SSRG International Journal of Civil Engineering
ISSN: 2348-8352 / https://doi.org/10.14445/23488352/IJCE-V9I10P102

Volume 9 Issue 10, 7-15, October, 2022

Original Article

Risk Management Survey in the Context of Flood Events and Rob in Campus I Lambung Mangkurat University

Retna Hapsari Kartadipura[1], Elma Sofia[2], Meireinda Rahmadania[3], Maya Amalia[4]

Civil Engineering, Faculty of Engineering, Lambung Mangkurat University, Indonesia.

Received: 03 September 2022 Revised: 05 October 2022 Accepted: 18 October 2022 Published: 31 October 2022

Abstract - *North Banjarmasin District, such as Campus I Lambung Mangkurat University (ULM), which is on the street of Brigjen H Hasan Basry, is at risk of flooding and water inundation. The height of inundation that occurred in front of the main entrance of the campus ranged from 40 to 60 cm. Campus I ULM was inundated, and many buildings and classrooms were difficult to reach by motorcycle and car. The Regional Disaster Management Agency (BPBD) of Banjarmasin City says tidal flooding (rob) could occur in November 2021 because of the sea tides. The occurrence of tidal flooding (rob) was caused by the activity of sea tides and phases of the new moon, a spike in precipitation, and the possibility of high winds. A field survey has been conducted to collect this research data in October 2022. Interviews, questionnaires, observations, and reviews of flood-affected areas served as sources of information. Data collection via questionnaires was administered to respondents, including staff and lecturers of Lambung Mangkurat University. When filling out this questionnaire, people can look at what has happened in two ways: the probability and the impact of risk. The outcomes are flood risk vulnerability evaluations for the development of mitigation plans.*

Keywords – *Campus I ULM, Rob, Survey, Questionnaire.*

1. Introduction

The consequences of flooding can sometimes be catastrophic [1,2]. Extreme floods are expected to worsen due to increased intensity and frequency modifications of extreme rainfall patterns caused by climate change [3]. The evaluation of risks is a vital component of effectively managing natural disasters [4,5,6]. Many vector-borne diseases, stress, and toxic effects are just some of the bad things that have happened to people's health because of contaminated water sources and the vectors and pathogens that grew after the flood [7,8].

The impacts of climate change are becoming more apparent, and with that comes an increase in the frequency of extreme weather occurrences. It is known that flooding has negative consequences on people's health, but it is important to understand how these effects will play out over time for those who have been impacted [9]. Flood Damage Functions are used to provide an estimate of flood vulnerability. These functions are essential for conducting an integrated flood risk assessment in order to establish sustainable flood management, mitigation, and adaptation strategies in response to global change [10]. Numerous rivers regularly experience flooding, resulting in the formation of a floodplain in the land surrounding the river. Most floods are caused by natural events and human actions [11]. A questionnaire survey method was used to gather information, and a composite index was made to measure how the public sees risk [12].

Four locations are susceptible to flooding and inundation: West Banjarmasin, South Banjarmasin, Central Banjarmasin, and portions of North Banjarmasin, particularly Campus I of Lambung Mangkurat University on Brigjen H Hasan Basry Street. The inundation height in front of the campus's main gate was between 40 and 60 cm. Submerged puddles in Campus I ULM restricted access to buildings and classrooms. According to the Regional Disaster Management Agency (BPBD) of Banjarmasin City, the potential for tidal flooding (rob) due to sea tides hit Banjarmasin in November 2021 [13]. Tidal flooding (rob) occurs when ocean tides and new moon phases, as well as more rain and the possibility of strong winds, work together[14].

Preparedness for flood disasters, particularly in the environment of the ULM Banjarmasin campus, which is in the lowlands and includes wetland conditions, must be the primary concern of all concerned parties. The integrated flood and inundation risk analysis survey results will provide an analysis of the flood readiness of students, staff, and lecturers. This research can help the people and leaders of Lambung Mangkurat University, particularly the people of Banjarmasin as a whole, prepare for flood disasters [15,16].

2. Materials and Methods

2.1. Research Location

The research location is in the area of Campus I Banjarmasin, which is situated on Brigadier General H Hasan Basry Kayu Tangi, North Banjarmasin District, Banjarmasin City, South Kalimantan Province. Figure. 1 illustrates the location of the study.

Fig. 1 Campus I Lambung Mangkurat University [17]

2.2. Data Collection Methods

A field survey in data collection for this investigation was conducted in October 2022. Data sources were collected through interviews, dissemination of questionnaires, observations, and studies of flood-affected areas. Data collection through surveys was provided to respondents, including lecturers at ULM and staff.

2.3. Identity of the Respondents

Participants in the impacted region of campus I of Lambung Mangkurat University completed the questionnaire and participated in the interviews. Respondents in this study were lecturers and staff of Lambung Mangkurat University, who were dispersed over Campus I ULM Banjarmasin. In the course of completing the questionnaire, the researcher advises and clarifies the meaning of the questions. The number of selected respondents in this study was 73 people.

The data can be divided into numerous categories based on the respondent's name, gender, age, occupation, and work unit. In completing this questionnaire, respondents can rate the events that have transpired in probability and impact. Respondents fill out a Google form with questionnaire questions.

