PUBLIC ACCEPTANCE OF SMART FLOOD MITIGATION IN PUCHONG

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UNIVERSITI TUNKU ABDUL RAHMAN

PUBLIC ACCEPTANCE OF SMART FLOOD MITIGATION IN PUCHONG

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A project report submitted in partial fulfilment of the requirements for the award of Bachelor of Civil Engineering with Honours

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Universiti Tunku Abdul Rahman

April 2024

DECLARATION

I hereby declare that this project report is based on my original work except for citations and quotations which have been duly acknowledged. I also declare that it has not been previously and concurrently submitted for any other degree or award at UTAR or other institutions.

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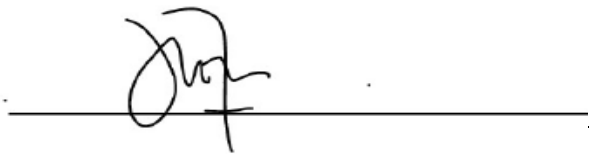
APPROVAL FOR SUBMISSION

I certify that this project report entitled **"PUBLIC ACCEPETANCE OF SMART FLOOD MITIGATION IN PUCHONG"** was prepared by **CHONG JIA CHEN** has met the required standard for submission in partial fulfilment of the requirements for the award of Bachelor of Civil Engineering with Honours at Universiti Tunku Abdul Rahman.

Approved by,

Signature : 

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Date : 29th April 2024

ACKNOWLEDGEMENTS

I wish to extend my appreciation to all those who played a part in the successful culmination of this research endeavor. I am particularly grateful to my research supervisor, Ir. Ts Dr. Tan Ooi Kuan, and the external expert, Prof. Ir. Dr. Lam Wei Haur, for their invaluable counsel, direction, and considerable patience in steering me through the process of developing this research study.

Furthermore, I would like to express my gratitude to everyone that aided me and given me encouragement and taking part in this research. Without the participation of the respondents in this research could potentially affect the result of this research.

ABSTRACT

In the past few years, flooding issue had become a frequent incident happened in the Puchong area. Although the government had allocated a huge budget in constructing the flood mitigation project, flooding issue still occurs frequently at the Damansara-Puchong Highway (LDP) located near the IOI Mall in Puchong. Therefore, it is crucial for the authorities to resolve the problem that govern the public immediately. In order to improve the implementation of Smart Flood Mitigation in Puchong, this research study focuses on investigating the public acceptance on Smart Flood Mitigation in Puchong. The first objective established in this research study is to identify the variables affecting the public acceptance on Smart Flood Mitigation in Puchong. In this research study, there are four independent variables that affecting the public acceptance on Smart Flood Mitigation in Puchong which are the Perception, Awareness, Readiness, and Preparedness. In order to measure the relationship and the impact of the independent variables towards the dependent variable, questionnaire survey was designed to collect the opinion of the respondents. A total of 137 samples were collected and undergo analysis by using the SPSS software and SmartPLS 4. This research showed that the public readiness and public preparedness ranked at the top two that caused impacts towards the public acceptance on Smart Flood Mitigation in Puchong. The analyzed results proved that the public readiness is significant affecting the public acceptance on Smart Flood Mitigation in Puchong. This research study helps the government to review in order to effectively implement the Smart Flood Mitigation in the Puchong area to fight against the flooding issues.

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INTRODUCTION

1.1 Background of Study

As the world keeps evolving, globalization and urbanization have become an unavoidable trend happening in all countries. People in rural areas tend to migrate to the city to experience a better living condition with several push and pull factors. High job opportunities with highly accessible to social services had become the major factors of urbanization that would eventually lead to many challenges towards the cities. Rapid development of cities without proper urban planning had directly created more issues that would affect the quality of life for all the residents. Urban poverty, environmental impacts, crime, and social inequality are listed among the top issues.

Globalization causes residents to migrate to cities while urbanization creates grey footprints as the population in the city increases significantly throughout the years. According to Fleck (2023), the globalization happened globally would lead to 70% of the global population will be living in the cities by 2050 compared to 2020 where only 54% of the global population living in the cities. However, in Malaysia there are estimated 9 million of Malaysians is currently living in the Klang Valley which consist of Selangor and Kuala Lumpur. Table 1.1 shows the population of Malaysia in each state (Department of Statistics Malaysia, 2022).

Table 1.1: Population and Key Demographic Indicators by Census Year (Department of Statistics Malaysia, 2022).

States	No. of Population (Million)*			Annual Population Growth Rate (%)			Natural Increase		
	2019	2020	2021*	2019	2020	2021*	2018	2019	2020
Malaysia	**32.52**	**32.45**	**32.66**	**0.43**	**1.7**	**0.22**	**329,914**	**314,211**	**303,688**
Johor	3.76	4.01	3.79	0.31	2.2	0.54	39,967	38,322	36,205
Kedah	2.17	2.13	2.19	0.50	1.2	0.53	21,091	20,122	20,125
Kelantan	1.88	1.79	1.93	1.24	2.0	1.25	27,044	25,349	25,301
Melaka	0.93	1.00	0.94	0.64	2.3	0.60	8,981	8,544	8,401
Negeri Sembilan	1.13	1.20	1.13	0.30	2.0	0.18	10,879	10,245	10,095
Pahang	1.67	1.59	1.68	0.40	1.0	0.46	17,760	16,611	16,606
Perak	2.51	2.50	2.51	0.22	0.8	0.04	15,269	14,181	13,605
Perlis	0.25	0.28	0.26	0.22	2.3	0.29	2,329	2,050	2,148
Pulau Pinang	1.77	1.74	1.77	0.34	1.3	0.23	9,496	9,267	8,921
Sabah	3.90	3.42	3.83	0.16	0.9	-1.29	39,085	38,193	34,581
Sarawak	2.81	2.45	2.82	0.51	0.2	0.32	22,796	22,448	21,279
Selangor	6.51	6.99	6.56	0.48	2.7	0.47	74,738	70,747	67,898
Terengganu	1.24	1.15	1.28	1.31	1.3	1.31	21,143	19,676	20,426
W.P. Kuala Lumpur	1.78	1.98	1.75	-0.40	2.2	-1.10	15,750	14,981	14,769
W.P. Labuan	0.10	0.10	0.10	0.33	1.3	0.67	1,404	1,369	1,396
W.P. Putrajaya	0.10	0.11	0.12	6.33	4.7	5.42	2,182	2,106	1,932

Malaysia is a tropical country located near the equator in the Southeast Asia. Unlike other countries consist of 4 seasons, Malaysia is categorised as equatorial which only consist hot and humid throughout the year. According to Nico (2022), Malaysia is ranked with no. 7 with most rainfall in the world with an average of 2875 mm of precipitation per year. Table 1.2 shows the list of top 10 countries with most rainfall in the world (Nico,2022). Malaysia experienced with 2 monsoon seasons annually which is Southwest Monsoon that start in April and end in September and the Northeast Monsoon that begin in October and last until March. However, the uncontrolled human's activities had polluted the environment and lead to climate change, the duration of monsoon seasons had eventually become unstable. The high average precipitation in Malaysia had caused a lot of trouble for the citizens in Malaysia due to lack of flood mitigation that led to floods.

Table 1.2: List of top 10 countries with most rainfall in the world (Nico, 2022).

No.	Country	Average Precipitation (mm/year)
1.	Columbia	3240
2.	Sao Tome	3200
3.	Papa New Guinea	3142
4.	Solomon Island	3028
5.	Panama	2929
6.	Costa Rica	2926
7.	Malaysia	2875
8.	Brunei	2722
9.	Indonesia	2702
10.	Bangladesh	2666

When the Malaysia is hit with the heavy rainfall during monsoon season, possibility of floods would be increase significantly. According to Lim (2023), a total of RM 622 million were lost in 2022 and RM6.1 billion was loss due to the floodings that occur due to multiple factors. Figure 1.1 shows the special report release from the Department of Statistics Malaysia regarding the value of flood losses in Malaysia 2022. The report had shown that public assets & infrastructure, living quarters and agriculture had suffered the most during the flooding. Hence, this study is crucial to investigate the public acceptance of smart flood mitigation in Puchong in order for the government to implement the smart flood mitigation system to minimize the flood losses.

Figure 1.1: Value of Flood Losses in Malaysia 2022 (Department of Statistics Malaysia, 2023).

Smart flood mitigation applies new advanced technologies invented in order to overcome the flood issue happen globally (Ridzuan, 2022). The capability of Artificial Intelligence (AI), Internet of things (IoT), advanced sensors are very huge, and the technologies can be works together in order to create a system that would effectively combat against the flooding (Josipovic 2023). Live data can be capture by the advanced sensor and then transfer to the other device through Internet of things that connect all the devices together. After that, the Artificial Intelligence would suggest an optimal action towards the operator and react to the condition. The smart flood mitigation also collects a huge amount of data toward the water quality, water level, stream flow and the weather forecast in order to make a better response and predict the future event. Advanced data-driven insight would be more effective in preventing and mitigating the destructive consequences of the flood.

1.2 Importance of the Study

As major population is migrating to the city for a betting living quantity, it is important for the urban planner to make decision in planning the infrastructure for the locals in order to satisfy the need and competitiveness against other countries. Although rapid urbanization boosts the economic sector in a good way, rapid urbanization without proper urban planning could be a disaster for everyone living in the city. According to the Sutjiningsih (2022), the capital of Indonesia, Jakarta is a good example of a mega city that currently facing flooding issues due to the massive urbanization.

Severe rainfall, rising sea levels, and land subsidence had heavily increased the frequency of flooding in the megacity that is home to 10.5 million people to live (Al Jazzera, 2022). The accelerating growth rate in Jakarta had mega issues in overcoming the environmental issue and disaster management as it had constantly suffered from large-scale flooding repeatedly over the past 3 decades (Saputra 2023). According to Sutjiningsih (2022), compare to other coastal cities such as Ho Chi Minh City from Vietnam , China’s Tian Jin and Myanmar’s Yangon, Jakarta is ranked as the fastest sinking cities where most of the coastal area would be submerged by 2050. The main causes of the flooding issue in Jakarta were originated from rising sea water level, unsustainable groundwater depletion, climate change and lack of flood

mitigation to overcome the flooding issues (Al Jeeza, 2022). To prevent Malaysia from facing similar challenges, it is compulsory for this study to be conduct in order to investigate the public acceptance of smart flood mitigation in Puchong.

Malaysia is a developing country that has a vision of becoming developed country in future. Klang Valley as Malaysia largest city must have a be well planned in order to eliminate all these problems faced by other countries. To eliminate the potential of suffering from the urban flooding, smart flood mitigation must be focus by the public for a better future.

In order to achieve the status of developed city, the citizens in Malaysia must accept and support the policies made by the government to accelerate the progress of development. In a society, public plays a crucial part in transforming the city into a more desirable living place. Public remain the largest beneficial from the development of a city as they would be able to enjoy the high tech and convenience living condition. Hence it is important to conduct this research that study the public acceptance of smart flood mitigation in Puchong.

1.3 Problem Statement

As major population is migrating to the city for a betting living quantity, it is important for the urban planner to make decision in planning the infrastructure for the locals in order to satisfy the need and competitiveness against other countries. Although rapid urbanization boosts the economic sector in a good way, rapid urbanization without proper urban planning could be a disaster for everyone living in the city. According to the Sutjiningsih (2022), the capital of Indonesia, Jakarta is a good example of a mega city that currently facing flooding issues due to the massive urbanization.

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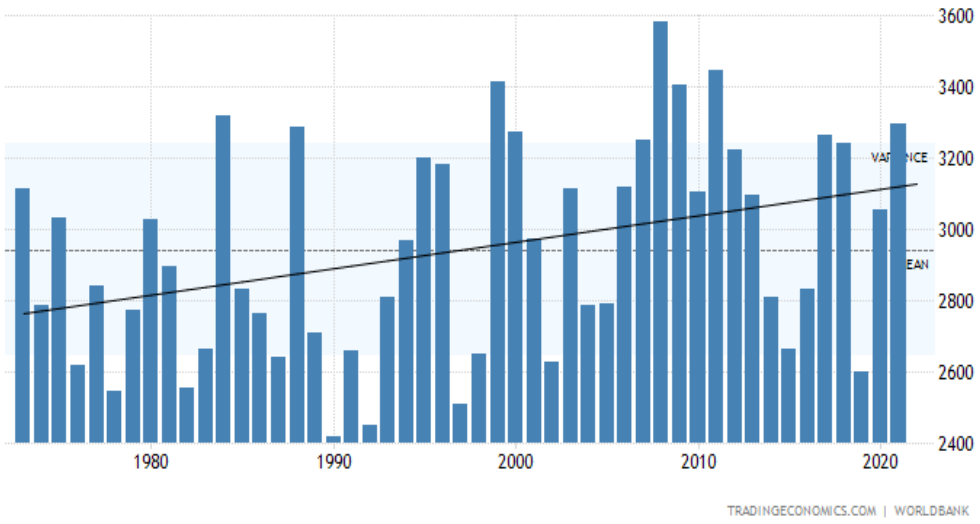

Figure 1.2: Annual precipitation in Malaysia from 1971 to 2021 (Trading Economic, 2022).

Malaysia is a developing country that is competing among the neighbors' countries in Southeast Asia. In order to achieve the status of a developed country, Malaysia must be equipped with mitigation to overcome the environmental challenges that would lead to deaths towards the citizens. A city without proper urban planning and mitigation measures would be a ticking bomb when unplanned disaster caused by extreme climate change (Fawzy, 2020). High annual precipitation in Malaysia had made Malaysian suffers in floods throughout the years and it had remained an issue that the government is failed to solve. In order to increase the competitiveness of Malaysia in the global field, it is a must for all Malaysian to resolve the issue of flooding in Malaysia.

After the precipitation drops from the cloud, it will become either infiltration of surface runoff. Infiltration indicates that the precipitation will enter the permeable ground and be store under the ground which is known for ground water and the surface runoff will flow on the surface of the ground that would end up flowing to the sea or evaporate back to the atmosphere.

A report from the Department of Statistics Malaysia (DOSM) (2022) had shown that Selangor State had recorded 120 flood incidents in 2021 and 132 flood incidents in 2022. A total of 1,057 cases of floods were reported in 2021 in which Sarawak had the ranked as state with highest number of floods incident reported followed by Selangor and Perak. Figure 1.3 shows the statistics reported from the Department of Statistics Malaysia (2022). Constantly flooding in the urban areas brings a lot of inconvenience towards the locals and disturbs their life as they are required to evacuate from their homes to stay in the evacuation area in order to survive the floods. Undeniable, heavy rainfall must be the main contributing factor towards the constantly flood in urban areas but there are several factors that contribute to the floods which are the deforestation over the years, the rapid urbanization without proper urban planning and the unpredictable weather conditions due to the climate change.

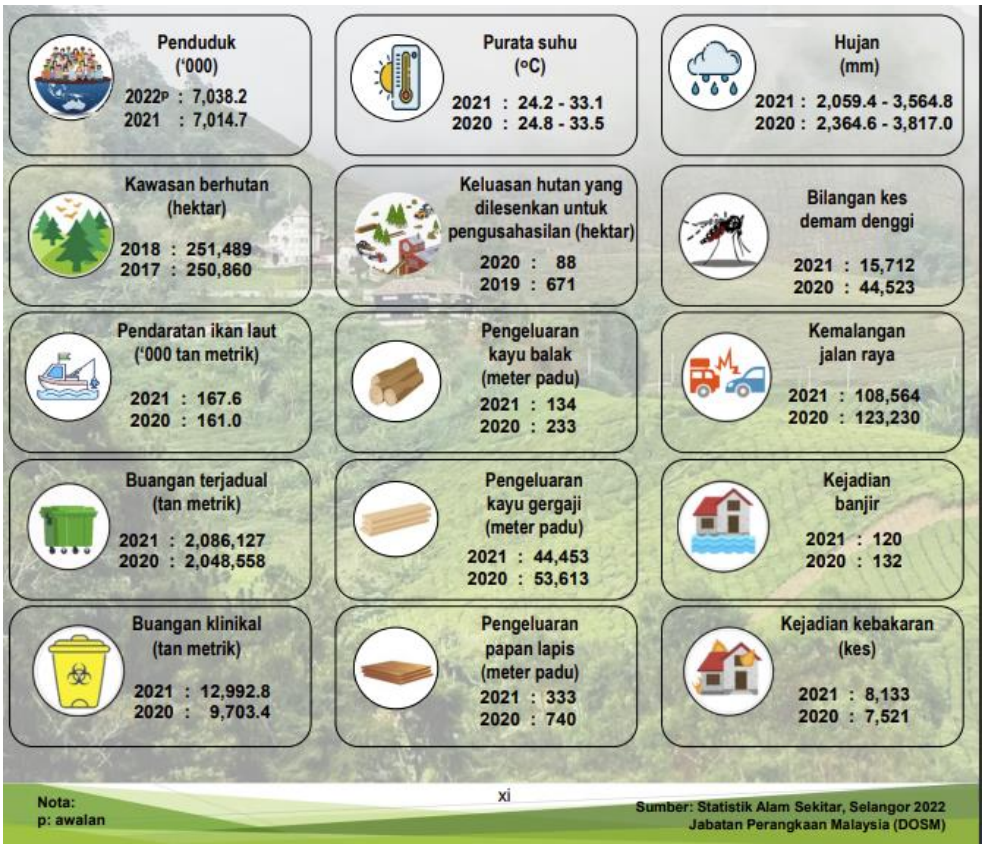

Figure 1.3: Statistic Environment 2022 Selangor (Department of Statistics Malaysia, 2022).

The grey footprint of urbanization had eventually led to reduction of precipitation into infiltration due to the impermeable of the concrete pavement. In contrast to the reduction of infiltration, the increasing of the surface runoff had increased the difficulty of designing the stormwater management system. Konrad (2003) explained that decreasing in the green surface would increase the peak discharge of the precipitation toward the stream and increase the frequency of the flood. Lesser storage capacity for water in urban areas with high volume of surface runoff tends to more frequent of floods compared to sub-urban area that consist of major green surface so the precipitation could end up being infiltration.

Besides large quantity concrete buildings and tar roads, the construction of bridges could also affect the floods frequency. Bridges constructed at the river tend to narrow the stream width and disturb the stream flow as the pier would become obstacles to the water flow and lead to higher water level. Increasing the surface runoff would also tend to cause soil erosion.

Lack of drainage and unmaintained drainage system could also be major contributors to the urban flooding. According to Norazam (2022), most ditches and drains are clean regularly but during heavy rainfall, the rubbish was carried by the rainwater into the drains and clogging the drainage system that would reduce the flowing rate of the precipitation.

Malaysian government had begun to focus on the flood mitigation in the urban area as the Palansamy (2022) had reported that the Selangor government had allocated RM700 million to the Klang River flood mitigation project that is planning to carry out remedial construction works and maintenance towards the Klang River. A proposal of deepening the Klang River by 2 – 3 meters had been approved and it would be capable of increasing the river capacity by 40%. Furthermore, the state government would focus on the removal of the large volumes of trash beneath the surface of the Klang River that had accumulated over the years.

These are the problems that faced by the Malaysia in flood mitigation while developing the countries to a brighter future. For the sake of resolve the constantly flooding issues in the urban area, one of the most efficient ways is to enhance the insight and acceptance of the public so that the public would have higher knowledge and involvement toward the flood mitigation. Hence, this research aims to study the public acceptance of smart flood mitigation in the Puchong area.

1.4 Aim and Objectives

As the flooding issues had occurred more frequently in the recent years, it is important for the authorities to understand the feelings of the respondents towards the Smart Flood Mitigation in Puchong. The research study is carried out in order to study the public acceptance of smart flood mitigation in the Puchong area. There are 3 objectives would be investigate in this report:

To identify the variables to measure the public acceptance on smart flood mitigation in Puchong.

(i) To identify the variables affecting the public acceptance on smart flood mitigation in Puchong.

(ii) To investigate the relation between the independent variable and dependent variable towards the public acceptance on smart flood mitigation in Puchong.

(iii) To investigate the impact of the independent variables towards the public acceptance on smart flood mitigation in Puchong.

1.5 Research Questions

Three questions are developed with regards to the research objectives of this research study:

(i) What are the variables that affect the public acceptance on smart flood mitigation in Puchong?

(ii) What is the relation between the independent variables and dependent variable towards the public towards smart flood mitigation in Puchong?

(iii) What is the impact of the independent variables towards the public acceptance of smart flood mitigation in Puchong?

