a literature review will be proposed and discussed using four phases. This process is developed from practical experience and is synthesized and influenced by various standards and guidelines proposed

for literature review (Liberati et al., 2009; Tranfield et al., 2003; Wong et al., 2013, Snyder, H. 2019). The four phases are as follows:

Table 1
Guidelines for literature review method



Phase 1: Designing the review: Through this approach, we understand the problems faced during flood disasters and how to help people affected by floods by comparing different sources of information, we can form a comprehensive understanding of the functional requirements of appropriate clothing during flood disasters. This method allows us to draw conclusions based on various existing knowledge without conducting new field research. *Phase 2*: Conducting the review: In this paper, it focuses on the collection and analysis of existing works and publications related to the flood disaster in Pasir Mas Kelantan. It has included all related articles from 2020 to 2025 limited to articles in the social sciences. The data collection in this research includes survey methods based on flood studies that have been conducted in Kelantan. The titles and abstracts of articles published in English and Bahasa Malaysia were searched by surveying previous flood studies in Kelantan on Scopus using specific search strings were complied and search term “Flood AND in AND Kelantan” (n=15) and “Flood And disaster And in And Malaysia” (n=47) . Phase 3: Analysis: Records identified (n=62) through database searching and social sciences journal paper, (n=11) records screened the title and abstract. Finally, (n=4) studies were included and analyzed after studying the inclusion and exclusion criteria. While by studying previous life jacket studies on Scopus using specific search strings were complied and search term “life AND jacket” records identified through database searching and social sciences journal paper (n=25) from 2020 to 2024. Finally, (n=2) studies were included and analyzed after studying the inclusion and exclusion criteria. *Phase 3: Analysis*: This paper is a thematic systematic review aimed to investigate and categorize criteria that save lives during flood disaster. Principles of thematic analysis techniques, such as encoding data, searching for themes, refining themes, and reporting findings (Flick, 2022) as below:

Table 2
Thematic analysis framework

Researchers using thematic analysis as a way to identify, understand, analyze and report themes in an interrelated dataset have been widely used (Nowell LS, etl. 2017). *Phase 4*: Writing the review: Previous studies have found that there is a challenge that emerged as themes. This research highlights the important role of functional clothing capable of aiding risky behaviours during floods.This will be discussed in research findings and discussion.

Research Findings and Discussion

Previous studies have found that there is a challenge that emerged as themes, namely Life jacket used during flood disaster.

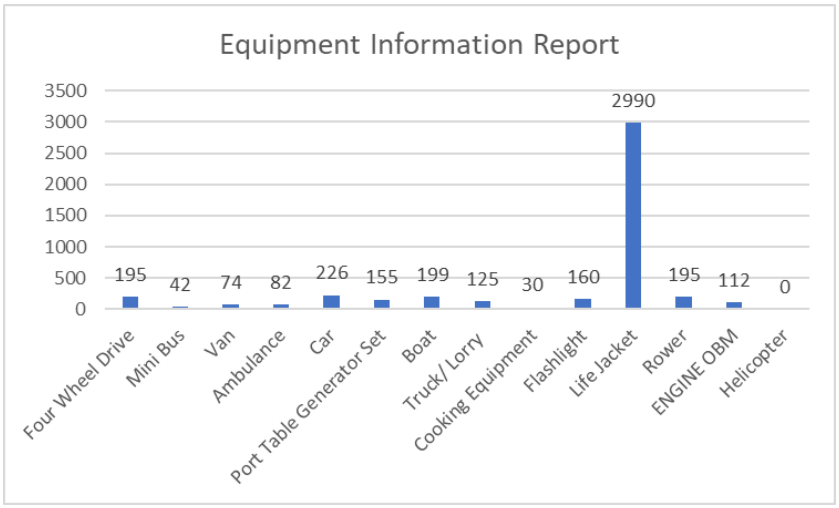
Challenge 1: Life Jacket Used During Flood Disaster