2.4. Probability and Impact

Project risks are unintended occurrences that could result in costs running over budget, incomplete work, unsafe or environmentally hazardous conditions, or even complete failure [18,19]. To accomplish the project's goal, risk management entails detecting, assessing, and taking appropriate action in response to various risks [20,21]. No one can completely eliminate project risks, but we can surely prepare by including risk management activities in project planning and setting up procedures, backups, and additional resources to protect the organization in case something goes wrong [18,22]. In general, qualitative risk analysis evaluates the significance of the risks that have been found and creates prioritized lists of risks for additional investigation to identify how to lessen their possible impact [23,24].

The data from the respondents' completed questionnaires are then processed to generate the probability and effect values. In the form of questionnaire questions, the 15 high-probability risks and impacts are prioritized for mitigation.

Table 1. Probability

Levels	Classification	Frequency
1	Rare	unlikely to happen
2	Unlikely	Once every 10 years
3	Possible	Once every 5 years
4	Likely	Once every 2 years
5	Almost certain	Once every 1 year

Source: [25]

Table 2. Impact

Levels	Classification	Frequency
1	Insignificant	Almost no impact
2	Minor	A small percentage of the affected area is very small
3	Moderate	A small percentage of moderately affected areas
4	Major	A small percentage of large affected areas
5	Catastrophic	The entire area was severely affected

Source: [25]

3. Results and Discussion

3.1. Risk Analysis

This study uses a questionnaire survey which aims to explore data and information about the tidal flood (rob)/inundation events and their capacity to reduce the level of risk faced in the area of Campus I ULM Banjarmasin. The results of the research questionnaire were in the form of respondents' perceptions of the question of whether tidal flooding (rob)/inundation events have a potential risk in the area of Campus I ULM Banjarmasin.

3.2. Classification of Respondent Characteristics Data

Some respondents' characteristics are classified by name, gender, age, and work unit. Such classifications are presented in the form of pie charts and bar charts.

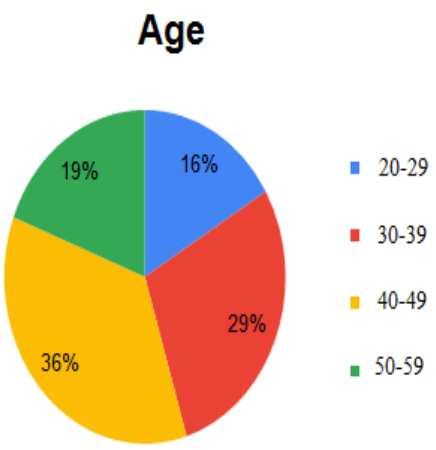


Fig. 2 Age Percentage of Respondents

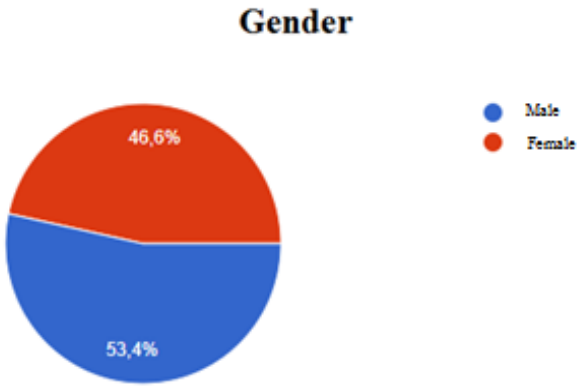


Fig. 3 Gender Percentage of Respondents

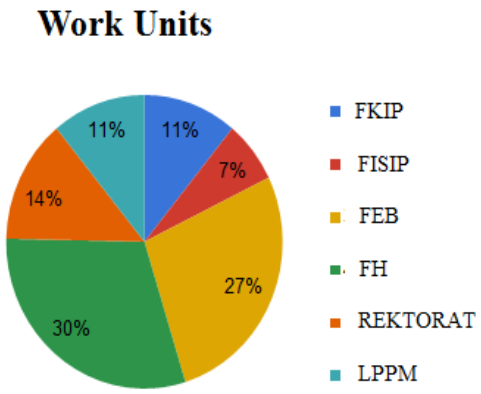


Fig. 4 Percentage of Work Units of Respondents to Each Faculty

3.3. Flood and Inundation Event Data

This survey aims to explore data and information about tidal flooding and inundation events and their capacity to reduce the risk level faced on the campus I ULM Banjarmasin. The data on flooding and inundation events that occurred on Campus I of ULM is presented in the form of the following pie chart.