1.6 Scope and Limitation of the Study

This study primarily focuses on the public acceptance of smart flood mitigation in Puchong. Variables used to identify the acceptance level is the perception, awareness, preparedness, and readiness of public. The targeted population of this study is the residents in Puchong and individuals that had travelled to Puchong before. Questionnaire through emails and social media applications will be conducted to obtain the view of the public. Questionnaire would be established using quantitative method as it would be more objective and focused to reach the targeted results compared to the qualitative method. Data analysis obtained would be analysed using SPSS and PLS-SEM software. The results and conclusions of this study can only represent the opinions of the residents in Puchong and individuals that had travelled to Puchong before.

1.7 Contribution of the Study

This research is significant because it validates the public acceptance of smart flood mitigation in various variables in Puchong. As flooding frequently occurs in the nation, the Malaysia government could use the results and analysis based

on the public acceptance to use it as a guideline to develop an effective framework in order to improve the perception, awareness, preparedness, readiness level of public toward smart flood mitigation. In-depth smart flood mitigation would be provided in this research study and effectiveness of the smart flood mitigation compared to the ordinary flood mitigation. On the other hand, this research study would provide insightful study of the concerns and misconceptions that impact the public acceptance on certain policies. Upon the matter, respective authorities could educate the correct information towards the public based on their concerns and misconceptions. In-depth investigation regarding the public perceptions would lead to better-prepared communities against the natural disaster and this would act as a bridge between the experts and the public that would be able to gain insights regarding the public needs and preferences. In conclusion, this research study would be able to make significant contributions towards flood mitigation, community engagement and the successful integration of technology. Insight provided in this research could be used to develop more effective strategies and more prepared society to overcome the flooding issues.

1.8 Outline of the Report

In this research study, there are total of 5 chapter conducted regarding the public acceptance of smart flood mitigation in Puchong. Chapter 1 consist of the Introduction of the research study. There are several subtopics discussed which are the background of study, important of study, problem statement, objectives, research objectives, contribution of study, scope and limitation of the study.

Chapter 2 is the Literature Review of the public acceptance of smart flood mitigation in Puchong that discussed the overall concept of this research study. This chapter highlighted the development of the flood mitigation around the world and the subtopic regarding smart flood mitigation. Apart from that, chapter 2 also included the review of the independent variables and dependent variable which are the Acceptance, Perception, Awareness, Preparedness and Readiness.

After that, the research study entered the Chapter 3, Methodology. In this chapter, methods used for conducting the research study were mentioned. The chapter started with the research onion, development of conceptual

framework, research design, data collection, sampling design, research instrument, measurement scale, data analysis, reflective and formative framework, and also structural model assessment.

Chapter 4, Result and Discussion. After conducting the data collection, the data undergo the analysis to obtain the result of this research study. Data analysis were conducted by using the SPSS and SmartPLS 4 software. Multiple assessments were conducted that included overview of the respondent, pilot test result, demographic analysis, descriptive analysis, reliability test, multicollinearity test, reflective measurement model assessment, formative measurement model assessment, and structural model assessment. At the end of this chapter, the discussion was carried out.

Chapter 5 highlighted the Conclusion of the research study. In this chapter, the conclusion was made along with the objective and result generated with recommendations for future researchers to improve the research study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

As the population growth is increasing day by day, the issue faced by the city had become more important than it used to be. As a living place for almost half of the world population, it is crucial that the application of mitigation toward the disasters that are potentially happen in the future. As the world is now transforming all the megacities toward the smart sustainable city that utilize the efficiency of the Information Communication Technology (ICT) in the cities that would make the city to be more effective, more convenience and the most important aspect, sustainable for future generations. Saraju (2016) had studied that the combination of various advanced technologies would be a natural and effective strategy to overcome the problems happened due to the rapid urbanization and urban population growth happen all around the world. Floods had been a common enemy that faced by all the Malaysian since a long time due to large number of precipitations and lack of flood mitigation implemented in Malaysia. In this report, a study regarding the smart flood mitigation will be carried out. Although there are many floods mitigation applied in the urban area but not many researchers had commented on the system and lack of evaluation of the efficiency of the flood mitigation system had been carried out. It is important that the flood mitigation system in the cities to be following the smart city trend to equip the ICT toward the system in order to overcome the flooding issues in the city.

Development of to fully acknowledge the flooding issue, happen globally, development of the flood mitigation must be carried. According to the studies from Wang (2022), a traditional flood mitigation could be divided into 2 types which are the structural and non-structural measures in order to prevent the flooding events. According to Peacock (2011), these measures developed in the past are aimed to protect, reduce and eliminate the impacts and actions before the flooding event. The structural flood measures focus on keeping the water away from the urban area in order to minimize the flood hazard reductions.

Dams, weirs, reservoirs, pump station and etc are examples to the structural flood measures. On the other hand, the non-structural flood measures focus on keeping the public away from the water bodies to reduce the flood vulnerability. The example for the non-structural flood measures are the policies, laws, training, education, land usage adjustment, flood forecasting, emergency plan, disaster management plan and many more.

2.2 Development of Flood Mitigation

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2.2.1 History of Flood Mitigation Development

Chutkow (1991) wrote that the history of sewers represented the history of man as the French's writer write that "The history of man is reflected in the history of sewers". The history of sewer and drainage system began as the civilization of human began. In the history, the ancient civilization began to build city due to increasing in the population. As soon as the cities is developing faster, the great people invented the sewer and drainage system to handle the surface runoff from the rainfall. The intelligence of human leads the civilization into more advance living condition day by day since the stone age era. The history of the drainage and sewer system was founded back in the Neolithic Age also known as the New Stone Age.

Based on the report from James (2022), during the Neolithic Age that lasted from 10,000 BC to 2,200 BC was reported as the shift of hunter-gatherer strategy into the farming strategy. Instead of hunting, fishing, and gathering wild plants as food sources, the ancestors begin to raise the crops and keep domestic livestock. The people started to learn about grinding and polishing rocks to create tools such as axe, blades, and hammer to enhance their lifestyle. People in the era collect big stones to create shelter and monuments that is used for religious or ceremonial purposes. The human learned to stack the stones together to create a shelter from the natural and a notable structure that was built in the neolithic age is the Stonehenge that is found in England that last until today. As the neolithic era practiced agriculture, the location of the civilizations is mainly located near to the water source that would keep the soil moisture. Even though the water source enables the ancestors to plant crops, but the ancestors faced a lot of issue due to the water source. In order to survive at the time, humans created innovation with their intelligence to overcome the issue and contribute to the humankind with their knowledge until today.

According to Giovanni (2020), the Mesopotamian Empire represented significant advancements in human civilization throughout history. The remnants unearthed in Mesopotamian cities reveal sophisticated storm-drainage and sanitary sewer systems dating back to 4000-2500 BC, spanning thousands of years. The Mesopotamians engineered vaulted sewers for waste disposal, along with household sewage systems, and constructed gutters and drains to manage surface runoff within the cities using baked bricks sealed with asphalt. Historically, it's noted that the Mesopotamians considered urban runoff both a nuisance, causing flooding issues, and a valuable natural resource for household and irrigation purposes. The discovery of clay-made tees and angle joints utilized in the sewer and drainage infrastructure (Giovanni ,2020).

Based on Schrakamp (2018), thousands of archival records had proved that agriculture, breeding, fishery had begun in the society in Mesopotamia. In Southern Mesopotamia, the agriculture activity was deeply affected by the climate, water regime and hydrological landscape. The region was characterized by a dry dessert with hot and dry summer, but it also consists of a humid, cold winter. Besides, the main rivers in Mesopotamia, Euphrates and Tigris poses a threat to the crops as the flood pattern are unpredictable. As the spring rains and

snowmelt from the highlands, the rivers tend to be flood. It is a big problem for the Mesopotamian that would face extreme high temperature and annual flood in a single year. Therefore, the Mesopotamia constructed canals that would resolve the problem as the canals took water out of one river and distributed it among the agricultural fields then link it toward another river. Jimmy (2022) shown that the canals were beneficial towards the Sumerians' crops as the water would constantly flow to the agriculture land to keep the soil moisture during the extreme high temperature period and it would be capable to hold the water and manage its flow throughout the flood season.

According to Steven (2002), the Ancient Egyptians mark an historical moment where the people started to practice the urbanism. Similar to other civilization, the Egyptian settle around the Nile River that had generated a well fertile soil that is suitable for farming. Nile river is the source of life for the Egyptian, and it had considered as the longest river in the world. Unlike the Mesopotamia civilization, the Egyptian gained more benefits from flooding than the damages as the Nile Flood played a vital role in the success and prosperity of the Ancient Egypt civilization. The annual flooding from the Nile River produced well fertile floodplains that provide a well foundation for the cereal and barley. The brilliant Egyptian would track down the water level of the Nile River and collect the data to predict the annual flooding season.

Hassan (1997) mentioned that the Egyptian divided their year into 3 seasons based on the cycle of Nile River. From June to September the Egyptian named it as Akhet where the annual flooding would take place. During Akhet, the Egyptian would not plant any crops as the flood will destroy the crops. Peret take place in October to February as the flood will end. As the flood recede, it would bring nutrient-rich soil and sediment so the farmers would plough the land and seed it with cereal and barley. Then it reached the harvesting season, Shemu that started in March and end in May. The fully grown crops would be harvest before the annual flooding of Nile River take place.

The Egyptian favours the annual flooding of Nile River as it led to enormous harvest for the crops. However, the Egyptians also concern regarding the annual floods that would damage the infrastructure of the civilization. According to Hassan (1997), the Egyptian constructed extensive network canals and irrigation channel after the harvesting season. Not only to control the flood,

but the construction would also benefit the Egyptian as the fertile nutrient would reach to more lands after the lands experience the floods while protect the buildings of the Ancient Egypt. Furthermore, flood relief trenches were constructed to protect the settlement from suffering damages from the annual flood. The shallow flood relief tranches would be able to temporary hold off the flood that act as a simple reservoir. As the Egyptians constantly record down the water level of the Nile River, the Egyptian could predict the unusual flooding event to signal the communities to prepare for flood event that would minimize the impacts.

Another notable civilization in the history of the humankind is the Roman Empire that happen around 27 BC. Majority of the ancestors begin to abandon their rural home and moved into larger communities and cities for a more convenience living condition and the scenario is known as urbanism. As the population increase in the city, more development in the city had been constructed to accumulate the large population. The development of urban roadway increases the surface runoff volume, so the Romans adopted the practice to develop drainage in a bigger scale that form an intricate network of sewers by the assist of the construction of large underground conduit. Steven (2002) mentioned that the Roman Empire is the only civilization in all the Western Asia and Europe that had well planned road system with properly drained surfaces up until 1800s. The romans constructed curb and gutters along the roadside and graded the surface with gradient that would direct the surface runoff toward the drainage channels.

Instead of directing all the surface runoff toward the streams, the Romans focus on collecting the rainwater for local use and irrigation usage. The Romans significant building in the ancient age is the construction of aqueduct that would import the water from rural area to supply the water to the city. The water from aqueduct is mainly supplied to the street fountains and the public baths as the Romans had a culture that construct large number of street fountains and public baths that consume large amount of fresh water. Another major factor that Romans built efficient drainage system is to drain the low-lying districts and remove the excessive water imported via the aqueducts. As the water flow from aqueducts will not stop, it is necessary for the Romans to plan to dispose the water to prevent the water overflow from street fountains and public baths.

Based on Steven (2002), the water supply from the aqueduct and the drainage system of the Roman Empire created an urban water cycle system that had slowly became a common practice for the Europe countries during the late nineteenth.

All of this ancient civilization had developed useful knowledge and technologies to mitigate the flood under different circumstances. These knowledges were applied on our daily life to mitigate the flood and with the development of modern technologies, smart flood mitigation was developed to overcome the flooding issue with higher efficiency.

2.2.2 History of Flood Mitigation in Malaysia

Similar to other civilization, Malaysia also developed flood mitigation system throughout the years. Malaysia had been independence since 1957 and yet the nation still suffers from the flood. As the population in the cities of Malaysia are growing rapidly, the disaster caused by flood must be faced seriously. According to Sani (2015), Flood is known as the most devastating natural disaster experienced in Malaysia and the flood. Floods not only cost millions of Ringgit Malaysia, but it also cost the precious life of Malaysians. Like other countries, Malaysia also picked up the flood management strategies that consist of 2 main parts which are the structural and non-structural approaches in order to prevent the floods.

Mabahwi (2020) mentioned that Malaysia government had set 4 guidelines for implementing flood mitigation measures:

(i) Execution of structural flood mitigation within the realms of engineering and socio-economic contexts.
(ii) Deployment of supplementary non-structural measures.
(iii) Application of non-engineering measures in areas where engineering solutions are infeasible.
(iv) Sustained enhancement of flood forecasting and warning systems.

Along the guidelines, the Malaysian government had conducted multiple structural flood mitigation projects which including canalization of rivers, raising river embankments, and construction of multi-purpose dams. Despite the

high cost of structural measure, structural measure remain priority toward the Malaysia government as the budget allocation for flood mitigation had consequently increased significantly in Malaysian's 5 years development plan.

In order to eliminate the flood risk, bulk of annual budget must be allocated by the government toward the preparation of the flood disaster, relief operations, accommodation and living needs of the flood victims and public utilities. Figure 2.1 had shown that the budget allocated by the Malaysian Government for flood mitigation measures under the Malaysia's every 5-years plan from 1971 to 2020. Figure 4 had shown that 17,000 million of Ringgit Malaysia had been allocated for 2005 to 2020 for flood mitigation as the government is determined to avoid the damages caused by floods. According to Anwar (2023), RM 11.8 billion was allocated for 33 high priority flood mitigation projects for the nation.

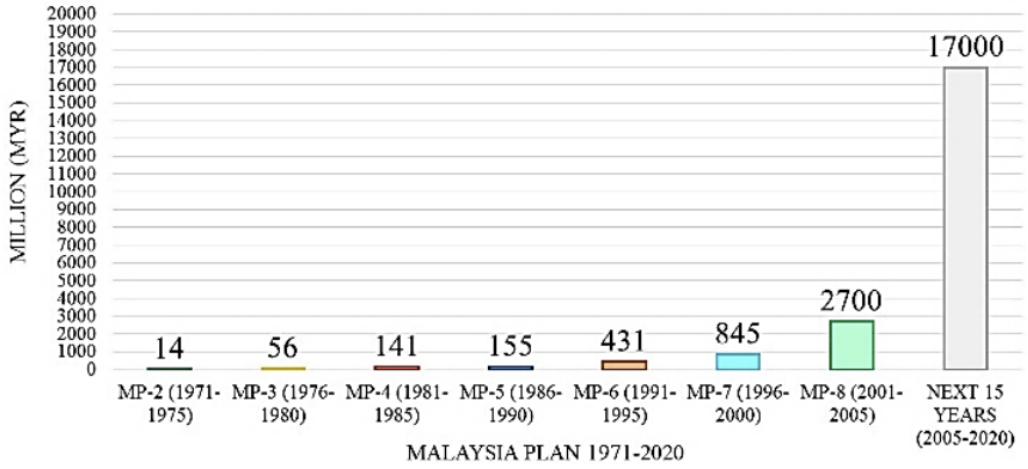

Figure 2.1: Budget Allocation for Flood Mitigation Measures by Malaysian Government (Muzzamil, 2017).

A significant structural flood mitigation that had been implemented by the Malaysia government is the Stormwater Management and Road Tunnel (SMART) project. Martinez (2021) mentioned that the SMART project serves a multipurpose 9.5km tunnel which it could relieve traffic congestion and flood mitigation. The SMART project could be divided into 4 modes where mode 1 SMART act as a 4km dual-deck road that could reduce the travel time by 10 minutes. In mode 2, part of the tunnel was filled with stormwater during

moderate rainfall and the stormwater would end up at the Kerayong River Storage Reservoir. If there are major rainfall, the traffic tunnel will be empty to reserve for mode 4 where the tunnel is fully utilized as stormwater management where the whole tunnel is fulfilled with stormwater. Figure 2.2 shows the mechanism of SMART tunnel during flooding events.

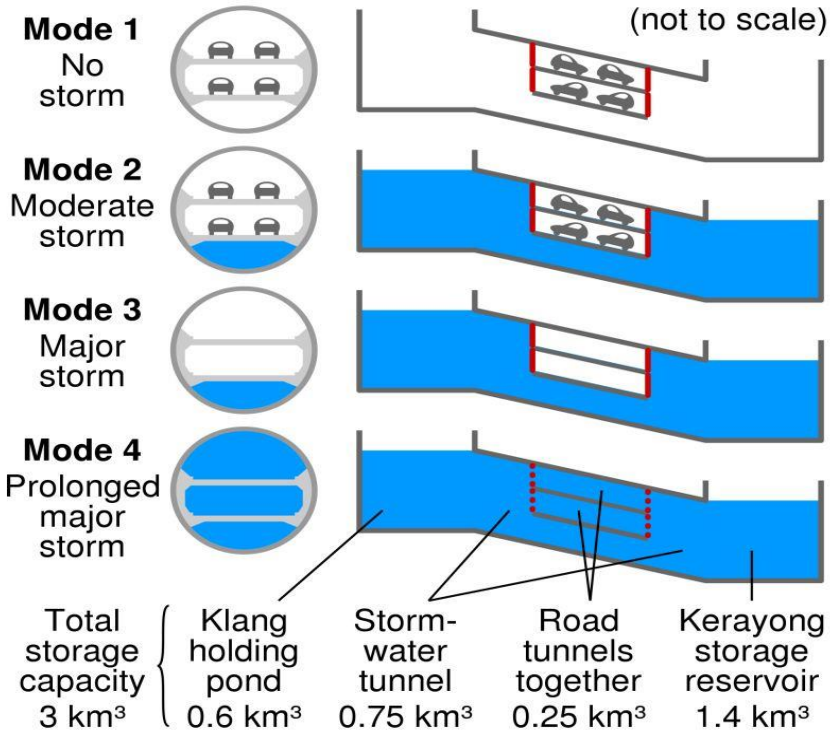

Figure 2.2: Stormwater Management and Road Tunnel (SMART) Project Modes (Martinez, 2021).

Upon the construction completed in 2007, SMART project received the UN-Habitat Scroll of Honor Award and bring major benefit toward the community. The infrastructure helped the city to become more resilient and fulling the SDG 11: Sustainable Cities and Communities. According to Martinez (2021), SMART project had been significant in combating the climate change that has constantly increase the frequency and intensity of major storms. The flexibility of the SMART project had maximized the utilization of the project.

Furthermore, the Malaysia government had constructed a flood detention ponds and flood diversions at the Batu Jinjang, Kepong. According to Fang (2012), Malaysia had suffered a major urban flood on 26th April 2001 due

to the channel capacity of Sungai Klang was insufficient to cater the flood flow accumulated from heavy rainfall. The presence of "bottlenecks" in the river had significantly increased the intensity to overcome the high rainfall intensity during the monsoon season. Thus, the Malaysian government had allocated RM 600,000,000 and the project had completed in 2009. The flood detention ponds and flood diversions were constructed to protect the event of 1 in 100-year ARI floods away from the urban area along the Sungai Gombak and Sungai Batu.

In this project, it had been divided into 2 scheme which are the Gombak diversion scheme and Keroh scheme. Fauzi (2013) mentioned that both schemes consist of construction of barrage across the river, enlarging the detention pond to increase the storage capacity and construct associated structure such as trash screen, inlet and outlet gates, ogee weirs, bridges, flood walls, quarters, control rooms, maintenance ramps etc. Besides, the Gombak diversion channel had been upgraded to handle a discharge capacity from 60 to 275 cubic metre per second while the Keroh diversion channel will be constructed with the capability to handle 100 cubic metre per second. The Sri Segambut Pond will be bund as the inlet regulation pond for Keroh Diversion Scheme in order to increase the capacity to hold the surface runoff. According to the Department of Irrigation and Drainage Malaysia (2017), the whole system would divert the floodwater away from Kuala Lumpur through the gate operations constructed at Gombak Diversion and Keroh Diversion to keep the urban area from suffering flooding. After the water level near the Putra World Trade Centre (PWTC) dropped to acceptable level after heavy rainfall, the floodwaters in storage ponds will be gradually released.