Pasir Mas district in Kelantan is an essential equipment to deal with flood disasters is life jackets. Life jackets are used by rescue teams as well as flood victims. Rescue team life jackets are provided by the authorities while life jackets used by flood victims are purchased by themselves, external assistance or loans from rescue teams to be used during the evacuation process of flood victims. The life jackets used during the flood disaster in Pasir Mas, Kelantan are as shown in figure 1 and 2. Figure 1, it is suitable for calm inland waters (slow-flowing lakes and rivers) where there is a good chance of being rescued quickly. Smaller sizes usually have a high collar to help keep the child's face above the water. Designed to make the wearer unconscious face up. Whereas, referring to figure 2, it has similar flotation characteristics to the second type. This type is the most comfortable and offers freedom of movement so that the wearer can transform his body into an upward-facing position. There are a variety of size options available, from toddlers to adults. In short, life jackets are suitable as an aid to swimmers. Meaning, it works if you're not unconscious but it's not designed to keep you a float.

Figure 1 (on the left): The use of life jackets by rescue teams (inherently bouyant life jackets). Bernama Photo. (Photo source: https://thesun.my/cerita/berita/jumlah-mangsa-banjir-di-kelantan-menurun-terengganu-meningkat-FF10375101). **Figure 2 (on the right)** : Life jackets used by flood victims (inherently bouyant life jackets). PHOTO of Hazira Ahmad Zaidi. (Photo source: https://www.hmetro.com.my/mutakhir/2021/01/663228/harung-arus-deras-sungai-kelantan-demi-bantu-mangsa-banjir)

According to Kelantan's official ebanjir portal, diagram 1 shows the equipment provided to deal with flood disasters.

Diagram 1: Chart of equipment information report by department / agency date info:23-12-2023



(Source: eBanjir Portal V1.01.https://ebanjir.kelantan.gov.my/p_gerpt03.php)

Based on diagram 1, we find that the equipment provided by the Department and Agency has provided 2990 pairs of life jackets during rescue activities. Although life jackets are the equipment provided, there is an issue in these life jackets, namely in terms of design that does not care about user behavior, environmental factors, around comfort and fashion-sense which causes them not to be used unless forced. Below are adult flood victims and children who are not wearing life jackets as shown in figure 3.

Figure 3: Adults and children enter the water for a safe destination.
(Photo souurce: https://www.bharian.com.my/berita/nasional/2022/12/1041559/mangsa-banjir-di-kelantan-meningkat-kepada-12415-orang)

In conclusion, life jackets are an important equity to save lives during flood disasters and are widely used by people involved in floods but do not meet the needs of people during flood disasters.

Recommendation

In this section, we have presented one key challenges that emerged as themes from past studies. Based on the information obtained from previous studies, this paper propose a descriptive conceptual framework as below.

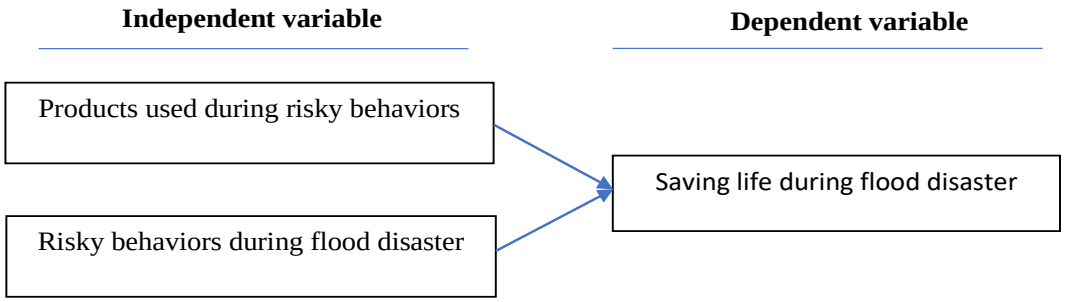


Figure 4: Descriptive conceptual framework

Based on figure 4, in response to the challenges identified, we propose a strategy to save lives during flood disaster, to better understand user behaviour and to better understand the different types of requirements and various design problems of the strategy is as follows.