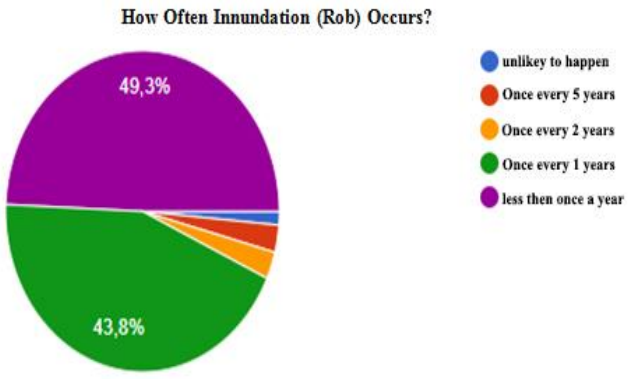


Fig. 5 Frequency of Inundation (Rob)

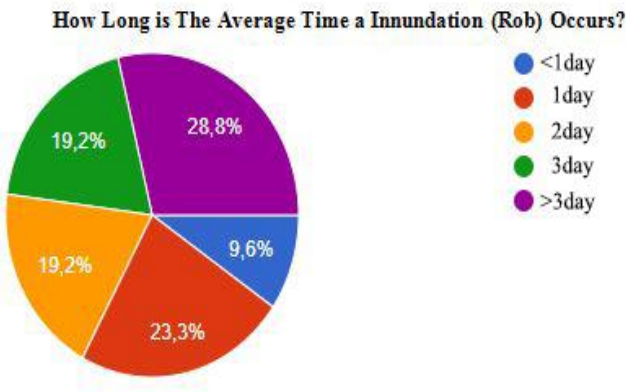


Fig. 6 Duration of Inundation (Rob)

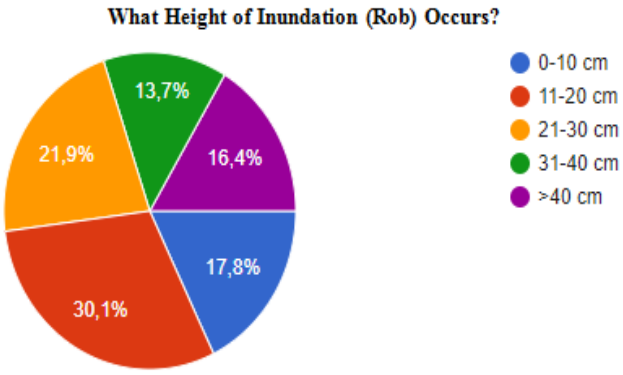


Fig. 7 Height of Inundation (Rob)

Table 3 describes the results of a risk management survey of 73 respondents. The probability and effects of the flooding that happened in Campus I ULM were shown in the form of a bar chart. The x-axis of the bar chart shows the classification of probability and impact risks based on the levels classified in Tables 1 and 2. At the same time, the y-axis shows the percentage of respondents who chose the answer.

4. Conclusion

The results of the research questionnaire were in the form of respondents' perceptions of the question of whether tidal flooding (rob)/inundation events have a potential risk in the area of Campus I ULM Banjarmasin. The integrated flood and inundation risk analysis survey results will provide an analysis of the flood readiness of students, staff, and lecturers. This research can help the people and leaders of Lambung Mangkurat University, particularly the people of Banjarmasin as a whole, prepare for the flood disasters mitigation concept.

Acknowledgements

A thank you to Research and Community Services Institute (LPPM) Lambung Mangkurat University for funding this research according to contract number: 024.102/UN8.2/PL/2022 dated April 1, 2022. Do not forget to thank all the parties who helped with this research.

References

[1] Shiyun Xiao, Na Li, and Xiaoyang Guo, "Analysis of Flood Impacts on Masonry Structures and Mitigation Measures," *Journal of Flood Risk Management*, vol. 14, no. 4, pp. 1–19, 2021. *Crossref*, https://doi.org/10.1111/jfr3.12743

[2] Word Meteorological Organization (WMO), "Urban Flood Risk Management," Associated Programme on Flood Management, 2008.

[3] Federica Zabini, Valentina Grasso, et al., "How do People Perceive Flood Risk? Findings From a Public Survey in Tuscany, Italy,"*Journal of Flood Risk Management*, vol. 14, no. 1, pp. 1–20, 2021. *Crossref*, https://doi.org/10.1111/jfr3.12694

[4] Goro Mouri, Daigo Minoshima, et al., "Probability Assessment of Flood and Sediment Disasters in Japan Using the Total Runoff-Integrating Pathways Model," *International Journal of Disaster Risk Reduction*, vol. 3, no. 1, pp. 31–43, 2013. *Crossref*, https://doi.org/10.1016/j.ijdrr.2012.11.003

[5] I.B. Purbawijaya, "Risk Management for Flood Handling in the Drainage Network System in the City of Denpasar," *Civil Engineering Scientific Journal*, vol. 15, no. 1, pp. 72-82, 2011.

[6] E.B. Santoso, "Disaster Risk Management of the Lamong River Flood in the Surabaya-Gresik Peri-Urban Area Through an Institutional Approach," *Spatial Planning Journal*, vol. 8, no. 2, pp. 48-59, 2013.

[7] N. Husain, T.H. Trak, and L. Meshram, "Impact of Flood-Caused Pollutants and Micro-Organisms on Human Health, "*International Journal of Science and Research*, vol. 7, no. 2, pp. 1375–1377, 2018.

[8] S. Nasution, "Health Risk Communication for Prevention of Dengue Disease Due to Floods," *Proceedings of the 5th IABI Disaster Research*, pp. 120-130, 2018.