To make this flood mitigation project to be more efficient, Malaysian government implemented the Supervisory Control and Data Acquisition (SCADA) System. SCADA System consists of multiple monitoring devices connected to the local control station that would ensure secure and consistent water flow management (Department of Irrigation and Drainage Malaysia, 2017). The SCADA System would automatically trigger the floodgates installed after detecting water level was rising unexpectedly through the sensors. Furthermore, the SCADA System also capable to ensure the condition of the floodgates to prevent malfunction during emergency. SCADA system had

become an important component to fully utilize the flood mitigation system to prevent technical error.

The Malaysian government had constructed many measures in order to fight against the flash floods in urban area. According to Sonia (2022), widening drain in Jalan Serindit 2, Bandar Puchong Jaya were completed as the upgraded drain is currently capable to resolve the flash floods issues that affected 30 units of factories within the flash flood area. Two flood mitigation works worth RM1.1 million were carried out at Taman Kinrara, Puchong to strengthening and stabilize the riverbanks in Sungai Keroh and construction of river bunds (Fathil, 2022). It is cleared that the Malaysian government had allocated their attention toward fighting against the natural disaster, however cities still suffered from flash floods. It is clearly instructed that the flood mitigation constructed were insufficient to mitigate the flooding issues. Hence it is important for this study to be carry out to study the public acceptance of smart flood mitigation in Puchong.

2.3 Smart Flood Mitigation

In order to increase the reduce the potential risk of flooding, Smart Flood Mitigation is had been invented to boost the development of flood mitigation system. The idea of "Smart" had been recorded a successful achievement in the histories. In order to increase the efficiency of current implemented flood mitigation systems in our environment, it is necessary to upgrade the ordinary flood mitigation system to smart flood mitigation systems (Ibrahim, 2021). Rapid urbanization that caused huge transformation of the cities had burdened the flood mitigation that had been constructed long time before. It had become a norm for the cities to face urban flash flood during the high precipitation seasons. Smart flood mitigation is capable to transforming our current cities to a more sustainable, efficient, and liveable environment that is free from flood disasters.

2.3.1 Components of Smart Flood Mitigation

According to Ariyaningsih (2022), the idea of smart flood mitigation could be redefined as water smart city which surrounds the application of Internet of Things (IoT) to manage the flood related issues. Internet of Things is a

technology that is aimed to collect and share data from countless of physical devices to other devices by the internet connection (Ranger, 2020). In order to maximize the Internet of Things, the flood management system is required to equipped with multiple sensors that could read the various real-time data such as water level in rivers, precipitation volume in certain areas, capacity of water reservoir etc. According to Aziyati (2015), the collected data from sensors would be sent to big data analytics and modelling to process all the data so that accurate forecasts and predictions could be model and simulate in the modelling software. Forecasts and predictions generated by the software could be used to aid the specific department to make critical decisions.

Furthermore, there are more advanced technologies developed by the humankind to increase the efficiency of the smart flood mitigation such as the real time monitoring with the camera and satellite imagery. This real-time monitoring technologies could provide guidance while making decision during disaster response and recovery efforts. According to Seyed (2023), current smart flood mitigation had a system that equipped with various technologies to access flood susceptibility, it is crucial to equip the machine learning technologies in the modelling software so the software could identify the solution during multi-criteria decision making. After the centralized data centre made decision, the signal will be assigned to the flood management infrastructure to make actions based on the decision made to overcome the issues. Stream gate, reservoir outlet, diverging channel connects to the data centre plays in important to control the volume of precipitation gained during the rainfall that would lead to flood disasters as immediate action could be carried out after the signal had been sent.

Beside from the structural measure for smart flood mitigation, it is important for the local authorities to implement the non-structural measure to eliminate the floods. According to Ngai (2020), Malaysian's citizens in current generation are lack of knowledge and awareness regarding to flooding events. Flood awareness, flood education, flood preparedness, flood perception, flood readiness and flood evacuation programmes are recommended to be launched to promote non-structural measures in the society (Ngai, 2020). With the advancement of internet and social media, all these programmes could be carried out through online platform to educate the public. Nonetheless, the non-structural also including the land use planning and floodplain mapping &

management. According to Rita (2022), land use planning is the fundamental input for flood risk reduction that require long-term systematic planning based on various aspects. A proper land use planning could effectively minimize the flood risk by avoiding development in the floodplain with high risk of flooding. A huge amount of adequate data is needed before this land using strategy could be carry out with high rate of success. Hence, it is important for all the city to develop the smart flood mitigation in their flood management to reduce the chances of suffering the floods.

2.3.2 Smart Flood Mitigation in Malaysia

Nonetheless, smart flood mitigation plays a crucial role in the future development of a city as it could potentially bring higher efficiency in management the floods. In Malaysia, the government is implementing the smart flood mitigation in order to overcome the annual flood disaster faced by all the Malaysian. According to Malaysian Communications and Multimedia Commission (MCMC), a programme name as Kemaman Smart Community (KSC) was carried out in year 2016 in order to turn Kemaman, a town in Terengganu into a smart community. In the proposal release by MCMC, the programme is surrounded by the disaster management as Kemaman suffered from year-end monsoon annually that would damage the homes of thousands and disrupts the life of the locals.

According to David (2016), Kemaman Smart Community consist of 2 primary objectives which is enhance the quality of life and socio-economic conditions in Kemaman and establish a strategic and comprehensive system in order to tackle the perennial floods in Kemaman. The flood management system launched by MCMC covers a pre-flood, during the flood and the post flood management. Real time information will be provided to the locals to increase their preparedness and information regarding the safe area during the pre-flood; During the flood, the operation room will analysis the real-time data received from sensors to manage the disaster such as rescue operation and location to setup flood mobilisation centres; the post system will provide the clean-up for the areas that suffered from the floods and provide relief aid from the government.

According to Eleventh Malaysian Plan that lasted from 2016 to 2020, a mission of developing integrated weather and flood forecasting system in nationwide were set by the government. However, the mission was failed to achieve as recorded in the Twelfth Malaysian Plan (2021-2025), only 3 river basins in Sungai Kelantan, Sungai Pahang and Sungai Terengganu is equipped with the integrated system. Furthermore, Eleventh Malaysia Plan also targeted to protect 2 million people through flood mitigation projects, but only 1.6 million people were involved in the protection. This had shown that the Malaysia government had failed to achieve the target in the nation.

Apart from the Malaysia 5 years plan, the local authorities of the most developed city, Kuala Lumpur, Kuala Lumpur City Hall (DBKL) had released 2022 Flash Flood Action Plan worth RM 10 million on 09 May 2022 in order to construct more flood mitigation plan in Kuala Lumpur (Bavani 2022). The action plan was proposed after the Kuala Lumpur had suffered from flash floods in April 2022 due to heavy rainfall that caused traffic congestion. Upon the action plan, the mayor Datuk Seri Mahadi Che Ngah mentioned had proposed multiple structural measures to eliminate 25 flood hotspots in the Kuala Lumpur which including upgrading scupper drains, constructing new sump pump, placing sandbags and desilting debris at flood retention ponds. The action plan also included smart technology such as DBKL Mobis application that would release real time data from the Meteorological Department Malaysia toward the citizen regarding the road status while the city is suffering from the floods.

However, residents in Kuala Lumpur had filed a lawsuit against the DBKL regarding the 2022 Flash Flood Action Plan on 29 September 2022 as the residents governs that the action plan is outdated and inadequate to deal with the monsoon season (Veena, 2022). The group was represented by a lawyer, Mr Lim had highlighted failure of DBKL to carry out flood mitigation projects as only 8 out of 104 flood mitigation projects were constructed after 4 months and mentioned that multiple highly flood prone areas are not included in the action plan. Based on above, statement, it had clearly shown that the Malaysia’s plan to mitigate the floods is still lack of professionalism and it is crucial to conduct this research to investigate the smart flood mitigation in Puchong.

Similar to Kuala Lumpur, Puchong area with an estimated population of 400,000 faced the same situation as the flooding issues often happened in the

area. According to Syahar (2024), the hot flood zone in Puchong which is the Damansara-Puchong Expressway (LDP) located near IOI Mall in Puchong is facing an issue of the delay of the flood mitigation project. According to Khoo (2019), Puchong is a mature urban area with a huge area covered with residential area and commercial area. As Puchong serves as a commercial area, the flood mitigation system in Puchong had yet to be upgraded to fully smart flood mitigation system as most of the flood mitigation devices are yet function as manually. However, in this recent years, there are certain funds allocated from the Selangor Irrigation and Drainage Department (DID) to Puchong area inorder to upgraded the ordinary flood mitigation system in Puchong area. As one of the developed cities, it is necessary for the government to ensure that the area should be free from the flooding issues. Hence, it is important to measure the variables that would affect the public acceptance towards the smart flood mitigation in Puchong.

2.4 Acceptance Level of Public Towards Smart Flood Mitigation in Puchong

Acceptance Level of public towards the smart flood mitigation indicates an act of agreeing on the development of the smart flood mitigation at the nation. According to Wang (2022), acceptance denotes an individual's attitude and level of action, encompassing factors such as the approval, support, and rejection. According to Kalantari (2018), public acceptance is one form of attitude that would reflect an individual's interest toward a topic. Public acceptance would directly portray the public action towards a new technology which has been implemented (Asmara 2021). To develop the smart flood mitigation in the specific area, relevant evaluation regarding the acceptance level of public is needed to be conduct by the local authorities.

In the society, many researchers had published studies regarding the smart flood mitigation and project performance evaluation, however there are a very few studies had been conducted based on the standpoint of a public toward the acceptance regarding the smart flood mitigation in Malaysia. As the technologies advancing day by day, the application of smart flood mitigation in urban areas had become a necessary component. The success of smart flood mitigation are highly hinges on the public's willingness to adopt and support the

strategies implemented by the government. Lack of investigation regarding the acceptance level of smart flood mitigation would lead to lower efficiency while the government implementing the mitigation in the city.

According to Marco (2020), social acceptance had proven to be significant barrier while implementing the renewable energy systems in Europe countries. Similar to implementing smart flood mitigation, public acceptance remains a crucial aspect to lead the strategies to become successful. Smart flood mitigation is heavily driven by the real-time data collection and crowdsourced information. Without public acceptance to the strategies, the contribution of data and information will be lack and it would directly affect the accuracy of the flood prediction models and the early warning systems. As the early warning system require the cooperation of the public while evacuation, the public are more likely comply and cooperate with the flood response protocols if they understand and accept the mitigation system.

In order to mitigate the public opposition to the implementation of specific policies, it is crucial for public to gain information toward the policy, and it would directly increase the public acceptance (Wang, 2021). According to Li (2019), by improving the public acceptance, the public are more willingly to actively seek out additional information regarding the policy and develop better scientific knowledge regarding the policy then change their original attitude. As the smart flood mitigation require a long-term support from data provided from the community, increasing public acceptance would lead to continuous support and engagement from the public. By gaining acceptance of the public, the streamline of the project execution could be minimized from the opposition to avoid delay and disruptions during construction.

For the questions in the questionnaire survey to collect the data, a popular questionnaire from Abud-Dalbouh had been adapted to measure the public acceptance on smart flood mitigation in Puchong. The questionnaire release from Abud-Dalbouh is named as "A Questionnaire Approach Based on the Technology Acceptance Model for Mobile Tracking on Patient Progress Application" that had been adapted by other 151 researchers to carry out similar type of research study.

According to Titko (2020), the acceptance is a dependent variable that is driven by multiple independent variables such as usefulness, perception,

awareness, readiness, and preparedness. As major research had proven that the usefulness of adopting smart flood mitigation would widely eliminate the flood risks, the government is required to prove the effectiveness of the smart flood mitigation in minimizing the damages of flood and reduce the urban flash flood risks toward the community in order to gain the acceptance of the public. On the other hand, by providing knowledge towards the community would improve the insightful investigation and the familiarity of the public towards the smart flood mitigation. By providing technical information, individuals tend to have higher openness in supporting the relative policy made by the lawmakers (Kamil, 2023). Beside from proving technical information to the individuals, it is important that the government should demonstrate the implementation of smart flood mitigation from various aspects including the economic, socio-cultural and the development of the cities. Hence, it is important that this study must include the factor that affecting the public acceptance toward the smart flood mitigation in Malaysia.

2.5 Perception of Public Towards Smart Flood Mitigation in Puchong

Based on Pollick (2023), public perception can diverge from the absolute truth, which is grounded in scientific evidence, and instead be influenced by a virtual reality shaped by popular opinion or media coverage. Public perception is often related to the attitudes, intuition, experiences, expectations as well as information related to the context (Asmara, 2022). It is a complex and subjective to assess to individual's perceptions as it could affect by various aspects. Perception of an individual would directly affect the individual's action, decision-making ability, emotions. The success of smart flood mitigation hinges on both public acceptance and the technical effectiveness.

In order to obtain the public perception towards Smart Flood Mitigation, the questionnaire was adapted from Broadbent (2006). In the research study of Broadbent, the brief illness perception questionnaire (IPQ) had been designed to determine the cognitive and emotional representations of illness. This questionnaire had been widely used in the research study as the questionnaire designed are capable to understand the public perception. Up until 2023, a total of 3532 humankinds had cited this questionnaire to investigate the public perception. Hence, the questionnaire from the research study "The Brief Illness

Perception Questionnaire" from Elizabeth Broadbent et al. would be adapted in the questionnaire in this study. According to Wilkes (2015), the Brief IPQ developed by the Elizabeth Broadbent is useful across various applications. Apart from that, further evidence has been provided to prove its validity. The questionnaire's results align consistently with theory and encompass the fundamental cognitive dimensions found in the Common-Sense Model.

According to Sledge (2020), the public perception towards the policies implemented by the government to respond to crisis had become a significant area of study in the public policy research. Public perception is a bridge between the society and the policy makers that enable both parties to review on the policies made. Perceptions of the public would directly affect the effectiveness of government action and the willingness of vulnerable groups while confronting the natural disaster (Sledge, 2020). Public perception towards the smart flood mitigation would also influence the acceptance level of the public. Hence, the research question is developed in this research study.

2.6 Awareness of Public Towards Smart Flood Mitigation in Puchong

According to Gafoor (2010), awareness indicates that an ability of an individual to perceive, to feel, or to be conscious of events, objects, or sensory patterns. Awareness acts as a dynamic process that allow the individual's decision-making ability to switch from habitual to optimal behaviour based on the feedback given from the feedback mechanism of self-observation (Bizzarri, 2022). An individual with awareness regarding to the topic usually is equipped with certain knowledge regarding to the issue. Awareness could also refer to public or common knowledge or investigation about a social, scientific, or political issue (Gafoor, 2010).

According to Kaushik (2021), a series of questions were developed to identify the public awareness regarding the COVID-19 outbreak to prevent the spread of the pandemic in India. Furthermore, Lapada (2020) also developed a questionnaire to measure the awareness, readiness, and preparedness of the teachers in institutions towards the COVID-19. Both of the questionnaires mentioned above had successfully measured the awareness level of the public towards the pandemic and these questionnaires are suitable to be used in this research study to measure the public awareness towards the Smart Flood

Mitigation in Puchong. A total of 371 researchers had adopted both questionnaire from the "Teachers' Covid-19 Awareness, Distance Learning Education Experiences and Perceptions towards Institutional Readiness and Challenges" by Lapada (2020) and the "Cross-sectional study on the role of public awareness in preventing the spread of COVID-19 outbreak in India" by Kaushik (2020). Hence, both of the questionnaires would be adopted in this research study.

As awareness level is usually linked to the knowledge regarding the topic, therefore the public awareness is closely linked to the effectiveness of implementation of the smart flood mitigation in Puchong. According to Scolobig (2012), awareness level of the public would directly influence the preparedness of the public to fight against the flood risk. By increasing the awareness of the public toward the smart flood mitigation, the public would gain more knowledge regarding the flooding issue that would be beneficial toward the policy maker while implementing the smart flood mitigation. Public Awareness towards the smart flood mitigation would also influence the acceptance level of the public.

2.7 Prepardness of Public Towards Smart Flood Mitigation in Puchong

Preparedness is a key component for research study that is crisis related as it determines how well the society is prepared to overcome when disaster happened (Delgado, 2017). According to Paton (2018), United Nation International Strategy for Disaster Risk Reduction had defined preparedness refers to the knowledge and capabilities cultivated by government, response, and recovery organizations, communitive and individuals to effectively response towards current disaster. It had clearly shown that preparedness is essential to be measured in this research study.

The survey questions in this research study are adopted from the "Preparedness and Preventive Behaviors for a Pandemic Disaster Caused by COVID-19 in Serbia" by Cvetkovic (2020). This questionnaire had been officially cited by 198 researchers and it proven to be a useful survey to be used as a measurement to investigate the awareness level in society.

Preparedness level of the public would make great impact toward the efficiency of the smart flood mitigation. According to Finn (2019), high preparedness level in the society would highly minimize the losses and damages that caused by the disasters. With high public preparedness in the public, the public tends to be more comply with the flood mitigation system while the floods hit the environment (Atreya, 2017). Public preparedness towards the smart flood mitigation would also influence the acceptance level of the public. Hence, the research question is developed in this research study.

2.8 Readiness of Public Towards Smart Flood Mitigation in Puchong

Readiness level of the public would indicate the condition of the society in order to comply with the mitigation that implemented by the government (Chung, 2020). According to Jolpin (2020), readiness of the public determines the successful of the new implemented policy and its often related to the preparedness of the public. In order to establish high acceptance level in the society, the government is required to establish high level of readiness upon the policy made.

To measure the public readiness toward smart flood mitigation in Puchong, a questionnaire would be developed based on the journal article written by Smith (2010) “Towards identifying Factors Underlying Readiness for Online Learning: An Exploratory Study”. The questionnaire released by Smith had totally cited by 255 researchers as it consists of 13 questions that would provide insight into the public readiness of online learning that can be modified into other topics.

According to Blyth (2015), society with high readiness tends to be more supportive and complying with the implemented strategics as they will not panic during the disaster. It is crucial to develop public readiness toward smart flood mitigations as it would encourage the society to adopt to long-term mitigation measures and comprehend with the policies made to reduce the flood issues happening in the urban areas. Public readiness towards the smart flood mitigation would also influence the acceptance level of the public. Hence, the research question is developed in this research study.

2.9 Summary

In conclusion, this chapter provided a general overview of the 4 independent variables that are the perception, awareness, preparedness, readiness will affect the public perception of smart flood mitigation in Puchong. In depth literature study had been conducted on the all the independent and dependent variables respectively. A detailed explanation of the methodology of this research study will be discussed in the Chapter 3: Methodology.

CHAPTER 3

METHODOLOGY AND WORK PLAN

3.1 Introduction

In order to establish a flood free community by adapting the smart flood mitigation in Puchong, the methodology must be carried out to establish the achievement. In order to observe the public perception, awareness, preparedness, and readiness that would directly influence the public acceptance towards the smart flood mitigation in Puchong, methodology that must be designed and carried out.

3.2 Research Onion

To establish the connection between variables mentioned previously, research onion could be implemented in this research study to describe the different decisions while developing research methodology in this search. According to Phair (2021), research onion allows researchers to work from outside of the onion to inwards that consist of multiple layers and multiple selection that starting from high-level and philosophical to tactical and practice in nature. Research onion was developed by Saunder in 2007 that created a firm basis for development of coherent and justifiable research design. Since the establishment of research onion, the effective model had been widely adopted in social sciences research (Melnikovas 2018). Figure 3.1 shows the research onion components in each layer. Research onion served as a guide for this research study to perform the data collection and data analysis.

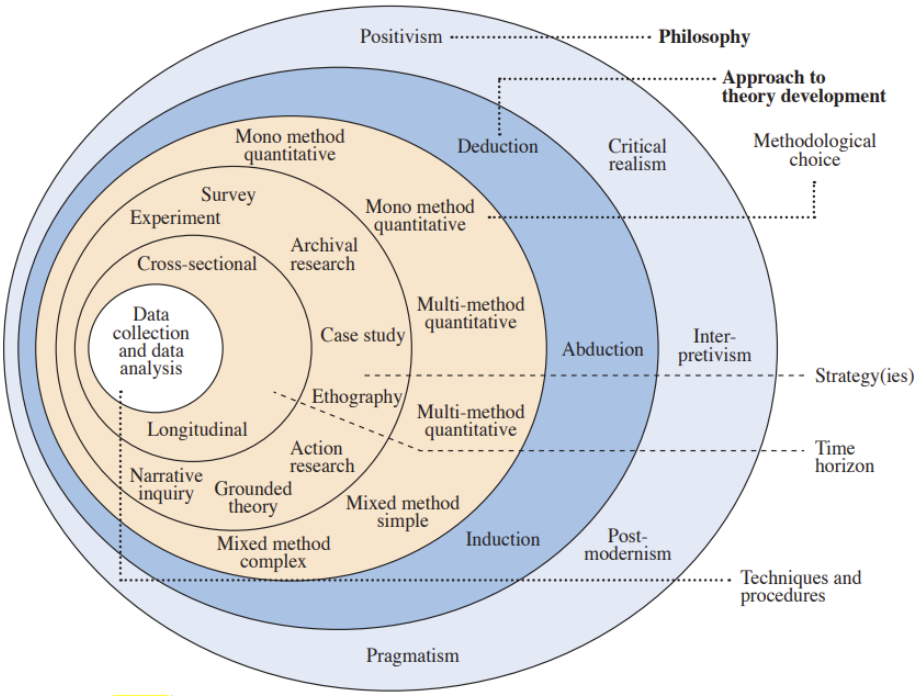

Figure 3.1: Research Onion(Melnikovas, 2018).