To Better Understand User Behavior

Theory of Planned Behavior (TPB) is well aware of the potential for intentions and is different from deliberate and planned behavior. This is largely due to the difference between perceived behavioral control and actual control exercised or used. We will understand this in more depth when we look at the TPB Model or the TPB Diagram. Figure 5, is the Ajzen Theory Model (2005) of planned behavior (TPB).

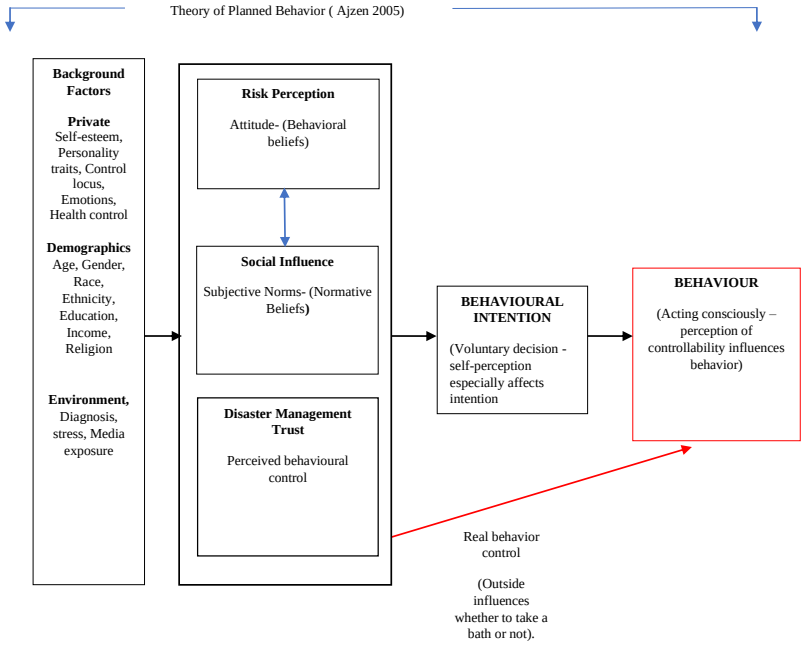


Figure 5: Ajzen Theory (2005) planned behavior (TPB)

Based on figure 5, Ajzen (2005) covers three "*background factors*", namely personal, social and informational. "*Behavioral beliefs*" determines the attitudes of individuals who act as a link between the behavior and the expected outcomes that the behavior can produce or bring. *"The normative beliefs"* involving the main person or character around the individual are shaped by the level of importance he places on these people. The presence of factors called '

"*control factors*" that will impact how the action will be taken. *"Perceived behaviors control"* are made up of internal (i.e., self-efficacy; the belief for a person to be able to perform

something given a behavior) and external (i.e., perceived controllability; obstacles to performing a behavior). "*Behavioral intention*" refers to the motivating factor that influences a given behavior

To Better Understand the Different Types of Requirements and Various Design Problems Using the FEA Model

Designers of protective clothing, ready-to-wear, and theatrical apparel can use FEA consumer needs models as they work through the design process and according to Lamb and Kallal (1992) this model is a clothing design for people with different types of needs and a variety of design problems. Based on figure 6, the target user is at the center of the model and they suggest that designers should think about culture in developing user profiles and in defining their needs. Functional elements, expressive elements, and aesthetic elements are used to identify the needs and wants of the target users and set design criteria.

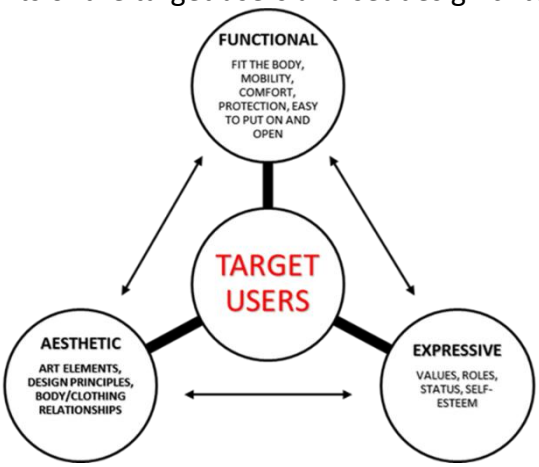


Figure 6: FEA consumer needs models (Lamb and Kallal, 1992)