[9] M. Twiddy, B. Trump, and S. Ramsden, "Understanding The Long-Term Impact of Flooding on the Wellbeing of Residents: A Mixed Methods Study," *PLOS ONE*, vol. 17, no. 9, pp. 1–14, 2022. *Crossref*, https://doi.org/10.1371/journal.pone.0274890

[10] Islam M. Khairul, Mohamed Rasmy, et al., "Developing Flood Vulnerability Functions Through Questionnaire Survey for Flood Risk Assessments in the Meghna Basin, Bangladesh," *Water (Switzerland)*, vol. 14, no. 3, pp. 1–24, 2022. *Crossref*, https://doi.org/10.3390/w14030369

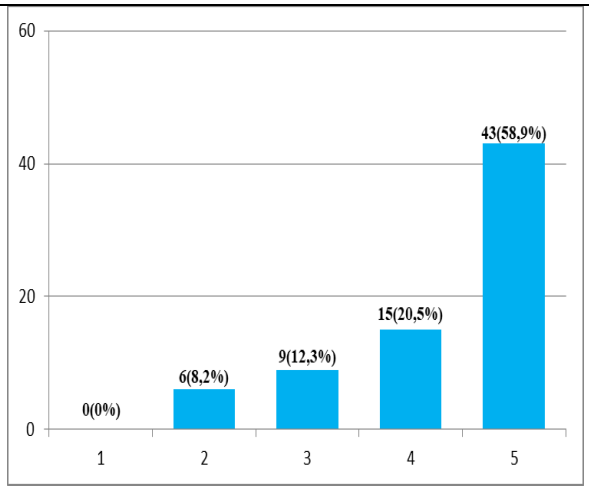
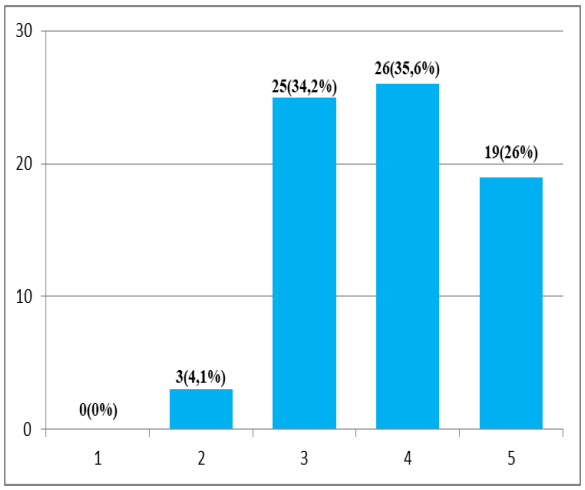
[11] A. Rahadiati, Munawaroh, and E. Suryanegara, "The Impact of Flooding on Settlement along the Jangkok River Mataram, Indonesia," *IOP Conference Series: Earth and Environmental Science*, vol. 750, no. 1, 2021. *Crossref*, https://doi.org/10.1088/1755-1315/750/1/012003