3.3 Development of Conceptual Framework

Conceptual framework is needed to generate a big picture for the methodology on variables that are going to be observed. According to Swaen (2022), conceptual framework will illustrate the expected relationship between the variables with the objective that the research study focuses on. Conceptual framework is a network for multiple concepts together to generate a higher insight of the situation and research (Jabareen, 2009). According to Luft (2022), the conceptual framework will visually depict the anticipated relationships between the variables, aligning with the specific objectives that the research study aims to address. Therefore, it is crucial for this study to construct a conceptual framework to facilitate a thorough examination of public acceptance on smart flood mitigation in Puchong.

Based on the Chapter 2, four variables had been identified that affects the acceptance level of the public towards the smart flood mitigation which are the perception, preparedness, readiness, and awareness. The variables mentioned in chapter 2 are known as the independent variable while the dependent variable is the acceptance in this research study. Figure 3.2 shows the conceptual framework that connect the perception, preparedness, readiness, and awareness towards the public acceptance on smart flood mitigation in Puchong.

The conceptual framework was developed to generate a clear direction while designing the questionnaire to achieve the objectives in this study.

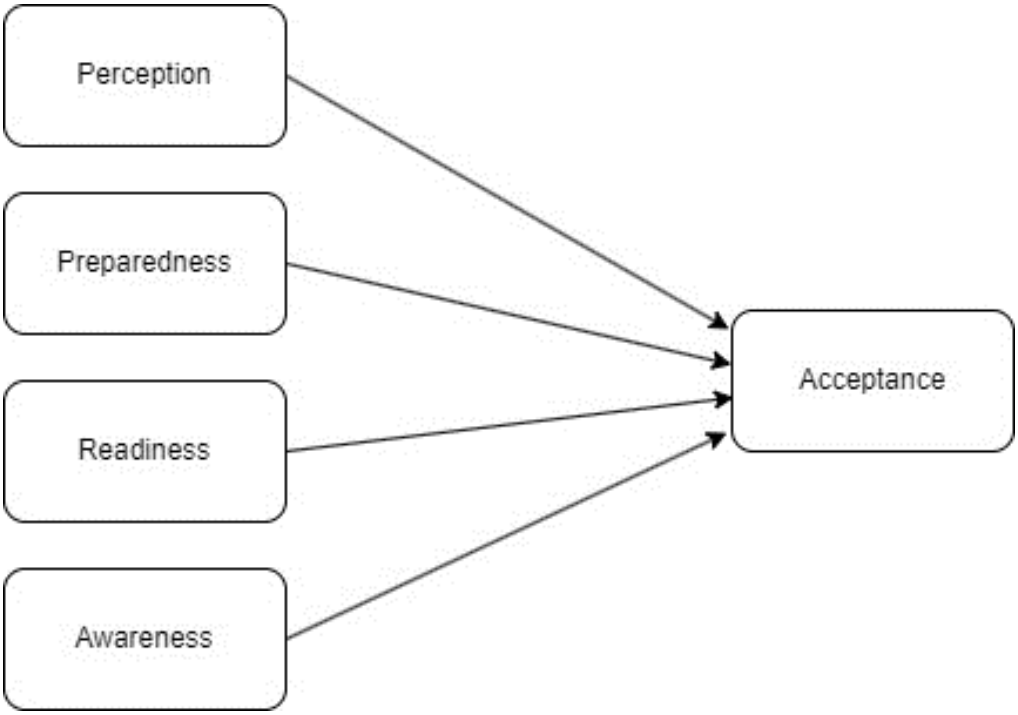

Figure 3.2: Conceptual Framework of Public Acceptance of Smart Flood Mitigation in Puchong.

3.4 Research Design

In order to generate a better result for this research study, the conceptual design was developed to aid the research design. Based on the conceptual design mentioned above, the public acceptance toward the smart flood mitigation in Puchong will be examined with proper research design. Research design is a plan developed to collect, analyse, and interpret data. Research design is implemented to ensure that the collected data effectively addresses the research problem with clarity, accuracy, and minimal bias (Bouchirika, 2023). In short, it is research design would outline the methods to be used in the questionnaire to collect and analyse the data. According to Pedamkar (2023), there are various types of research design were developed and used by the other researchers. However, the widely used research design are the qualitative and quantitative studies. Table 3.1 shows the differences between qualitative studies and quantitative studies. Even though there are differences between both qualitative

studies and quantitative studies, some of the research would combine both research studies for a deeper investigation of certain topics.

Table 3.1: Differences between qualitative and quantitative studies (Apuke, 2017).

Criteria	Qualitative Studies	Quantitative Studies
Aim	To understand & interpret social interactions	To test hypotheses, look at cause, & effect & make predictions
Targeted Group	Smaller & selected audience	Larger & randomly selected
Variables	Study of the whole, not variables	Specific variable studied
Type of Data Collected	Words, image, or objects	Number and statistics
Type of Questionnaire	Open ended question	Close-ended or Multiple choices question
Type of Data Analysis	Identify patterns, features, themes	Identify statistical relationship
Objectivity or Subjectivity	Subjectivity	Objectivity
Results	Particular or specialized findings	Generalizable findings
Nature of Observation	Study behaviour in natural environment	Study behaviour under controlled conditions; isolate causal effects
Common research objective	Explore, discover, & construct	Describe, explain, & predict

3.4.1 Qualitative Study

According to Teny (2022), qualitative research is research that explores and provide deeper insights into real-world problems. Qualitative research would

help to generate hypotheses based on the participants' experiences, perceptions, and behaviour to further investigation (Tenny,2022). Qualitative research would allow the researchers to gather in-depth insights on topics that are still exploring as the qualitative research are usually expressed in words. Qualitative research is commonly used in Ethnography, Grounded Theory, Phenomenology and Narrative Research (Tenny, 2022). Hence, qualitative research would not be suitable for the topic to be discussed in this research study, Public Acceptance of Smart Flood Mitigation in Puchong.

3.4.2 Quantitative Study

Opposite from the quantitative research, data obtained will be statistical and typically structured (Pickell, 2023). According to Sreekumar (2023), quantitative research can be utilized to observe events impacting a specific group of individuals by analysing data collected from a sample population. The data collected would undergo analysis by software to be sorted with various aspects. The analysis of the numerical data through mathematical methods would generate a high accuracy and reliable and validated data. Quantitative research could be classified into 4 types which are the survey, correlational, experimental, and casual comparative. The quantitative research enables the researcher to access to the relationship between the variables of the data collected from a smaller population into a wider population (Sreekumar, 2023).

Based on the comparison between the qualitative and quantitative research, quantitative research would be employed to identify the relationship of the variables toward the public acceptance of smart flood mitigation in Puchong. Qualitative research that consists open-ended questions would be more suitable for the theory-building research. However, quantitative research collects numerical and statistical data and undergo analysis to provide an in-depth investigation of the topic in this research. According to Adam (2023), quantitative research is more concerned with reliable facts and information and quantitative research could be verifiable and used to duplicate results. Thus, quantitative research will be more suitable to be employed compared to the qualitative research in this research topic.

3.5 Data Collection

As the research design had been selected for this study, the data collection to determine the public acceptance of smart flood mitigation in Puchong is required to be carried out. According to Cote (2021), data collection involves systematically gathering and measuring information based on the variables of interest within a structured framework. Quantitative analysis required data in order to prove the hypothesis mentioned in this research report. Data could be obtained by the process of data collection which enable individuals to respond toward designed questionnaire in order to undergo analysis to evaluate the outcome. As qualitative research requires words data and quantitative research requires statistical data, data collection for both of the research could be use in different approaches. Appropriate data collection would be capable to eliminate incorrect data that would lead to insightful discoveries of the hypothesis. For this research study, quantitative research would be conducted, and the data would be collected through a survey and distribution of questionnaires. In general, data collection could be categorized into two types which is the primary data and secondary data.

3.5.1 Primary Data

Primary data is the data that has been collected from the first hand-experience by the research from the targeted population (Cote, 2021). It is important that the primary data must be obtained without any reference from the other research studies. Survey, questionnaire, observation, and interviews from the targeted population remain the widely used methods to collect the primary data as it is more reliable, authentic, and objective compared to the secondary data. According to Kabir (2016), there is a huge constraint when collecting primary data is due to the time constraint as collecting primary data is time-consuming.

3.5.2 Secondary Data

Secondary data is data that retrieved from any source that had been published to the public. In this data collection, researchers are required to review huge amounts of literature that consist of the necessary information that could be used as references in the literature. Sources of the secondary data could be obtained from books, journal articles, newspaper, reports, databases any more other

forms that record the data. Compared to primary data, secondary data is less valid, but it contributes as a support toward the hypothesis and the data collected from the primary data. Table 3.2 shows the differences of primary data and secondary data.

Table 3.2: Primary Data vs Secondary Data.

Aspects	Primary Data	Secondary Data
Definition	First-hand data gathered by the researcher himself	Data obtained through other researchers
Time of data	Real-time data	Past Data
Collection Method	Questionnaire, Surveys, Interview, Observation, Experiments	Books, Journal Articles, Newspapers, Report, Websites
Advantages	• Reliable, Authentic, Relevant to objectives data • Accurate Data	• Less cost and time consuming
Disadvantages	• Time and money consuming • Require filtration for irrelevant responds	• Less reliable, authentic and accuracy • Data is not up to date. • Data is not based on the targeted population

In this research study, primary data will be collected via questionnaires, and it will remain as the primary source of data for this research to increase the validity and accuracy of the public acceptance of smart flood mitigation in Puchong.

3.5.3 Targeted Population

According to Barnsbee (2018), target population is a group of individuals that the researcher intends to study their opinion and analysed the information given from the respondents. Due to time constraints in this research study, a targeted population is required to be set to prevent irrelevant data. According to Zainury (2024), residents in Puchong area expressed their fatigue with frequent floods and the burden of vehicle damages caused by the flooding issue. In this study, the targeted population would be residents from Puchong and individuals that had experiences of traveling to Puchong before. As the Puchong had been declared as commercial area that consist high flow rate of the population, thus conducting data collection upon people travelled to Puchong will be relatively important. It is relatively important for the respondents to understand the flooding situation in Puchong to accumulate high accurate data.

3.6 Sampling Data

Upon data collection had been conducted, the sampling design to study the public acceptance of smart flood mitigation in Puchong is relatively important to generate high accuracy result for this research study. According to Gimino (2023), sampling is a process that select the estimating population characteristics which can be also understand as obtaining information about an entire population by conducting research on a part of the population. Sampling design would be beneficial toward the researcher in increasing the reliability and validity of the research. Lameck (2013) mentioned that quality social science research is evaluated by the sampling design, reliability, and validity of the research. Hence it is crucial to design the sampling in this research study.

3.6.1 Sampling Technique

In order to develop research with high accuracy and adequacy, sampling technique must be identified based on several important aspects that consist of population variance, size of population, desired result precision, objective of the study and the accuracy required for the study (Sharma, 2017). According to Sharma (2017), there are 2 types of sampling techniques that are widely used by researchers which are the probability sampling and non-probability sampling.

3.6.1.1 Probability Sampling

Probability sampling involves a method of sampling where each individual in the population has an equal opportunity of being selected for inclusion in the sample. According to Sharma (2017), the probability sampling could be divided into 4 methods which are the simple random sampling, systematic sampling, stratified sampling, and the cluster sampling. Table 3.3 and shows the difference between simple random sampling and systematic sampling.

Table 3.3: Simple Random Sampling vs Systematic Sampling (Sharma, 2017).

Aspects	Simple Random	Systematic
Definition	Each member of the population has an equal chance of being selected as subject.	The population are selected at a regular interval.
Advantages	• Unbiased sampling • Good representative of the population	• Ensure extension of sample to entire population • Easier to be conduct
Disadvantages	• Time – cost consuming • Require large population	• Time – cost consuming • Require large population

Apart from simple random sampling and systematic sampling, Table 3.4 shows the difference between stratified sampling and cluster sampling.

Table 3.4: Stratified Sampling vs Cluster Sampling (Sharma,2017).

Aspects	Stratified	Cluster
Definition	The sampling is divided into smaller groups known as strata based on shared attributes or characteristics.	The population is divided into sub-groups based on the geographical allocation.
Advantages	Produce representative sample with diversity	• Reduced variability • Less time and cost consuming
Disadvantages	Subgroup size could be uneven	• Biased sampling • Higher error

3.6.1.2 Non-Probability Sampling

Non-Probability sampling could be divided into 4 methods. Table 3.5 shows the difference between quota sampling and purposive sampling.

Table 3.5: Quota Sampling vs Purposive sampling (Sharma,2017).

Aspects	Quota	Purposive
Definition	A sample where the groups being studied are proportional to the population being studied.	A selective sampling that relies on judgement of the researcher when selecting the units to be studied.
Advantages	• Quicker and easier to conduct	• Can provide generalization based on the sample. • Effective for qualitative research
Disadvantages	• Sample must be clearly divided into multiple groups	• Highly prone to researcher bias.

Apart from quota sampling and purposive sampling, Table 3.6 shows the difference between self-selection sampling and snowball sampling.

Table 3.6: Self-Selection Sampling vs Snowball sampling (Sharma,2017).

Aspects	Self- Selection	Snowball
Definition	The individuals were chosen to be taken part in the research on their own accord.	The sample group appear to grow like a rolling snowball where it could be understood as chain sampling.
Advantages	• Quicker to be conduct. • High willingness from individuals	• Capable to identify hidden population (drug users or prostitutes)
Disadvantages	• Highly self-selection bias	• Impossible to determine sampling error and make generalizations

Based on the comparison mentioned in the table above, simple random sampling from the probability sampling will be adopted in this research study in order to determine the public acceptance of smart flood mitigation in Puchong based on public perception, awareness, preparedness, and readiness. Simple random sampling guarantees that every member of the population has an equal chance of being chosen for the sample, thereby minimizing biased selection, and enabling generalization of findings to the entire population. According to Dipersio (2024), simple random sampling offers high accuracy over other sampling method when researching for a huge population.

3.6.2 Sampling Size

It is necessary to identify the sampling size for the research study as the huge sample could be unnecessary and very time consuming while a small sample would be unscientific and inaccurate (Andrade 2020). Optimum sampling size is recommended to reduce the time and cost for data collection. According to Kabir (2016), there are multiple methods to identify the sampling size for the research. Among the methods to identify the sampling size, it can be categorized based on the estimation of mean or estimation of percentage / proportion. According to Kang (2021), G-Power is a simple approach to identify the sampling size by measuring the significance level required. In this research study. Figure 3.3 shows the sampling size require in for significant of 0.95.

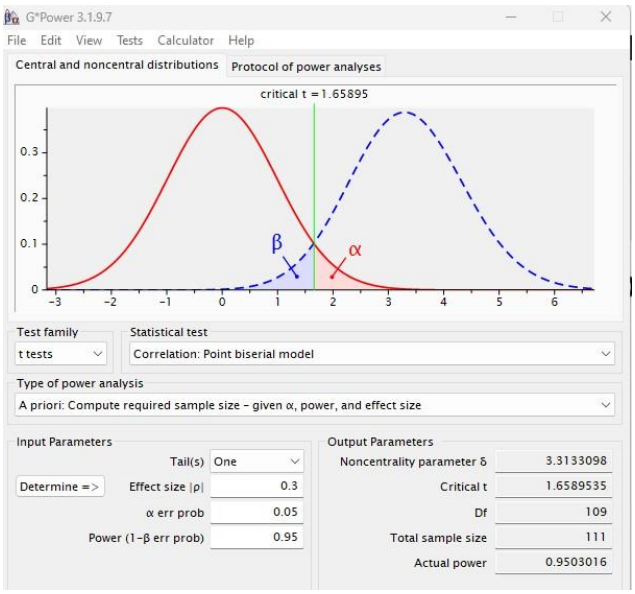

Figure 3.3: Sampling Size Required by G-power.

3.7 Research Instrument

Research instrument indicates the tools used by researcher to retrieve, study, and analyse the data (Collin, 2021). In this research, questionnaire survey is chosen as the research instrument to collect the data from the public.

3.7.1 Questionnaire Survey

According to Roopa (2012), questionnaire was invented by British statistician, Sir Francis Galton in late 1800 that consist of a list of questions to be answered by the respondents based on the respondent's opinion. Questionnaire survey is the primary sources to collect quantitative primary data to undergo future analysis (Roopa, 2012). According to Aryal (2023), questionnaire could be separated into two different types which are the structured questionnaire and unstructured questionnaire. Structured questionnaire is designed with closed-ended questions while the unstructured questionnaire is designed with open-ended questions. Thus, structured questionnaire is adopted in this research to obtain the data from the public for the quantitative research with close-ended questions.

3.7.2 Questionnaire Design

In this research study, the questionnaire was prepared based on the conceptual framework in this study. In order to ensure that the data collected is interpretable and valid, questionnaire from other researchers were adapted and modified to related to this research topic. This questionnaire is designed with 2 sections where the section A retrieve the general information of the respondent while the section B is questions adapted and modified according to each independent variables and dependent variable. Adapted questionnaires were modified by changing the keywords of the research. Table 3.7 shows the modified questionnaire to measure the public perception of Smart Flood Mitigation in Puchong.

Table 3.7: Perception of Smart Flood Mitigation in Puchong.

No.	Original Questions	Modified Questions	Reference
1	How much does the illness affect your life?	Smart Flood Mitigation will affect our life.	Broadbent, et al. (2006)
2	How long do you think your illness will continue?	Smart Flood Mitigation will be relevant in our environment.	
3	How much control do you feel you have over your illness?	Smart Flood Mitigation will resolve the flooding issues.	
4	How concerned are you about your illness?	I am concerned about the Smart Flood Mitigation.	
5	How much do you experience symptoms from your illness?	I have experienced the benefits of Smart Flood Mitigation.	
6	This retailer's stores are well known.	I know well about the Smart Flood Mitigation.	

Table 8 shows the modified questionnaire to measure the public Awareness of Smart Flood Mitigation in Puchong.

Table 3.8: Awareness of Smart Flood Mitigation in Puchong.

No.	Original Questions	Modified Questions	Reference
1	Aware that COVID-19 is a global pandemic.	I am aware that Smart Flood Mitigation is a global trend.	Lapada, et al. (2020)
2	Aware that the government declared the Enhanced Community Quarantine.	I am aware that the of the concept of Smart Flood Mitigation.	
3	Aware that the government declared the Enhanced Community Quarantine in Luzon.	I am aware that the government had implemented Smart Flood Mitigation in Puchong	

4	Aware of the Dos and Don’ts during the Enhanced Community Quarantine.	I am aware of the benefits of Smart Flood Mitigation.	
5	Aware of the importance of social distancing to prevent the spread of COVID-19.	I am aware of the importance of implementation of Smart Flood Mitigation to prevent flooding.	
6	COVID-19 is the same virus as SARS?	I am aware Flood Mitigation is the same strategies as Smart Flood Mitigation	Kaushik, et al. (2020)
7	How to prevent the spread of coronavirus?	I am aware that Smart Flood Mitigation could eliminate the flood risks.	

Table 3.9 shows the modified questionnaire to measure the public preparedness of Smart Flood Mitigation in Puchong.

Table 3.9: Preparedness of Smart Flood Mitigation in Puchong.