Functional elements of clothing refer to those that provide protection, assistance in mobility, or provide comfort and fit (Bye, E., & Hakala, L. (2005), Lamb & Kallal, 1992). *Elements of expressive* clothing are defined above as elements related to the communicative, symbolic aspect of clothing (Lamb & Kallal, 1992, p. 43), conveying a specific message or identity about the wearer (Dickson & Pollack, 2000, Edensor, Tim & Richards, Sophia, 2007). *Aesthetic elements* are components of clothing that use lines, shapes, colors, textures, and patterns to create pleasing designs (Lamb & Kallal, 1992, p. 43) or refer to the overall shape of an object including designs and textures (Morganosky & Postlewait, 1989, p. 11) that are considered beautiful by consumers.

The Use of the Apparel Design Framework

Clothing design product development is a creative problem-solving process (Davis, 1987; DeJonge, 1984; Rosenblad-Wallin, 1985). Watkins (1988) describes the design of process strategies that can be applied in education. Figure 7, presents a framework for using the design process, which incorporates features from other design process models (Hanks, Belliston, & Edwards, 1977; Koberg & Bagnall, 1981) with the FEA model.

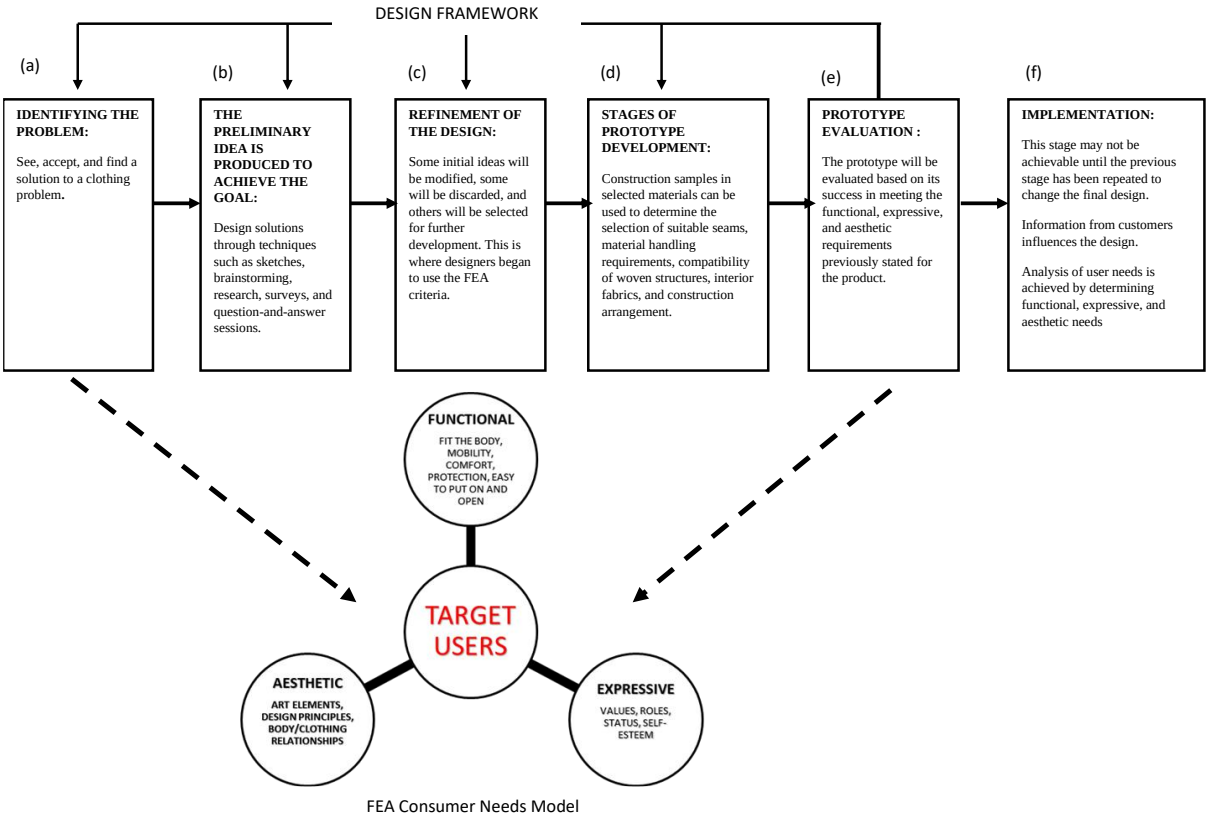
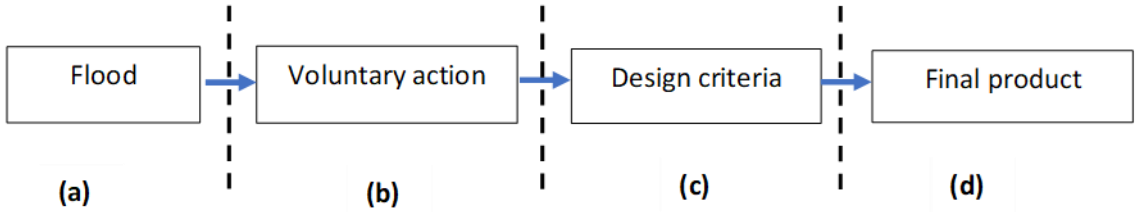