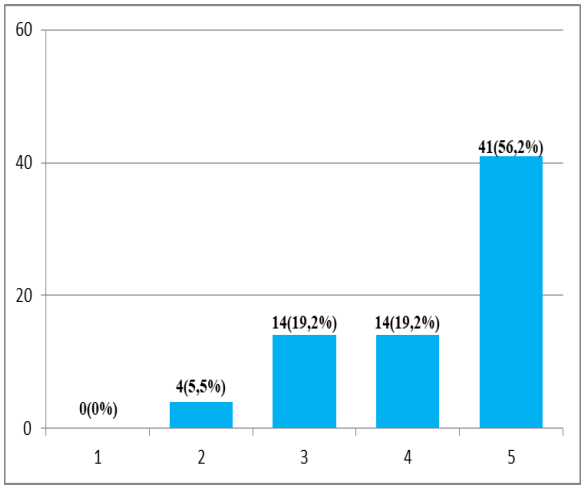
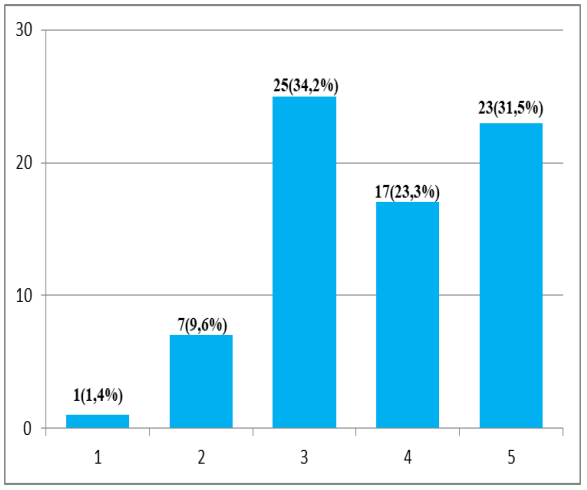
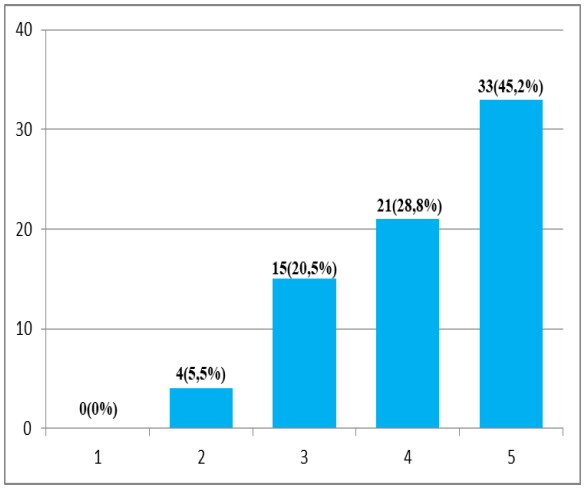
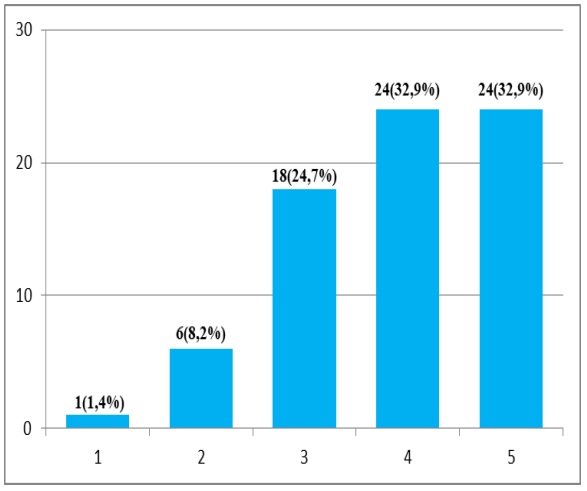
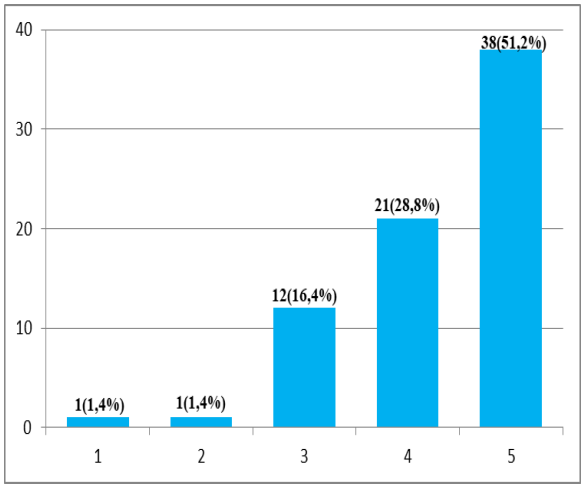
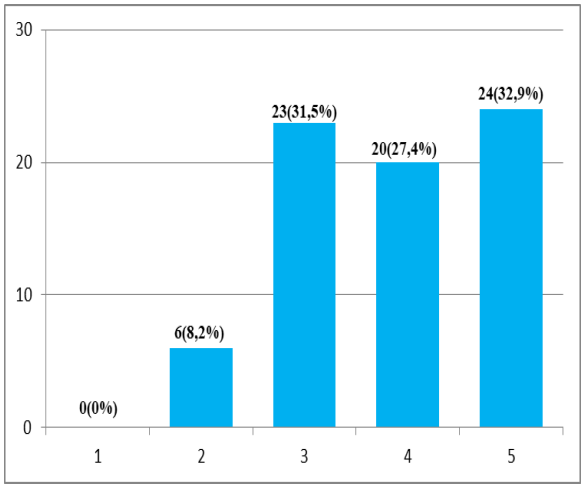
[12] Delin Liu, Mengjie Li, et al., "Assessment of Public Flood Risk Perception and Influencing Factors: An Example of Jiaozuo City, China," *Sustainability (Switzerland)*, vol. 14, no. 15, pp. 1–15, 2022. *Crossref*, https://doi.org/10.3390/su14159475