No.	Original Questions	Modified Questions	Reference
1	I find myself individually prepared to respond to emergencies caused by novel coronavirus epidemic.	I find myself individually prepared to respond to Smart Flood Mitigation in Puchong	Cvetkovic, et al. (2020)
2	I consider my local government prepared to respond to emergencies caused by novel coronavirus epidemic.	I think that the local government is prepared implement Smart Flood Mitigation in Puchong	

3	I consider my country is prepared to respond to emergencies caused by novel coronavirus epidemic.	I think that the government is prepared implement Smart Flood Mitigation in Malaysia	
4	I consider I have sufficient knowledge to respond properly to emergencies caused by epidemics.	I consider I have sufficient knowledge to the Smart Flood Mitigation.	
5	I consider that I have prepared adequate respond plans during the outbreak	I consider that I have prepared adequate respond plans to the Smart Flood Mitigation during floods.	
6	I believe that my local community has effective plans to respond during an epidemic.	I believe that Smart Flood Mitigation has effective plans to respond during floods.	
7	I believe that my state has enough training within the household to respond during an epidemic	I believe that my state has enough preparation to overcome the flooding issue with Smart Flood Mitigation.	

Table 3.10 shows the modified questionnaire to measure the public readiness of Smart Flood Mitigation in Puchong.

Table 3.10: Readiness of Smart Flood Mitigation in Puchong.

No.	Original Questions	Modified Questions	Reference
1	I am able to easily access the Internet as needed for my studies.	I am able to access to the information of Smart Flood Mitigation.	Smith, Murphy and

2	I am comfortable communicating electronically.	I am comfortable to supporting in the Smart Flood Mitigation.	Mahoney (2003)
3	I am willing to dedicate 8 to 10 hours per week for my studies.	I am willing to contribute to development of Smart Flood Mitigation.	
4	I feel that online learning is of at least equal quality to traditional classroom learning.	I feel that Smart Flood Mitigation is less effective than ordinary flood mitigation.	
5	I feel that my background and experience will be beneficial to my studies.	I feel that understand more about the Smart Flood Mitigation will be beneficial to flood mitigation.	
6	I am comfortable with written communication.	I am comfortable with the development of Smart Flood Mitigation in Malaysia.	
7	I believe looking back on what I have learned in a course will help me to remember it better.	I believe studying the past event would be beneficial to the Smart Flood Mitigation in Malaysia.	

Table 3.11 shows the modified questionnaire to measure the public acceptance of Smart Flood Mitigation in Puchong

Table 3.11: Acceptance of Smart Flood Mitigation in Puchong.

No.	Original Questions	Modified Questions	Reference
1	Mobile Tracking on patient progress system will enable the doctor and nurse to get information of the patient quickly.	Smart Flood Mitigation will enable the public to get information of the floods quickly	Abu-Dalbouh (2013)

2	The mobile tracking on patient progress systems allows the doctor to follow up the patient condition from outside of the hospital.	Smart Flood Mitigation allows the authorities to follow up the floods condition from far away.	
3	Mobile tracking on patient progress system is useful in the rapid retrieval of information from the patient.	Smart Flood Mitigation is useful in the rapid retrieval of information from the flood condition.	
4	Mobile tracking on patient progress system will save the time of Physicians and nurses.	Smart Flood Mitigation will reduce time required for the flood response.	
5	Using mobile technology would improve my tracking patient condition performance.	Implementing Smart Flood Mitigation will reduce the flood risks.	
6	Learning to operate mobile tracking on patient progress system would be ease for me.	Participating in Smart Flood Mitigation would be ease for me.	
No.	Original Questions	Modified Questions	
7	I would find it easy get mobile tracking on patient progress system to do what I want it to do	I would find it easy to implement Smart Flood Mitigation to do what I want it to do.	
8	I believe that from using mobile tracking on patient progress system will increase the quality of health care industry	I believe that Smart Flood Mitigation will increase the ability to prevent flood from happening.	

3.8 Measurement Scale

According to Mishra (2018), measurement scale is a crucial part for the data collection, data analysis and data presentation in a research study. Various types of measurement scales had been developed to measure help the respondent in answering the questionnaire. There are four types of measurement scale that are widely adapted in the questionnaire by the researchers which are the nominal, ordinal, interval, and ratio (Mishra, 2018). Each of the measurement scales mentioned above had a different nature and different application. In this research study, the nominal scale and ordinal scale were adapted in the questionnaire.

3.8.1 Nominal Scale

According to Dalati (2018), nominal scale is the most basic level of measurement, where letters or symbols are assigned as labels to classify objects into distinct categories. Nominal data is used mostly adapted when the survey involves huge population as the nominal scale would be able to classify the respondent's marital status, gender, nationality, age group and other related questions (Mishra, 2018). Nominal scale could be understood as multiple choice questions. Example of the nominal scale is the gender (male, female), marital status (single, married, divorced), age (above 30, 20-30, below 20), etc.

3.8.2 Ordinal Scale

The ordinal scale has clear ordering in the data compared to the nominal scale. Ordinal scale put the variables into ranks. According to Mishra (2018), the example of ordinal scales can be used in multiple aspects such as ratings of quality (very good, good, fair, poor, very poor), agreement (strongly agree, agree, neutral, disagree, strongly disagree), economic status (low, medium, high).

3.9 Data Analysis

By adopting the preferred sampling design, research instrument and measurement scale for this research study, the data collected will be undergo the data analysis for further investigation. Data analysis holds pivotal importance in a research study, serving as the vital process of refining, transforming, and

organizing raw data to derive actionable and pertinent insights for further examination (Kelley 2023). In quantitative research, the aid of computer software is necessary to process a large amount of data collected.

As this research conducts quantitative study, the quantitative data would be analyzed. Data analysis can basically be divided into two types which are descriptive analysis and inferential analysis. Descriptive analysis enables the researchers to understand the sample population without inferences or prediction about the entire sample population. According to Neo (2023), the inferential analysis would allow the researchers to make inferences toward the sample population instead of providing a specific data set. After conducting the data collection, Statistical Package for the Social Sciences (SPSS) will be used to conduct the reliability test of the collected data set. After the data set undergoes reliability test in SPSS, the data set will then be imported to the Partial Least Squares Structural Equation (PLS-SEM) to analysis the data with reliability test, validity test and collinearity test. The data collected in this research will be analyzed with descriptive analysis and inferential analysis to generate the results in order to accomplish the objectives of this study.

3.9.1 Descriptive Analysis

Descriptive analysis provide summary and describing the main features of a dataset that is collected from the primary data (Kelley, 2023). According to Creswell (2018), descriptive analysis is famous in analyse the rent in data to answer one single question based on the general tendencies (mean, mode, and median), the spread of scores (variance and standard derivation) and the comparison among the scores. Researchers are advised to carry out the descriptive analysis as it would provide a broad picture of an event or phenomenon based of statistical data collected (Rawat, 2021).

3.9.2 Reliability Test

According to Crossman (2019), reliability is a measurement instrument that identifies the consistency of the result even it is repeated several times. Reliability of the data is crucial to be truth in order to develop research with high accuracy. Data that does not fulfil reliability test will be identified as invalid for the research. To identify the reliability of the data in this research,

internal consistency reliability test that involved Cronbach's Alpha was carried out. By conducting the reliability test, it can ensure the data collected through the questionnaire survey are reliable to be further analysed. This is significant in order to measure the public acceptance on smart flood mitigation in Puchong.

Cronbach's Alpha, developed by Lee Cronbach in 1951, is a statistical measure aimed at assessing the internal consistency of a test, with values ranging between 0 and 1. Internal consistency would allow researchers to gain insights to all the items in the test to measure the concept and the inter-relatedness of the items with the test (Tavakol, 2011). Sufficient sample size is required to provide the desired consistency of the Cronbach's Alpha in a questionnaire. Ensuring sufficient sample size is crucial to avoid lack of power of the test due to small sample size and avoid the waste of resources due to huge sample size (Adam,2018). Hence, SPSS is required to be used to compute the Cronbach's alpha for each of the variables in this research. According to Taber (2018), Cronbach's Alpha lower than 0.45 is considered as not satisfactory and Cronbach's Alpha larger than 0.7 is categorized as reasonable and the strong reliable category is within 0.9 to 0.75.

3.10 Reflective and Formative Framework

In order to ensure the relations between the independent variables and dependent variables, the reflective and formative framework is required to be carried out by using the Structural Equation Model (SEM). In this research, the Partial Least Squares Structural Equation Modelling (PLS-SEM) will be adopted to describe the relationships between the constructs and the measures. According to Freeze (2007), Structural Equation Modelling (SEM) empowers researchers to evaluate the theoretical relationships within both the measurement model (which examines the relationships between constructs and their measures) and the path model (which explores the relationships between constructs themselves). Two types of the latent construct measurement model are the reflective and formative. According to Freeze (2007), reflective measures are influenced by the latent construct, whereas formative measures influence the latent construct. Figure 3.4 provides an example illustrating reflective and formative measurement.

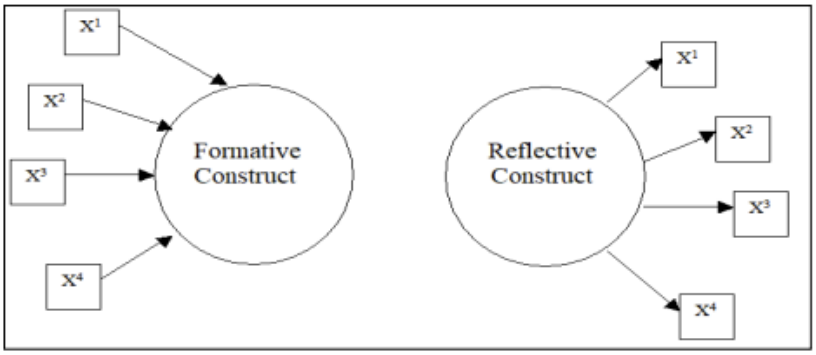

Figure 3.4: Reflective and Formative Measurement (Hannafiah, 2020).

Another simple example that can illustrate the formative and reflective construct is shown in the figure 10.

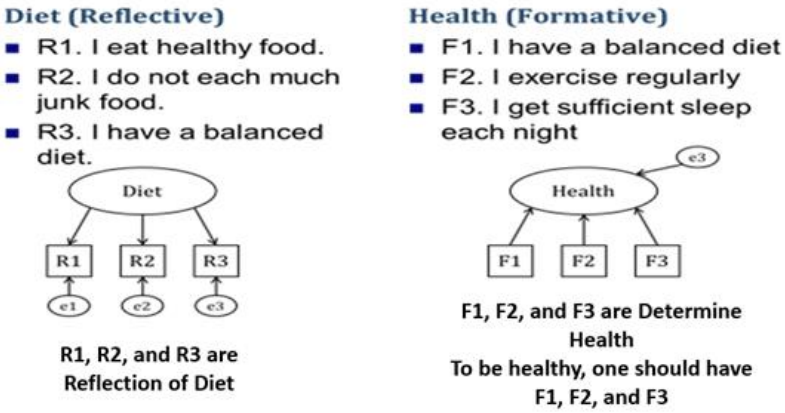

Figure 3.5: Examle of Reflective and Formative Measurement (Hannafiah, 2020).

3.10.1 Formative Measurement Model Assessment

As mentioned above, the formative measurement considers the observable indicators causes the latent construct. According to Hannafiah (2020), formative constructs need to be assessed based on the size of the indicator weight, collinearity among indicators and the statistical significance. Hence, there are three parameters is required to be carried out in formative measurement model assessment which are the multicollinearity test, construct validity and indicator reliability. Table 3.12 shows the formative outer model assessments.

Table 3.12: Formative Outer Model Assessments (Hannafiah, 2020).

Criterion	Recommendation/Rule of thumb/Thresholds

Multicollinearity	Variance Inflation Factor (VIF) determines the correlation between the formative indicators.
Construct Validity	Indicator weights was estimated to measure the contribution of each formative indicator toward the variance of the latent variable.
Indicator Reliability	Calculate the outer loadings of the formative construct, indicator should be retained if the item loading is (>.050).

The multicollinearity test is employed when two or more independent variables within the regression model exhibit correlation with each other. There are several indicators in the analysis that suggest the presence of multicollinearity, including large correlations among predictors and variations in coefficients of predictors from one another (Jamal, 2017). By relying only on correlation between pairs of predictors, limitation occurs due to the value of the correlation depends on the individual and field of studies. According to Donald (1967), in order to detect the multicollinearity in the dataset, indicator named as variance inflation factors (VIF) must be adapted in the research as VIF represents the reciprocal of the tolerance value. The VIF can be generated with the aid of the PLS-SEM software. Table 3.13 shows the interpretation of the VIF values.

Table 3.13: Interpretation of the VIF values (Jamal,2017).

VIF value	**Interpretation**
VIF = 0	Not correlated
1 < VIF < 5	Moderately correlated
VIF > 5	Highly correlated

After evaluating the multicollinearity test, the estimation of the indicators weight is required to be carried out. The weights of each variables explained whether or not the variable able to explain a significant portion of the variance of the formative construct. (Hannafiah, 2020). The estimation of

indicators weight would directly use to construct the validity. According to Hair (2021), the t-value would be derived from bootstrapping, as the t-value is above 1.96 for significance level of 5%, it indicates that the indicator weight is statistically significant. Then, the outer loading is required to be calculated to determine the indicator reliability. According to Hair (2021), indicator loadings of 0.5 and above suggest a substantial absolute contribution to forming the construct, even if they lack a significant relative contribution.

Apart from the VIF, the Heterotrait-Monotrait Ratio (HTMT) is measured by using the PLS-SEM software. According to Rasoolimanesh (2022), HTMT is effective in evaluating the discriminant validity. If the HTMT value higher than 0.9, the discriminant validity is considered as absent.

3.11 Structural Model Assessment

As the constructs were validated and proven reliable through the measurement assessment, the structural model assessment is required to examine the potential collinearity issues. According to Hair (2021), structural model assessment can be divided into 5 steps. Figure 3.6 shows the structural model assessment procedure.

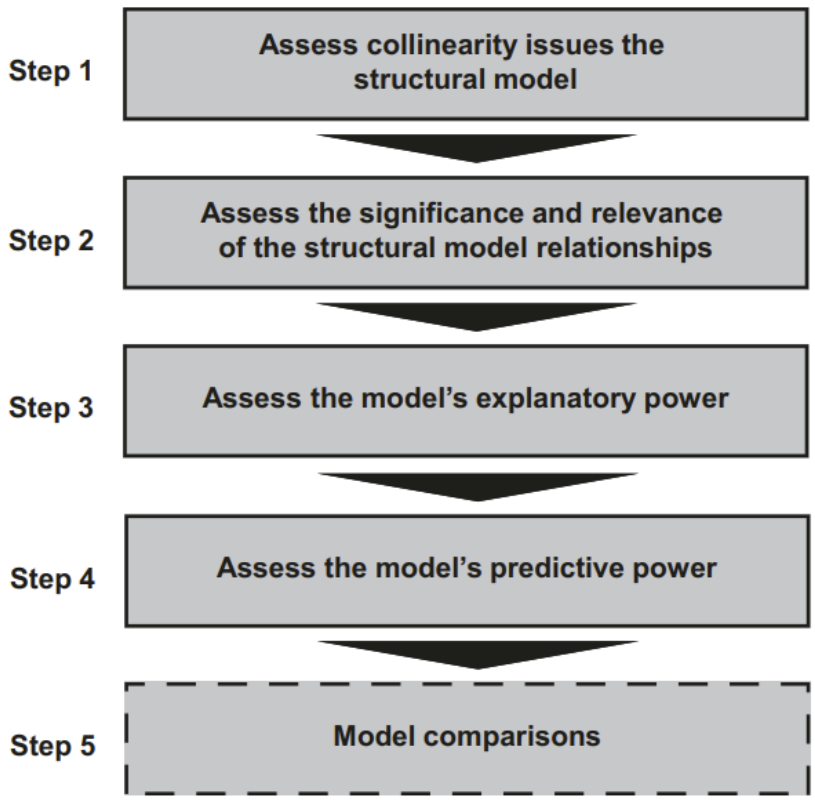

Figure 3.6: Structural Model Assessment Procedure (Hair, 2021)

In the procedure the collinearity issues in the structural model, it is similar to assessing the formative measurement models where the Variance Inflation Factor (VIF) is required to be calculated. However, the construct scores of the predictor construct in each regression are used to calculate the VIF. Then the significance of the path coefficients and the relevance of the path coefficients would be evaluate based on the t-value of path coefficients.(Hair, 2021). This step is repeated at the formative measurement model. In order to assess the model's explanatory power, coefficient of determination (R^2) is required to be calculated. The coefficient of determination indicates the is the function of the number of predictor constructs. According to Hair(2011), R^2 ranges from 0 to 1 where higher R^2 indicates higher explanatory power. Table 16 shows the interpretation of R^2 values.

Table 3.14: Interpretation of R^2 values (Hair, 2011).

R^2 value	**Interpretation**
0.75	Substantial
0.50	Moderate
0.25	Weak

By calculating the R^2, the effect size of the model, f^2 could be obtained to observe how each independent variables affect the dependent variable. According to Hair (2021), f^2 values of 0.02, 0.15 and 0.35 indicates as small, medium, and large effect towards the dependent variable. After the explanatory power and the effect size of the model had been assessed, the predictive power of the model can be accessed via the Q^2. The Q^2 can be obtained via the blindfolding function provided in the PLS-SEM software. Similar to R^2, Q^2also ranges from 0 to 1 and if it is greater than 0, it indicates that the values contain a level of predictive relevance (Garson, 2016).

3.12 Summary

This chapter presents the methodology to conduct this research study along with the research design and data analysis. The conceptual designed were developed based on 4 independent variables (Perception, Awareness, Preparedness, Readiness) and 1 dependent variable (Acceptance). In this study, quantitative research will be conducted, and the data will be collected via the questionnaire survey from the targeted population would be the Malaysian that had been travelled to Puchong. According to journal articles, the sampling technique and sample size were determined. While designing the questionnaire, the questions were adapted from other questionnaire and made modification to suit this research study. After the data had been collected, the data will undergo analysis by using the SPSS and PLS-SEM and validate through multiple tests discuss above.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

By adapting the method to conduct the questionnaire survey, the questionnaire survey to measure the public acceptance of smart flood mitigation in Puchong had been carried out and the result had been discussed in this chapter. Before the questionnaire survey was conducted, pilot test was conducted by using the SPSS software in order to ensure that the questions can be used in data analysis. A sample of 20 participants had been conducted for the pilot test. In this data analysis, Statistical Package for the Social Science (SPSS) software and Partial Least Square Structural Equation Modelling (PLS-SEM) software will be adapted to perform the data analysis. By applying both of these software to analyze the data, the hypothesis set in this study could be verified.

4.2 Overview of the Respondent

In order to acquire the respondents' answer regarding the public acceptance of smart flood mitigation in Puchong, Google Form was chosen to be used to collect the data. The questionnaire was sent to participants through the aids of the social media platforms and emails. In order to ensure the data were relevant to the study, the questionnaire survey was targeted to the Puchong residents. In a period of 3 months, a total of 300 questionnaire survey was sent to the public and 137 respondents answered the questionnaire survey, and all of those 137 data were valid for data analysis. Thus, 137 data were used in data analysis to prove the hypothesis mentioned in chapter 2. The 137 data were analyzed by using the simple random sampling method.

4.3 Pilot Test Result

In order to ensure the questions set were reliable for data analysis, the Cronbach's alpha for each variable must be larger than 0.7. Before collecting data, 20 data were undertaken for pilot test result to test the reliability of the independent variables and dependent variable. SPSS was adapted to run the

reliability test. Figure 4.1 shows the reliability test result for the perception variable using SPSS software.

Reliability Statistics

Cronbach's Alpha	N of Items
.705	6

Figure 4.1: Reliability Test Result for Perception.

Figure 4.2 shows the reliability test result for the awareness variable using SPSS software.

Reliability Statistics

Cronbach's Alpha	N of Items
.712	7

Figure 4.2: Reliability Test Result for Awareness.

Figure 4.3 shows the reliability test result for the preparedness variable using SPSS software.

Reliability Statistics

Cronbach's Alpha	N of Items
.822	7

Figure 4.3: Reliability Test Result for Preparedness.

Figure 4.4 shows the reliability test result for the readiness variable using SPSS software.

Reliability Statistics

Cronbach's Alpha	N of Items
.930	7

Figure 4.4: Reliability Test Result for Readiness.

Figure 4.5 shows the reliability test result for the acceptance variable using SPSS software.

Reliability Statistics

Cronbach's Alpha	N of Items
.803	8

Figure 4.5: Reliability Test Result for Acceptance.