Figure 7: Apparel design framework (Lamb, J. M., & Kallal, M. J. 1992).
(Source: http://ctr.sagepub.com/content/10/2/42)

Based on figure 7, (a) The design process begins with the identification of the problem. The problem identification phase combines Koberg and Bagnall (1981) Accept Situation, Analyse, and Define stage. (b) In the second stage of the process, the initial idea is generated to achieve the goal. This most creative phase results in design solutions through techniques such as sketches, brainstorming, research, surveys, and question-and-answer sessions. (c) The refinement of the design describes the part of the process in the initial idea which is subject to scrutiny. to do that, priority is set out in the FEA's consideration. (d) In the prototype development stage, ideas that hold most of the promise will be tried. The prototype can be a clothing sample or a clothing component sample. Construction samples in selected materials can be used to determine the selection of suitable seams, material handling requirements, compatibility of woven structures, interior fabrics, and construction arrangement. (e) Prototype evaluation is their evaluation according to the criteria set out in the problem identification stage. Therefore, each prototype will be evaluated based on its success in meeting the functional, expressive, and aesthetic requirements previously stated for the product. (f) The highlight of the design process is the implementation. This stage may not be achievable until the previous stage has been repeated to change the final design.

Conclusion

The current study identified one challenges that emerged as a theme from past studies and propose descriptine conceptual framework and three key strategies for supporting people involved in risky behaviours. Use of apparel design framework with theories and models will become the basis for the successful design of durable clothing. A summary of the framework before designing a life-saving product to support risk reduction as below.



Firuge 8: A framework before designing a life-saving product to support risk reduction. (a) problem (b) behavioral intention (c) design process (d) Functional Clothing During Flood Disaster (a+b+c=d)

Based on figure 8, the "*problem*" identification phase combines in apparel design framework namely accept, situation, analysis, and define. "*Behavioral intention*" refers to the motivating factor that influences a given behavior in which the stronger the intention to perform the behavior. "*Design process*", this is where designers begin to apply FEA criteria. The designer should resolve as many conflicts as possible in the design stage. Finally, the result "*Functional clothing design as a univesal design*" serves as a garment that can be used by the user in a variety of situations and can be used by everyone. These findings provide valuable information that can inform policies, research, and practices aimed at improving the safety of the public and rescuers during severe weather events. Therefore, future research should consider producing a functional clothing design as a universal design can be realized for use during flood disasters.

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