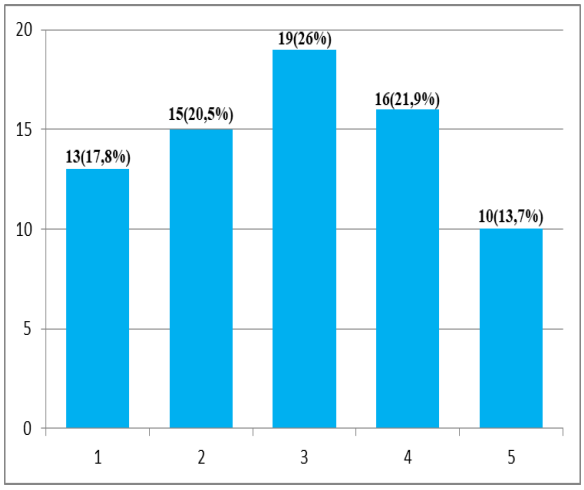
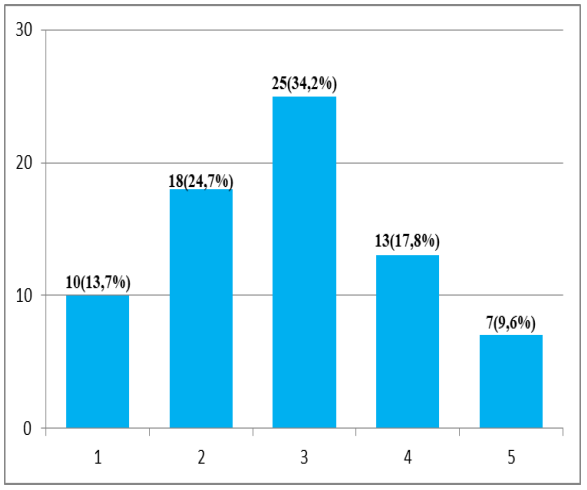
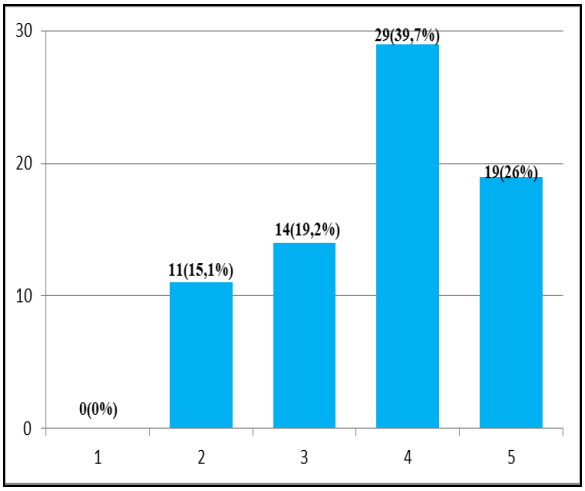
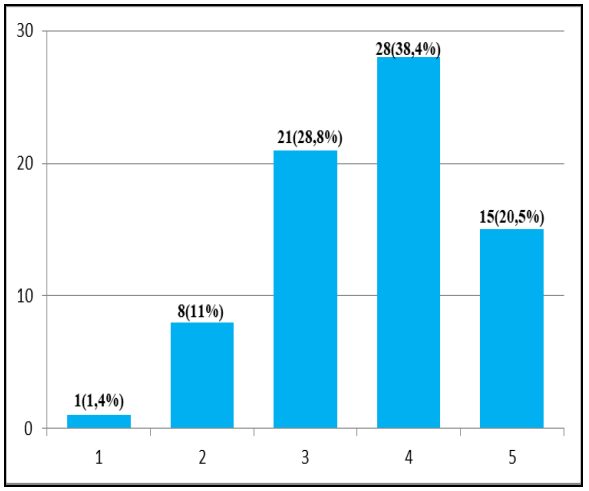
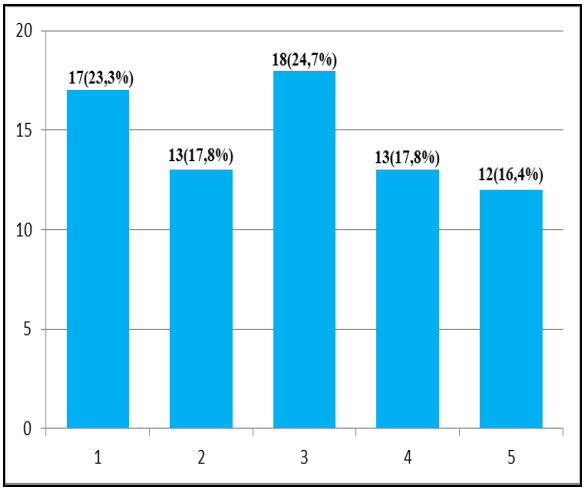
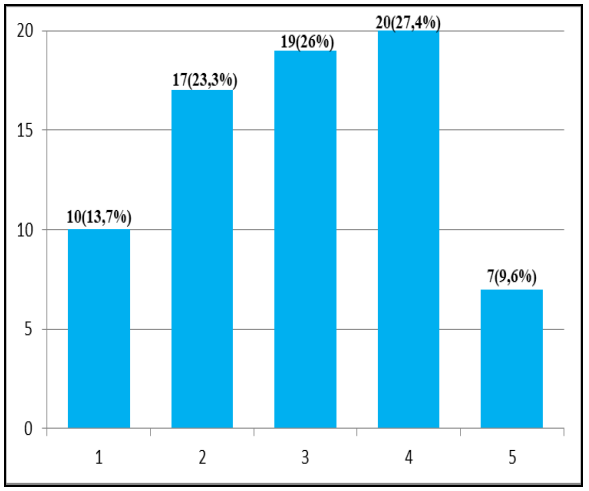
[13] BPBD, Potential Inundation of Banjarmasin City, 2021.