Based on the results generated from the Statistical Package for the Social Science (SPSS) software with 20 data for pilot test, all the variables generated a minimum of Cronbach's Alpha of 0.705. According to Taber (2018), Cronbach's Alpha larger than 0.45 is considered as sufficient and when the Cronbach's Alpha value is larger than 0.7, its described as good for social science study. The summary of the pilot test for 5 variables can be found in the Table 4.1. As the Cronbach's Alpha is higher than 0.45, this suggests that respondents do not encounter difficulty in comprehending, interpreting, and responding to the questionnaire survey. It is concluded that all the questions set for this questionnaire survey are able to be proceed for data collection

Table 4.1: Summary of Pilot Test.

Variables	Cronbach's Alpha
Perception	0.705
Awareness	0.712
Preparedness	0.822
Readiness	0.930
Acceptance	0.803

4.4 Demographic Analysis

According to Klimczuk (2021), demographic analysis is aimed to the insight of the population's characteristics. Demographic analysis is a process of collecting and studying the information of the respondent regarding their general information. In this research study, personal information of the respondents is not collected such as name and phone number but information such as gender, age, nationality, occupation, accommodation location and others.

4.4.1 Gender

Based on the questionnaire survey, there are 88 males (64.2%) and 49 females (35.8%) had participated in this survey. Figure 4. 6 shows the pie chart of the respondents' gender. According to Smith (2008), male more tend to respond to the web-based questionnaire in respectively to woman. Thus, it proved that this questionnaire survey is valid.

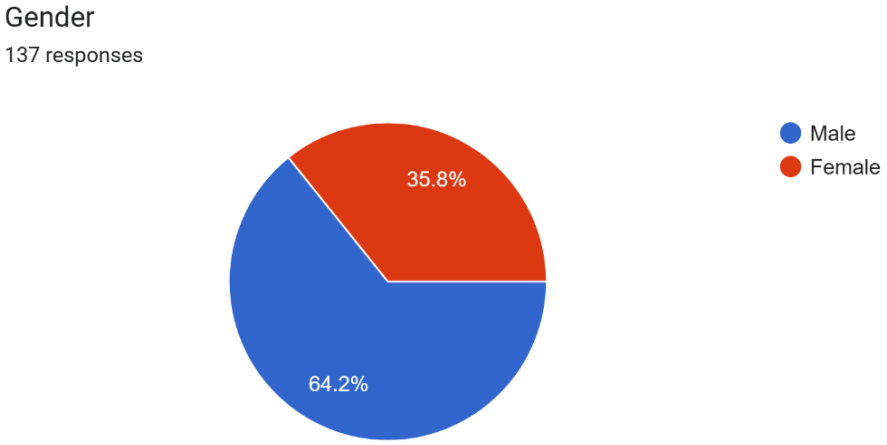

Figure 4.6: Pie Chart on Gender.

4.4.2 Age

According to the questionnaire results, 9 respondents (5.8%) are aged 20 or below, 55 respondents (40.1%) are aged between 21 and 30, 33 respondents (24.1%) fall in the age group of 31-40, and 41 respondents (29.9%) are in the 41-50 age bracket. Figure 4.7 shows the pie chart of the respondents' age group.

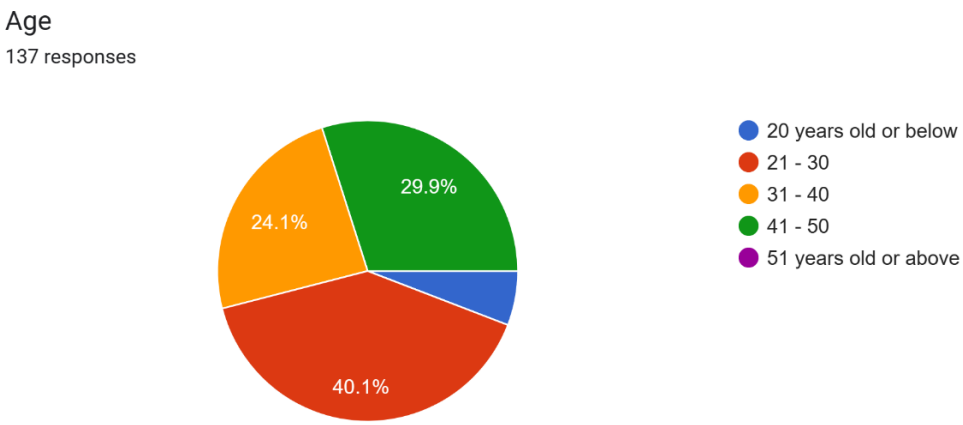

Figure 4.7: Pie Chart on Age.

4.4.3 Nationality

Based on the questionnaire survey, there are 137 respondents (100%) are Malaysian. Figure 4.8 shows the pie chart of the respondents' nationality. As the questionnaire survey is posted on social media in Malaysia, thus all the respondents are totally Malaysian.

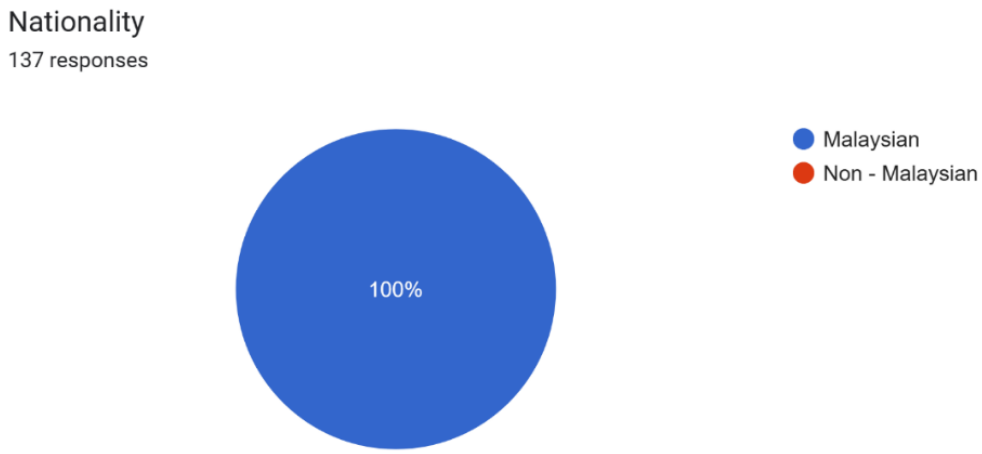

Figure 4.8: Pie Chart on Nationality.

4.4.4 Education Background

Based on the questionnaire survey, there are 2 respondents (1.5%) finished at secondary school, 39 respondents (28.5%) hold certificate/diploma while 96 respondents (70.1%) completed their bachelor's degree. Figure 4.9 shows the pie chart of the respondents' education background.

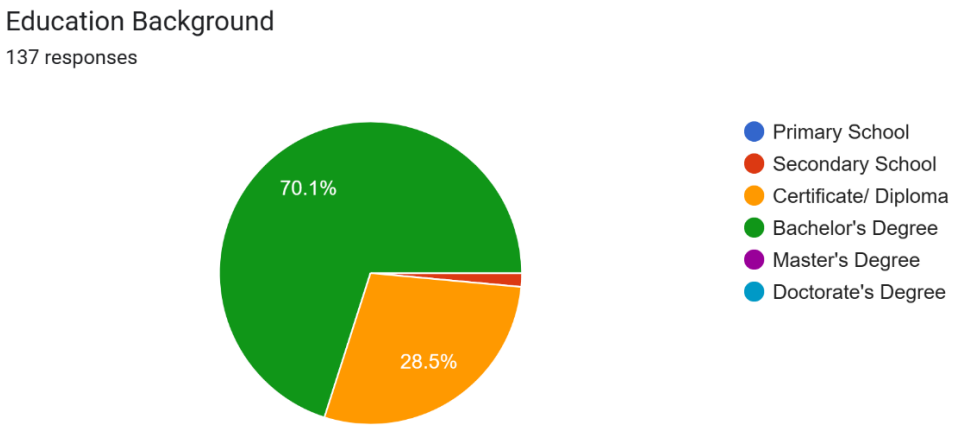

Figure 4.9: Pie Chart on Education Background.

4.4.5 Employment Status

Based on the questionnaire survey, there are 24 respondents (17.5%) are currently students and 113 respondents (82.5%) are currently employed full-time. Figure 4.10 shows the pie chart of the respondents' employment status.

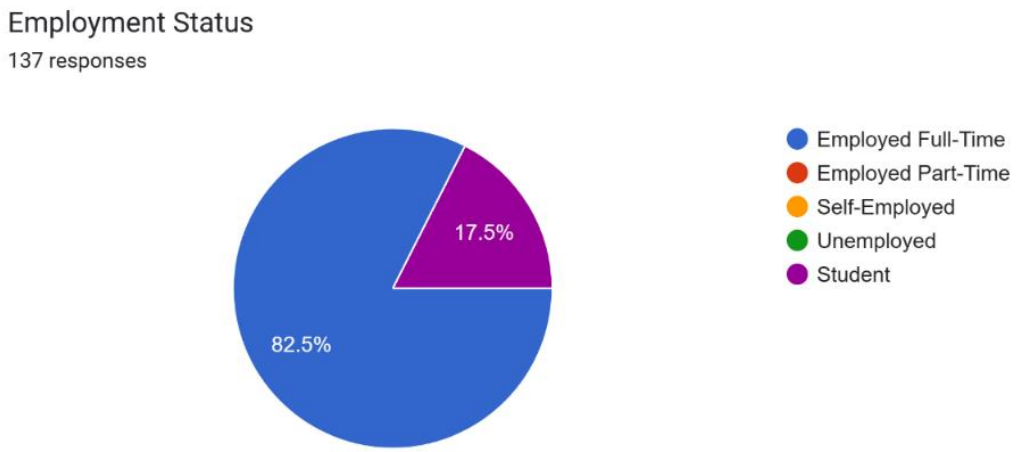

Figure 4.10: Pie Chart on Employment Status.

4.4.6 Accomodation Location

Based on the questionnaire survey, there are 115 respondents (83.9%) are residing in Puchong area and 22 respondents (16.1%) does not live in Puchong area. Figure 4.11 shows the pie chart of the respondents' accommodation location.

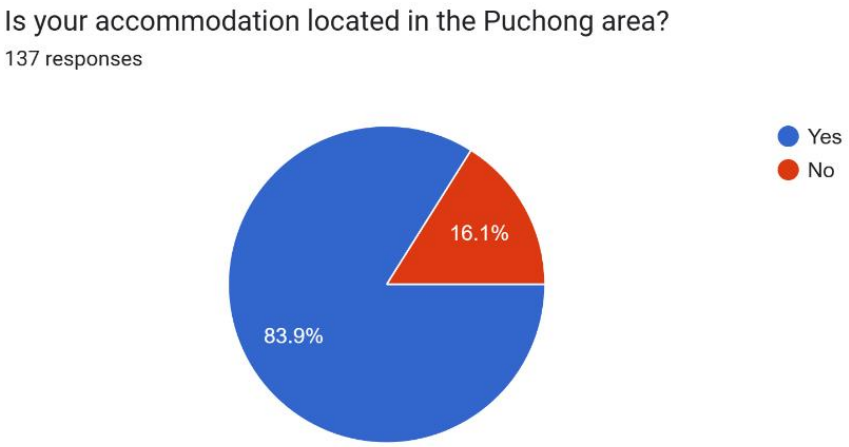

Figure 4.11: Pie Chart on Accomodation Location.

4.4.7 Experience of travelling to Puchong Area during raining season

Based on the questionnaire survey, there are 118 respondents (86.1%) had travelled to Puchong area during raining season and 19 respondents (13.9%) does not have that experience. Figure 4.12 shows the pie chart of the respondents' experience of travel to Puchong area during raining season.

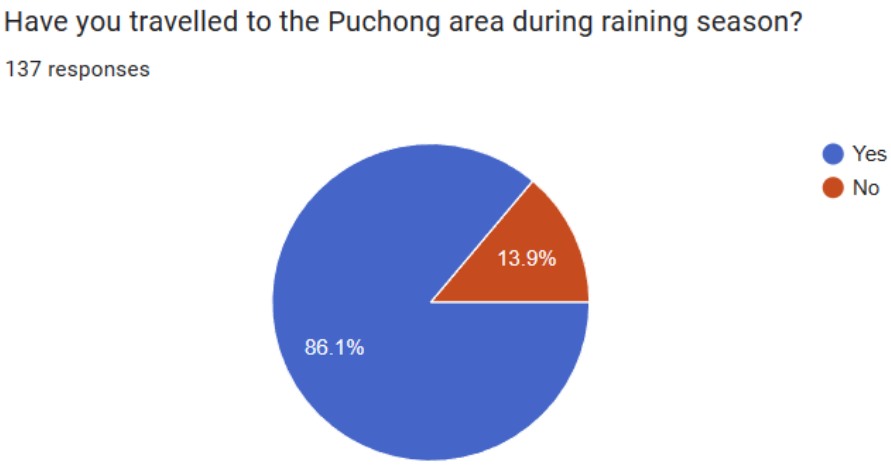

Figure 4.12: Pie Chart on Experience of Travel to Puhcong Area During Raining Season.

4.4.8 Experience of suffering from flooding in the past

Based on the questionnaire survey, there are 82 respondents (59.9%) had travelled to Puchong area during raining season and 55 respondents (40.1%) does not have that experience. Figure 4.13 shows the pie chart of the respondents' experience of suffering from flooding in the past.

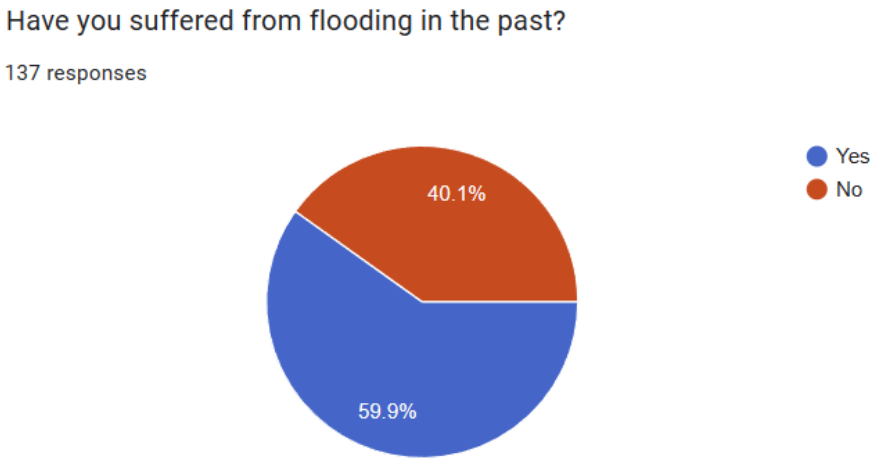

Figure 4.13: Pie Chart on Experience of Suffering From Flooding in the Past.

4.4.9 Efficiency of flood system at Puchong

Based on the questionnaire survey, there are 51 respondents (37.2%) rated the efficiency of flood mitigation system at Puchong at 5, 37 respondents (27%) rated the efficiency as 6 and 8, a total of 8 respondents (5.9%) feel that the efficiency is below 5 out of 10. Figure 4.14 shows the pie chart of the respondents' experience of suffering from flooding in the past.

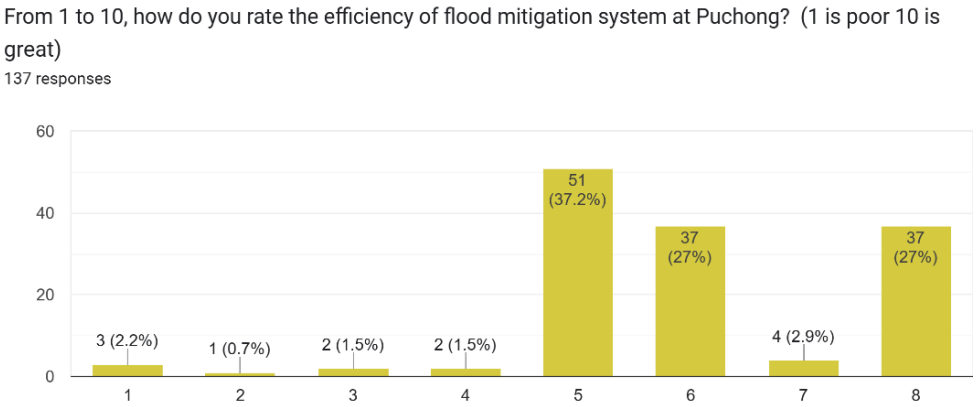

Figure 4.14: Bar Chart on Efficiency of Flood Mitigation System In Puchong.

4.5 Descriptive Analysis

According to Cote (2021), descriptive analysis is a process of using the data collected to identify the trend and relationship. One of the methods to perform descriptive analysis is using the Microsoft Excel to generate the bar chart of the data collected. By conducting the descriptive analysis, it is efficient to communicating change over time and use the trend as a springboard for further analysis.

4.5.1 Perception

In order to evaluate the dependent variable and independent variables through the questionnaire survey, multiple questions were developed to measure the variables from the respondents. As ordinal scale was adapted in this research study, the respondents are required to provide their opinions towards the questions with 5 options which are the Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D) and Strongly Disagree (SD). In this section, questions were set to determine the respondents' perception of Smart Flood Mitigation in Puchong.

Based on the Figure 4.15, it shows that the respondents' opinion is mainly agreeing towards that Smart Flood Mitigation will affect our life as a total of 70 respondents (51%) are strongly agreeing the question while 59 respondents (43%) agree with the statement. Only 7 of the respondents (5%) felt neutral towards the statement and 1 respondent (1%) disagree with the statement.

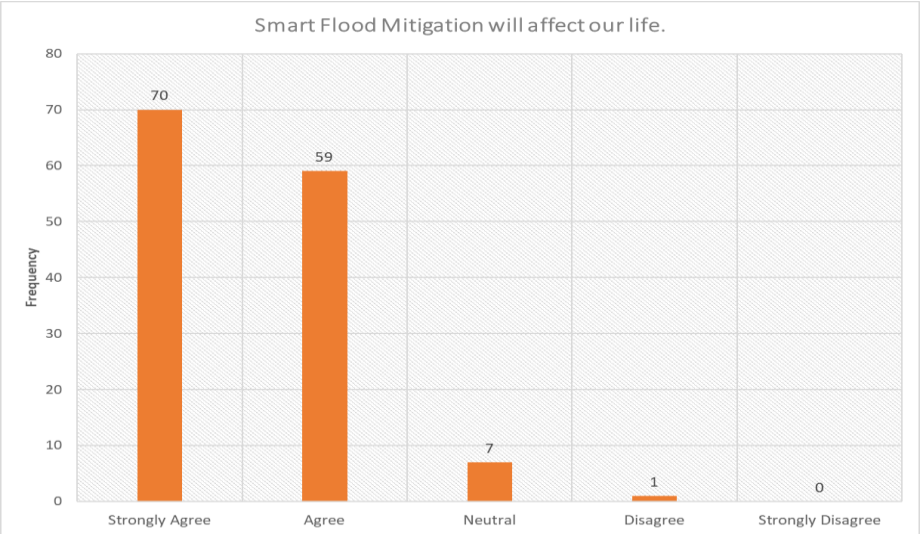

Figure 4.15: Smart Flood Mitigation will affect our life.

According to Figure 4.16, most of the respondents are strongly agree that the Smart Flood Mitigation will be relevant in our environment as 90 respondents (66%) had voted as strongly agree. There are only 1 respondent (1%) are strongly disagreeing and 2 respondents (1%) are disagreeing the statement. 30 respondents (22%) agree, and 14 respondents (10%) are neutral with the statement.

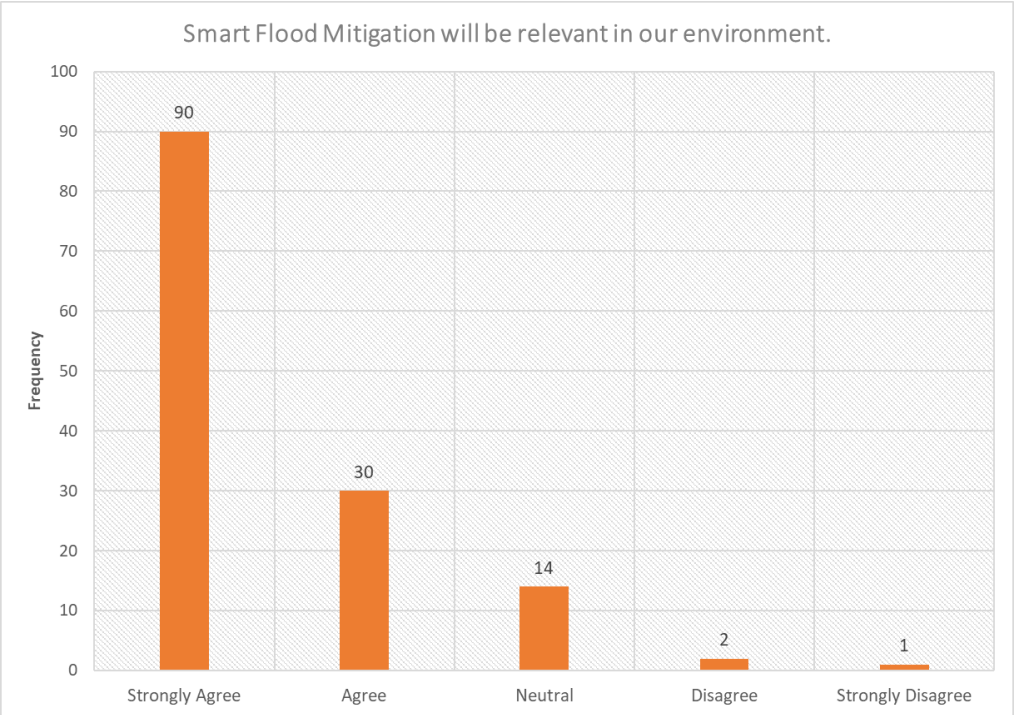

Figure 4.16: Smart Flood Mitigation will be relevant in our environment.

By referring to Figure 4.17, majority of the respondents strongly agree that Smart Flood Mitigation will resolve the flooding issues with a population of 90 respondents (66%). Besides, 38 respondents (27%) agree to the statement. Out of 137 respondents, there are 2 respondents (1%) that disagree with the statement while 7 respondents (5%) felt neutral regarding the statement.

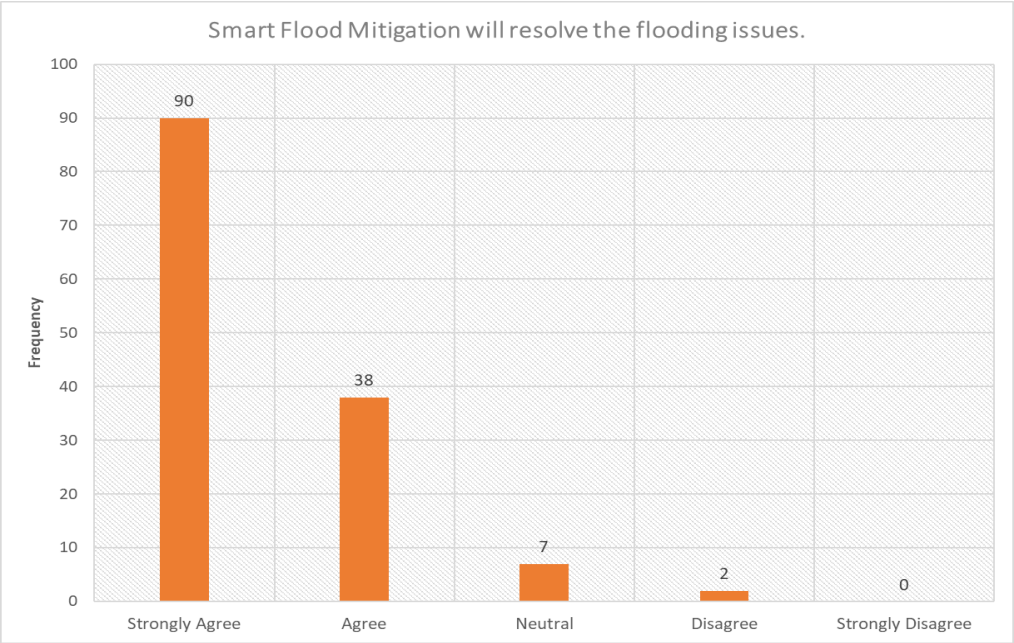

Figure 4.17: Smart Flood Mitigation will resolve the flooding issues.

According to Figure 4.18, it had clearly shown that majority of the respondents are highly concerned about the Smart Flood Mitigation as a total of 100 respondents (73%) had opinion of strongly agree and 27 respondents (20%) agree towards this statement. However, there are 8 respondents (6%) and 2 respondents (1%) think that they felt neutral and disagree respectively towards this statement.

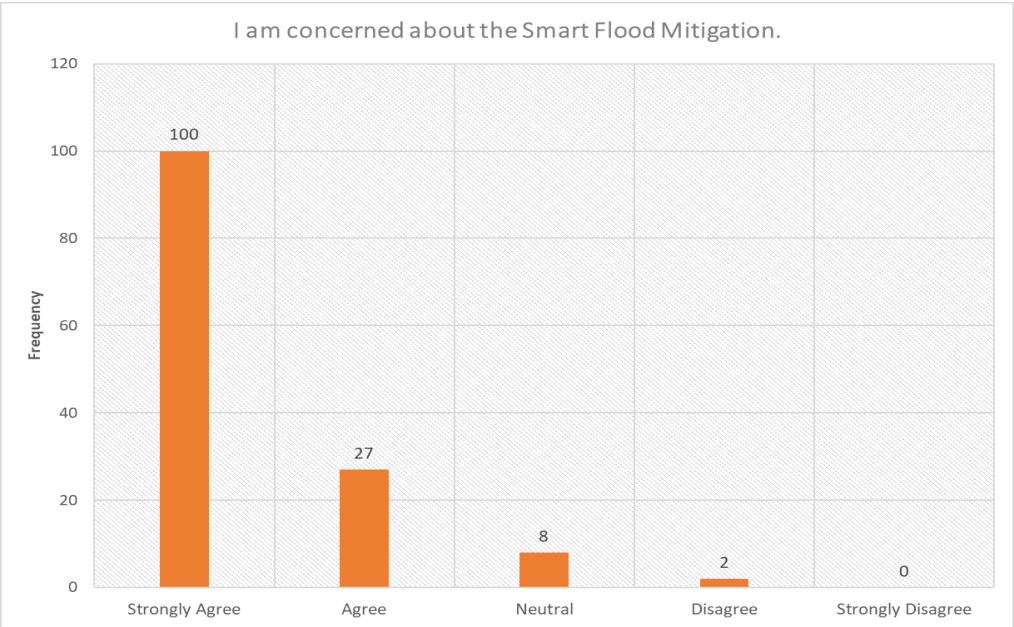

Figure 4.18: I Am Concerned about the Smart Flood Mitigation.

According to Figure 4.19, 57 respondents (42%) are strongly agreeing to the beneficial experience that brought by the Smart Flood Mitigation, 69 respondents (50%) felt agree toward this experience. There are 4 respondents (3%) and 7 respondents (5%) voted for neutral and disagree respectively. Throughout 137 respondents, there were no respondent that voted for strongly disagree against this statement.

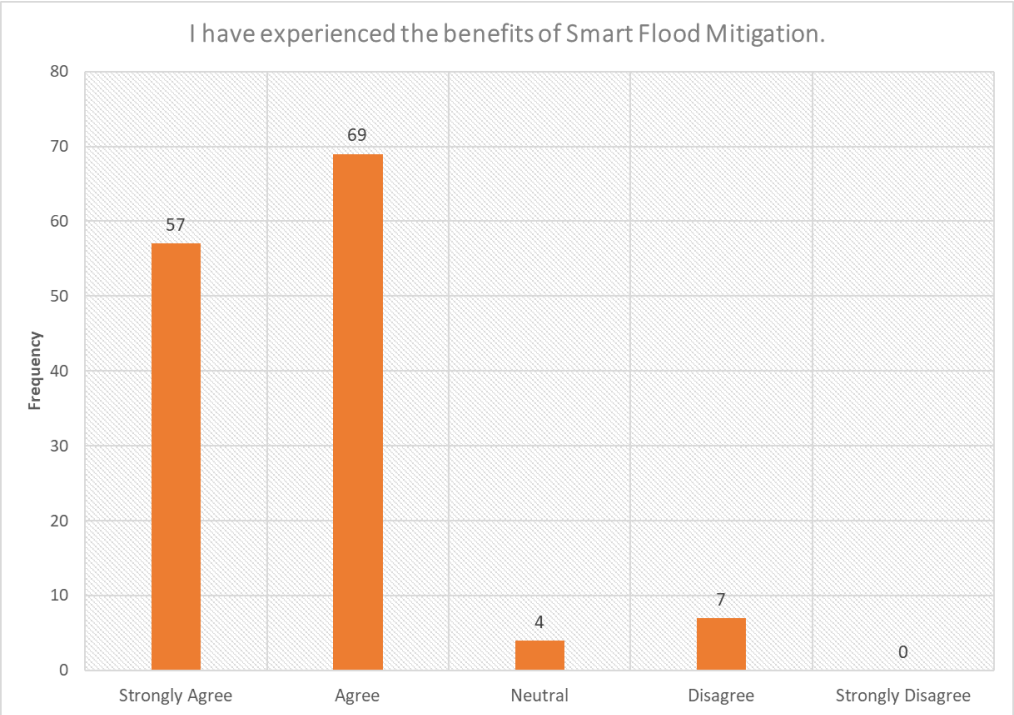

Figure 4.19: I have experienced the benefits of Smart Flood Mitigation.

Based on Figure 4.20, 87 out of 137 respondents (64%) felt they had understanding regarding the Smart Flood Mitigation as they voted agree towards the statement. There are 5 respondents (4%) are confident that they had very high knowledge toward the Smart Flood Mitigation. However, 35 of the respondents (26%) felt neutral and 10 respondents (7%) disagree towards the statement.

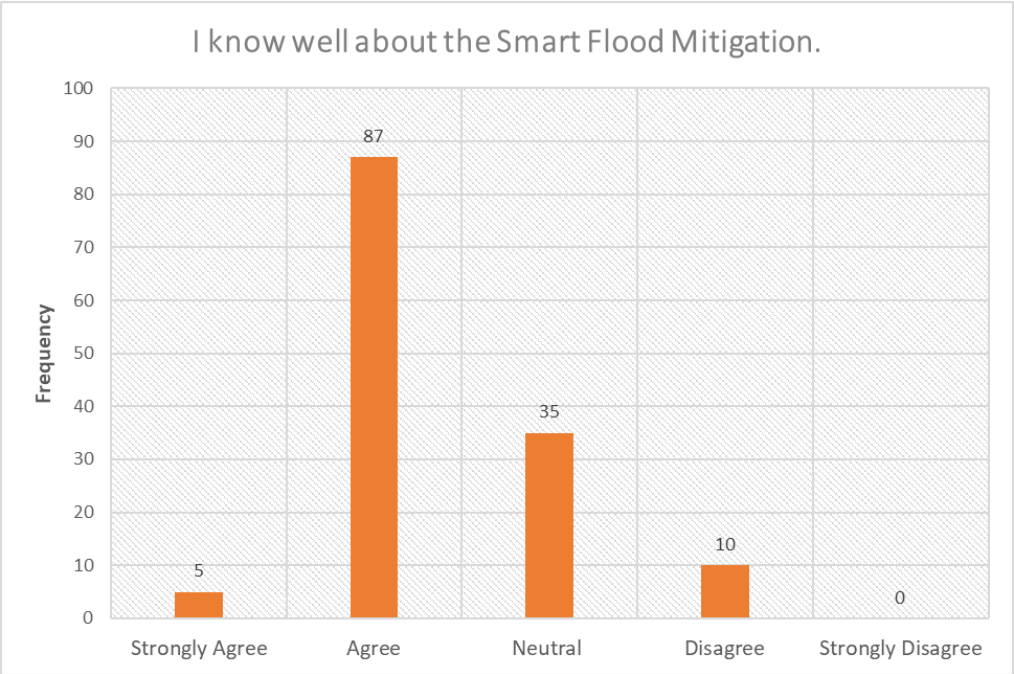

Figure 4.20: I Know Well about the Smart Flood Mitigation.

4.5.2 Awareness

Referring to Figure 4.21, agreeing with the statement provided is the highest among all which have a population of 88 respondents (64%). Respondents with have opinion of strongly agree is the second highest which contain of 42 respondents (31%) followed by neutral opinion with 6 respondents (4%). While the remaining 1 respondent (1%) disagree with the statement.

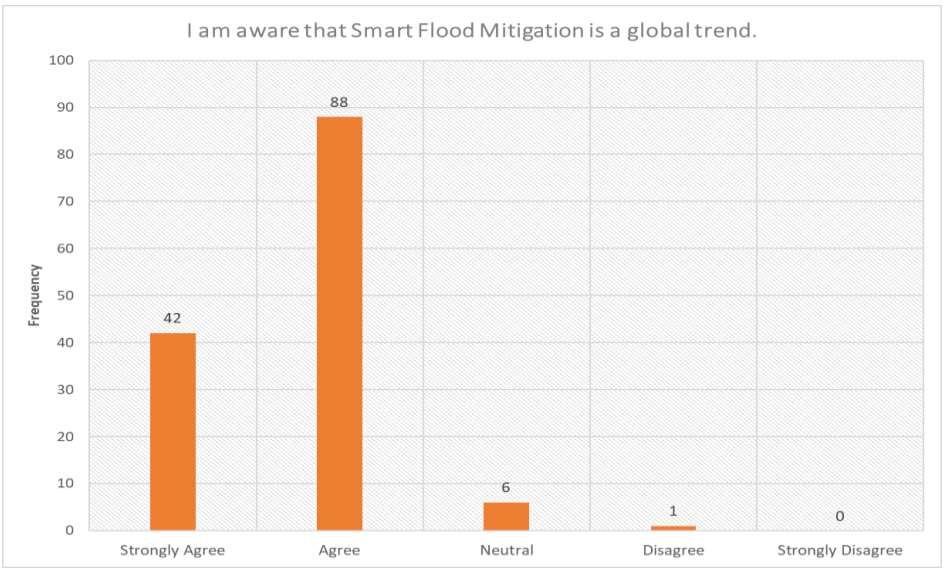

Figure 4.21: I Am Aware That Smart Flood Mitigation is a Global Trend.

Figure 4.22 shows that 79 of the respondents (58%) are strongly agree with the concept of the Smart Flood Mitigation. Among all respondents, there are only 2 respondents (1%) disagree with the statement and 11 respondents (8%) voted neutral towards the statement. 45 respondents (33%) had opinion of agreeing with the statement ranked as the second highest.

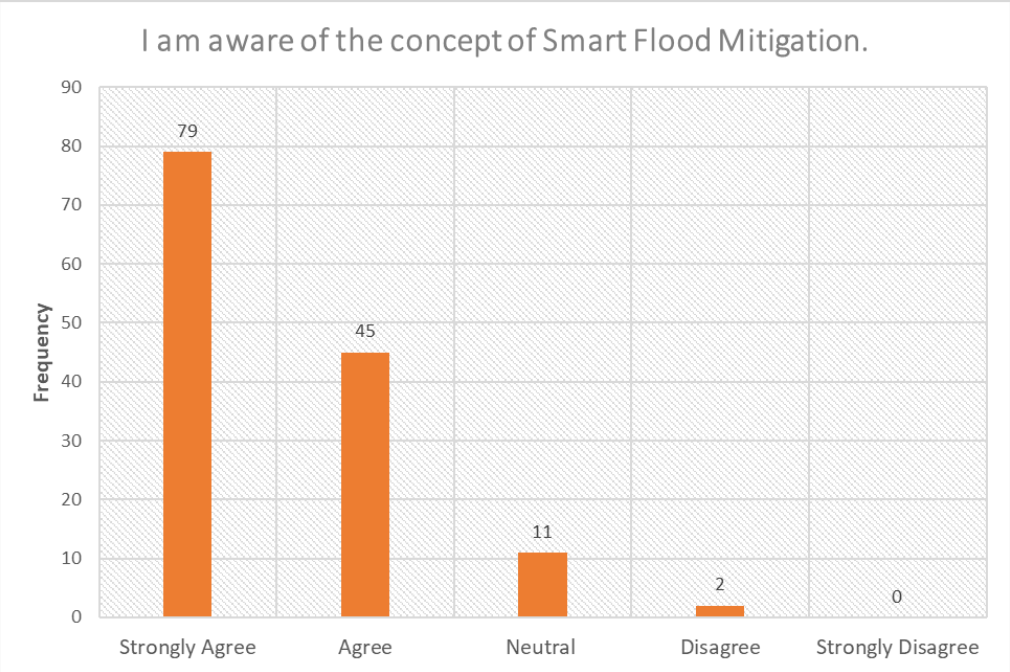

Figure 4.22: I am Aware of the Concept of Smart Flood Mitigation.

According to the Figure 4.23, there are total of 65 respondents (47%) felt neutral to the statement that they are aware that the government had implemented Smart Flood Mitigation in Puchong. The second highest opinion among is the strongly agree with the amount of 49 respondents (36%) followed by agree with 21 respondents (15%). Other than that, there are respectively 1 respondent (1%) disagree and strongly disagree with the statement.

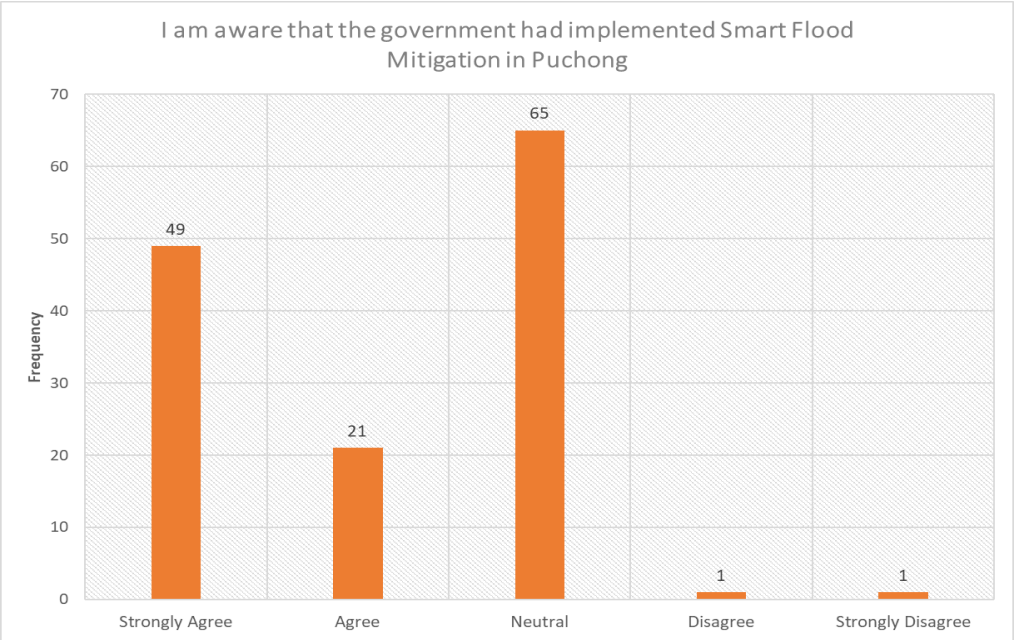

Figure 4.23: I am Aware that the Government Had Implemented Smart Flood Mitigation in Puchong.

By referring to Figure 4.24, majority of the respondents agree that they aware of the benefits of Smart Flood Mitigation with a population of 76 respondents (55%) followed by 6 respondents (4%) felt strongly agree to the statement. Out of 137 respondents, there are 2 respondents (1%) that disagree with the statement while 1 respondent (1%) felt strongly disagree regarding the statement. However, 52 respondents (38%) felt neutral towards the statement.