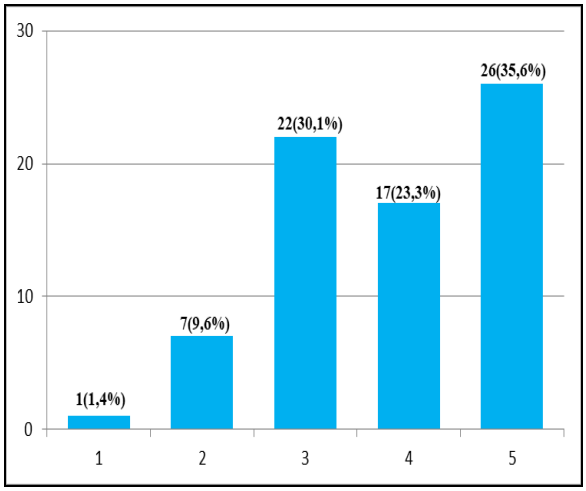
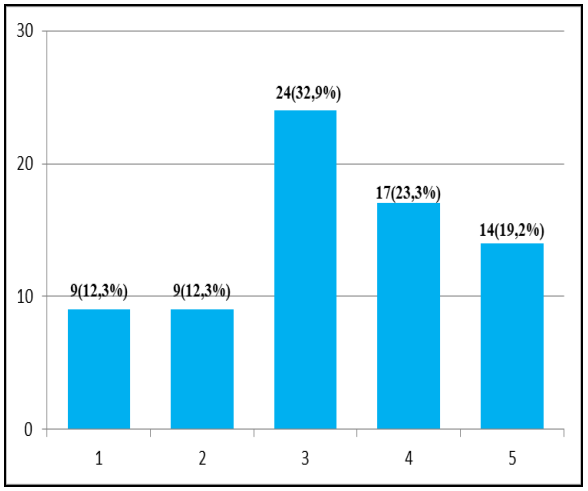
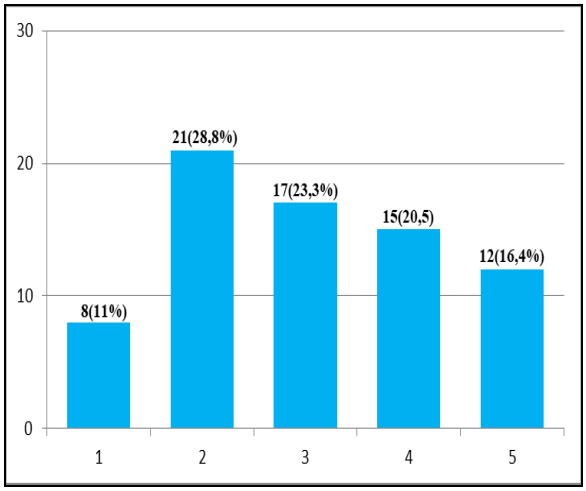
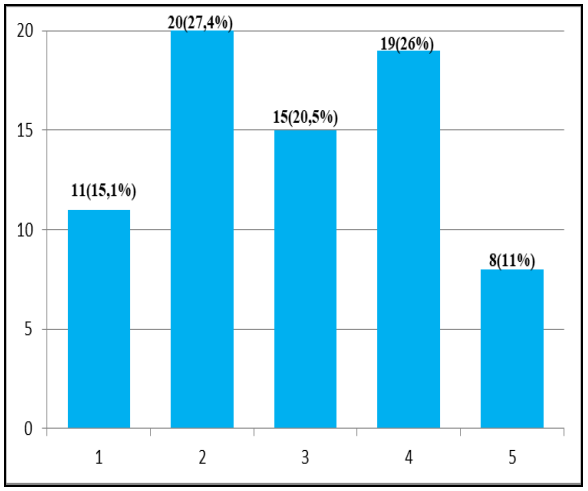
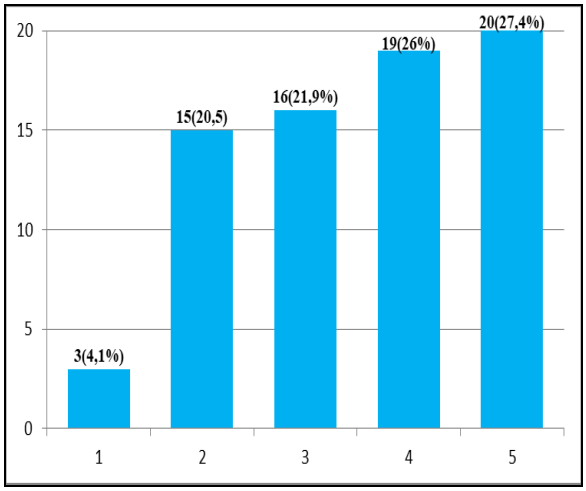
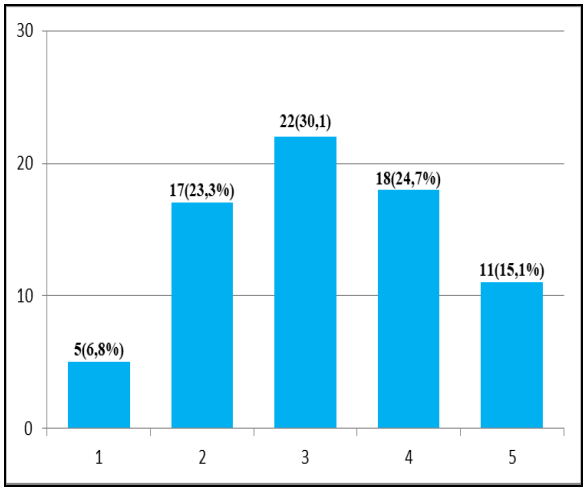
[14] M. Subhan, W. Wahyu, E. Erhaka, and M. Septiana, " Community Participation in Flood Management in Banjarmasin City," *EnviroScienteae*, vol. 8, no. 3, pp. 135-145, 2011.
[15] Oryza Lhara Sari, Rossana Margareth Kadar Yanti, et al., "Effect of Flood Risk Management Methods on Urban Flooding: Article Review," *Techniques: Journal of Science And Technology*, vol. 17, no. 2, pp. 301–308, 2021. *Crossref,* https://doi.org/10.36055/tjst.v17i2.12455
[16] E.J. Plate, "Flood Risk and Flood Management," *Journal of Hydrology*, vol. 267, pp. 2-11, 2002.
[17] Google Earth Web, Lambung Mangkurat University, 2022. [Online] Available: https://earth.google.com/web/sear%0Ach/ulm+banjarmasin/@-3.29574941,114.58529252,5.2849%0A6146a,1228.93963926d,35y,-131.86653625h,45.00110863t,-0r/
[18] T. Raz, A.J. Shenhar, and D. Dvir, "Risk Management, Project Success, and Technological Uncertainty," *R & D Management*, vol. 32, no. 2, 2002.
[19] Saurabh Pawade, Vaidehi Patil, et al., "Effective Risk Management in Construction Projects," *SSRG International Journal of Civil Engineering*, vol. 9, no. 5, pp. 1-4, 2022. *Crossref,* https://doi.org/10.14445/23488352/IJCE-V9I5P101
[20] K. Patel, "A study on Risk Assessment and its Management in India," *American Journal of Civil Engineering*, pp. 64-67, 2013.
[21] Sonia Sharma, Shantu Kar, "Risk Management and Analysis in Hydro-Electric Projects in India," *SSRG International Journal of Civil Engineering*, vol. 5, no. 3, pp. 1-7, 2018. *Crossref,* https://doi.org/10.14445/23488352/IJCE-V5I3P101
[22] Upasana R. Rana, Snehal V. Mevada, and Vishal B. Patel, "Seismic Risk Assessment of Asymmetric Frame Buildings using Fragility Curves," *SSRG International Journal of Civil Engineering*, vol. 7, no. 5, pp. 1-9, 2020. *Crossref,* https://doi.org/10.14445/23488352/IJCE-V7I5P101
[23] Dvir, D. Shenhar, and A. J, "*Reinventing Project Management-The Diamond Approach to Successful Growth and Innovation*," Harvard Business School Press, Boston, Massachusetts, USA, 2007.
[24] R. Flanagan and G. Norman, "*Risk Management and Construction*," Cambridge: University Press, 1993.
[25] "*PDAM Asset Management Technical Guidelines*," BPPSPAM ed., Minister For Public Works and Human Settlements, 2019.

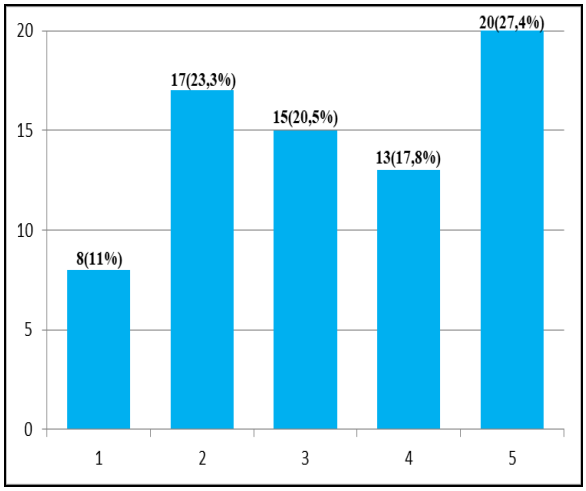
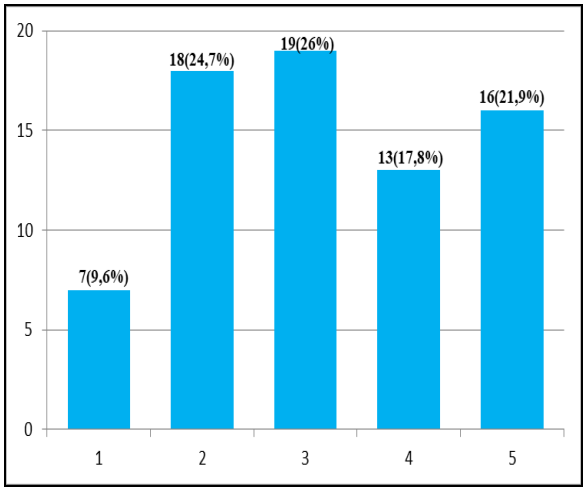
Table 3. Probability Impact Question

Question										Probability	Impact
Probability					Impact						
1	2	3	4	5	1	2	3	4	5		
There was flooding/inundation in the area of Campus I ULM Banjarmasin.											

Question										Probability	Impact
Probability					Impact						
1	2	3	4	5	1	2	3	4	5		
The location/place where you work in the Campus area is also affected.											
Flooding/inundation occurs as a result of drainage channels' inability to hold water.											
Flooded parking lot.											

Question										Probability	Impact
Probability					Impact						
1	2	3	4	5	1	2	3	4	5		
Garbage strewn about or piled up in the stream.											
The capacity of the detention pool/water storage system is not functioning optimally or not sufficiently able to hold water.											
Socialization of flood management as a form of disaster mitigation.											

Question										Probability	Impact
Probability					Impact						
1	2	3	4	5	1	2	3	4	5		
Campus and office activities are still running as usual when there is flooding or inundation.											
Damage to documents in the Campus area..											
Damage to facilities in the Campus area.											

Question										Probability	Impact
Probability					Impact						
1	2	3	4	5	1	2	3	4	5		
The 1st floor of the building is not used for offices or warehouses during flooding or inundation events.											
The existence of a warning system is a form of preparedness action during floods.