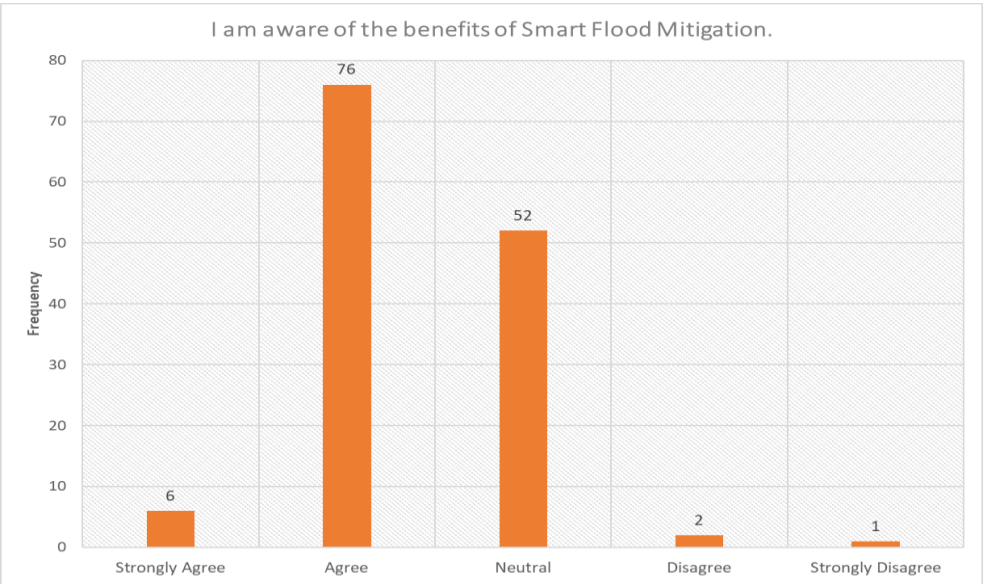

Figure 4.24: I am Aware of the Benefits of Smart Flood Mitigation.

Based on the Figure 4.25, it shows that the respondents' opinion is mainly agreeing towards that Smart Flood Mitigation will affect our life as a total of 111 respondents (81%) are agreeing the question while 14 respondents (10%) felt strongly agree with the statement. Only 9 of the respondents (7%) voted for neutral and 3 out of 137 respondents (2%) voted as disagree toward the statement.

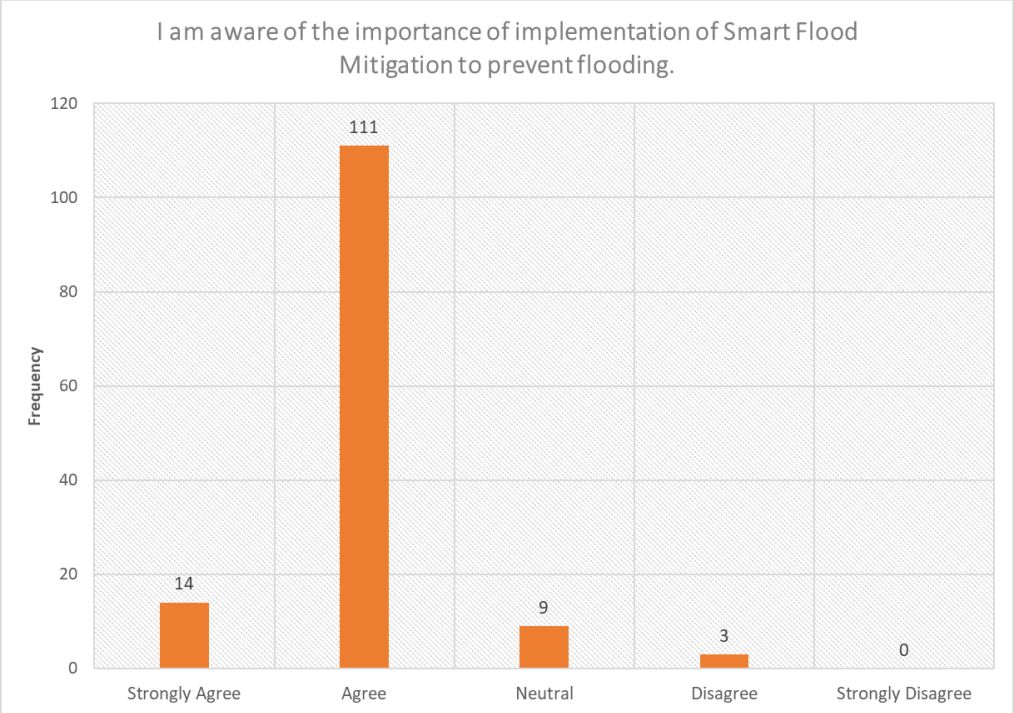

Figure 4.25: I am Aware of the Importance of Implementation of Smart Flood Mitigation to Prevent Flooding.

According to Figure 4.26, it had clearly shown that majority of the respondents are highly aware that the Flood Mitigation is the same strategies as Smart Flood Mitigation as a total of 107 respondents (78%) had opinion of strongly agree and 18 respondents (13%) agree towards this statement. However, there are 9 respondents (7%) and 3 respondents (2%) think that they felt neutral and disagree respectively towards this statement.

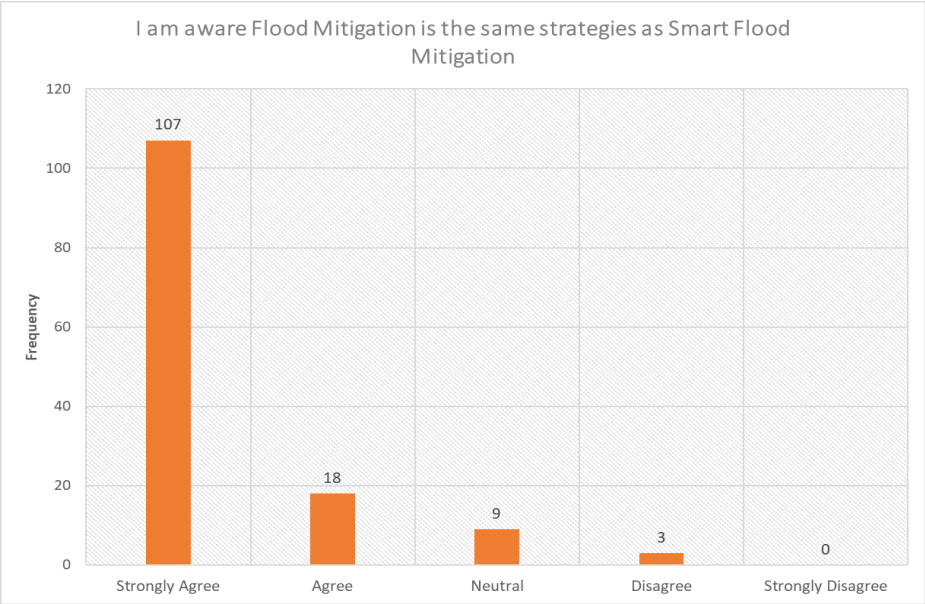

Figure 4.26: I am Aware that Flood Mitigation is the Same Strategies as Smart Flood Mitigation.

According to Figure 4.27, most of the respondents agree that the Smart Flood Mitigation could eliminate the flood risks as a total of 109 respondents (80%) had voted as agree while 12 of respondents (9%) are strongly agree to the statement. There are only 4 respondents (3%) are disagreeing and 12 respondents (9%) are felt neutral.

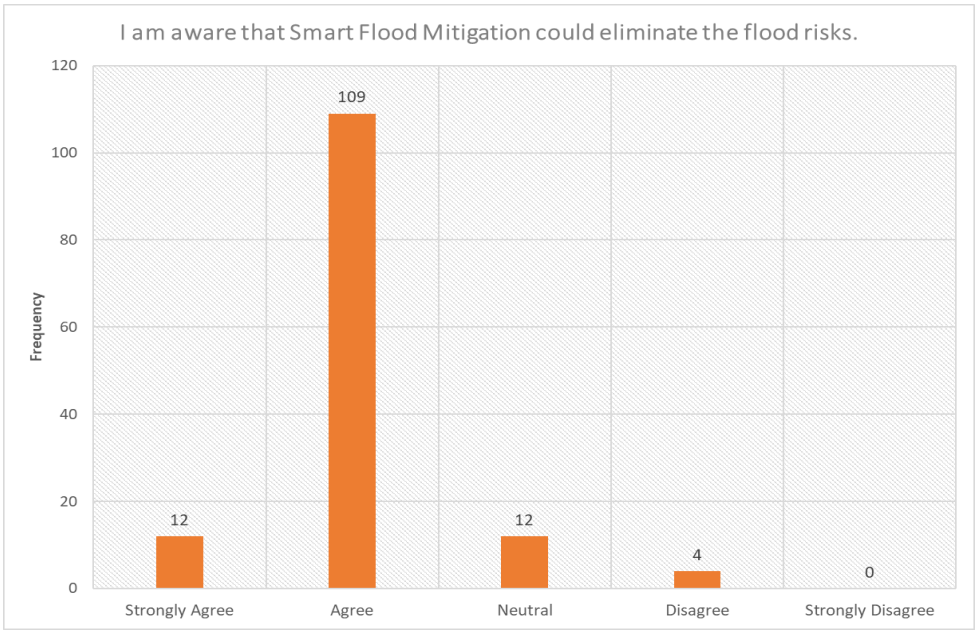

Figure 4.27: I am Aware that Smart Flood Mitigation Could Eliminate the Flood Risks.

4.5.3 Preparedness

Figure 4.28 demonstrates the respondents' opinion towards the question regarding to the preparation of individual to respond to Smart Flood Mitigation. Agreeing with the statement asked is the highest among all which have a population of 117 respondents (85%). Respondents which have neutral opinion is the second highest which contain of 18 respondents (13%). Besides, 2 respondents (2%) felt disagree towards the statement.

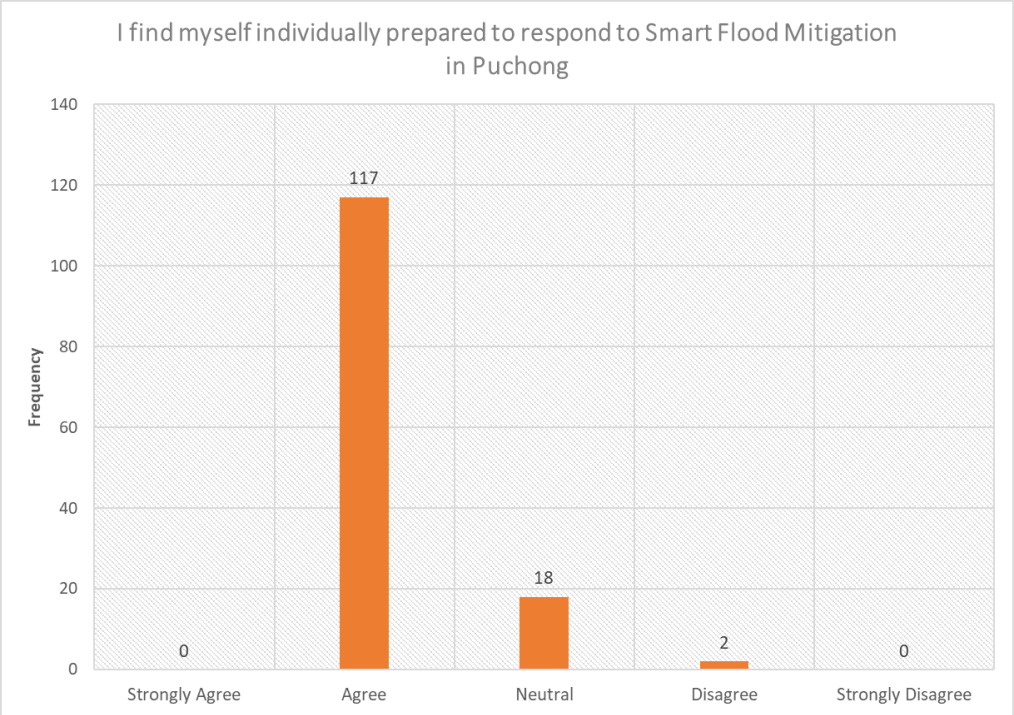

Figure 4.28: I Find Myself Individually Prepared to Respond to Smart Flood Mitigation in Puchong.

Referring to Figure 4.29, agreeing with the statement provided is the highest among all which have a population of 50 respondents (36%). Respondents with have opinion of strongly agree is the second highest which contain of 47 respondents (34%) followed by neutral opinion with 39 respondents (29%). While the remaining of 1 respondent (1%) disagree with the statement.

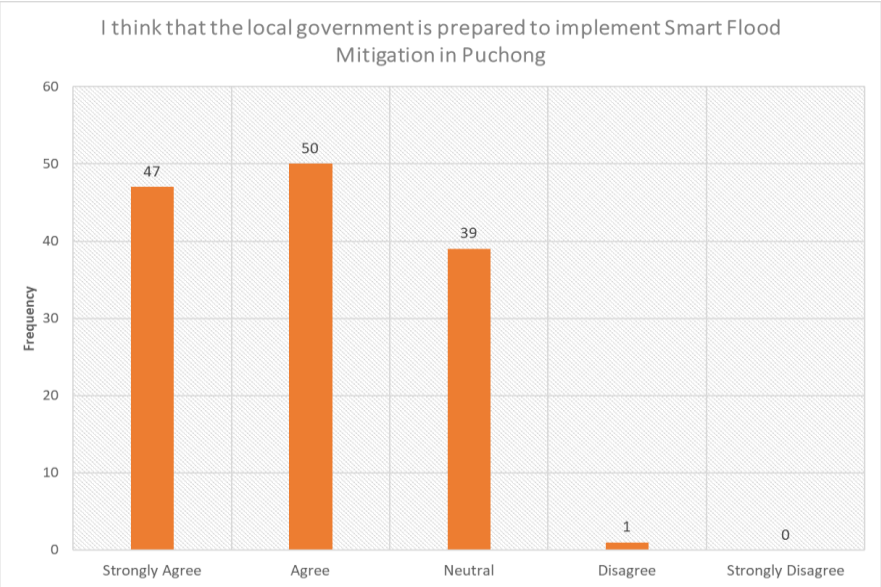

Figure 4.29: I Think That The Local Government Is Prepared to Implement Smart Flood Mitigation in Puchong.

Figure 4.30 shows that 73 of the respondents (53%) felt neutral towards the preparation of the government to implement the Smart Flood Mitigation in Malaysia. Among all respondents, there are only 42 respondents (31%) strongly agree with the statement while 20 respondents (15%) voted agree towards the statement. 2 respondents (1%) had opinion of disagreeing with the statement ranked as lowest among all.

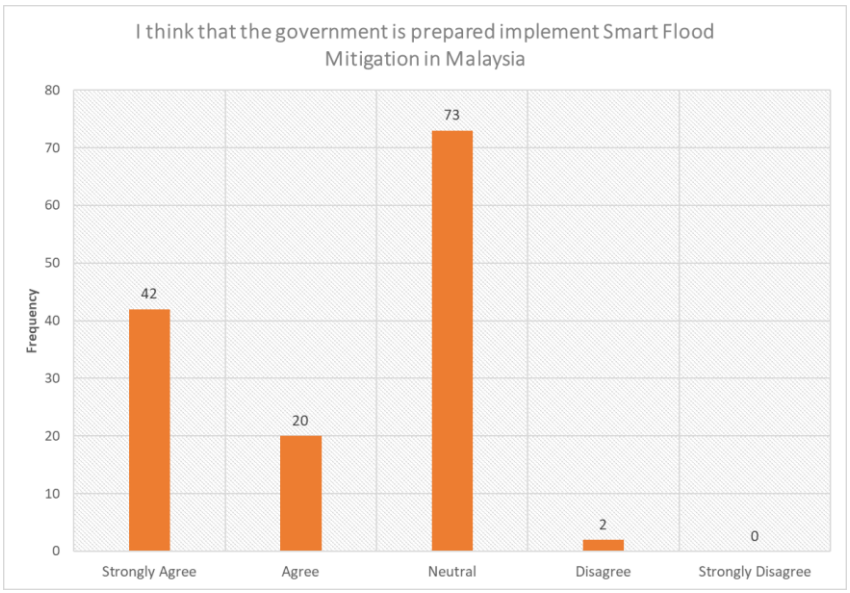

Figure 4.30: I Think That the Government is Prepared to Implement Smart Flood Mitigation in Malaysia

Referring to Figure 4.31, agreeing with the statement provided is the highest among all which have a population of 120 respondents (88%). Respondents with have opinion of strongly agree is the second highest which contain of 3 respondents (2%) followed by neutral opinion with 11 respondents (8%). While the remaining 1 respondent (1%) disagree, and 2 respondents (1%) disagree with the statement.

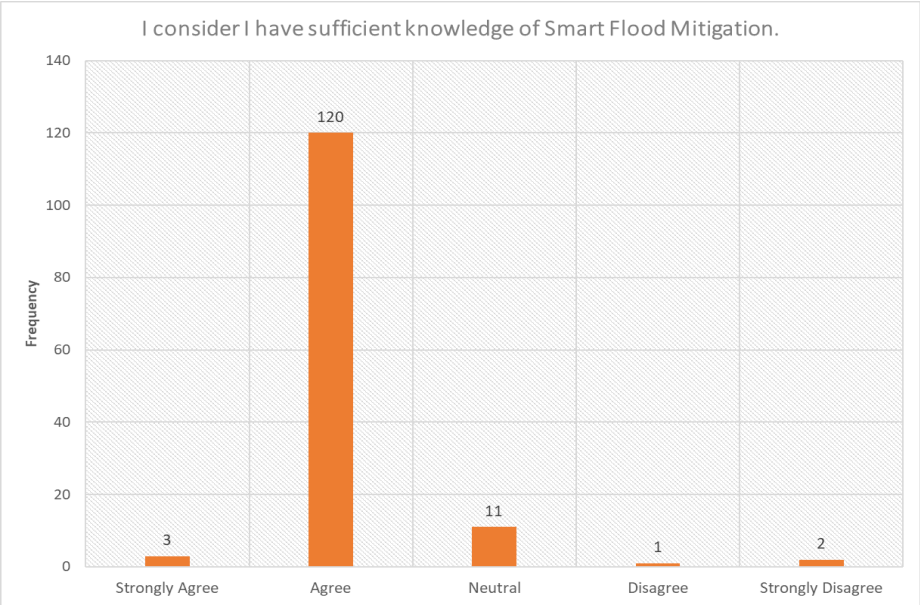

Figure 4.31: I Consider I Have Sufficient Knowledge of Smart Flood Mitigation.

Figure 4.32 shows that majority of the respondents agree that they are had prepared adequate plans in responding to the Smart Flood Mitigation during floods as 91 respondents (66%) agree to the statement. The second highest opinion among all respondents is the strongly agree with the amount of 38 respondents (28%). Out of 137 respondents, there are 5 respondents (4%), 2 respondents (1%) and 1 respondent (1%) voted for neutral, disagree and strongly disagree respectively.

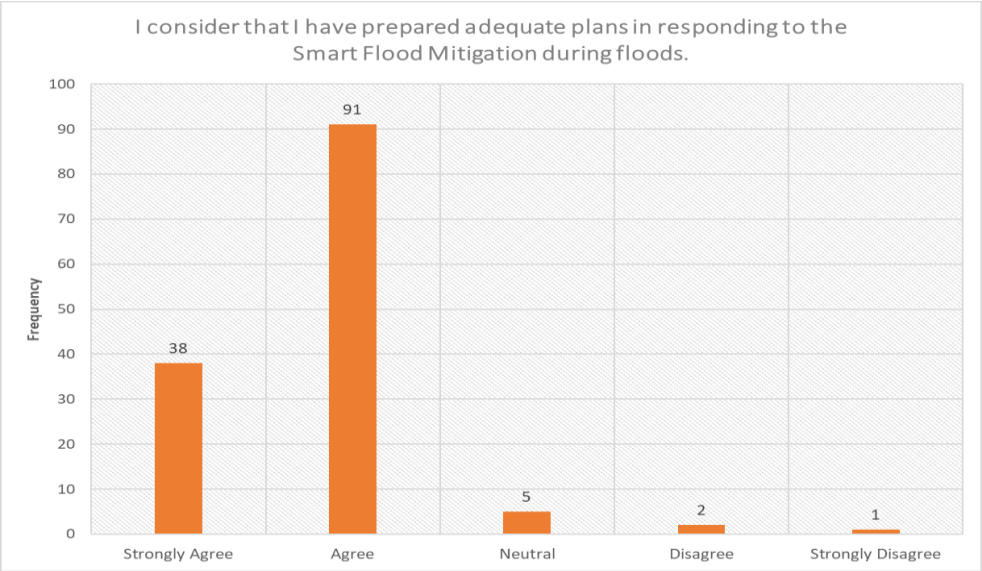

Figure 4.32: I Consider that I Have Prepared Adequate Plans in Responding to the Smart Flood Mitigation during Floods.

By referring to Figure 4.33, majority of the respondents strongly agree that Smart Flood Mitigation has effective plans to respond during floods with a population of 113 respondents (83%). Besides, 13 respondents agree to the statement. Out of 137 respondents, there are 1 respondent (1%) that strongly disagree with the statement while 2 respondents (1%) felt disagree regarding the statement. The remaining of the 8 respondents (6%) is neutral to the statement.

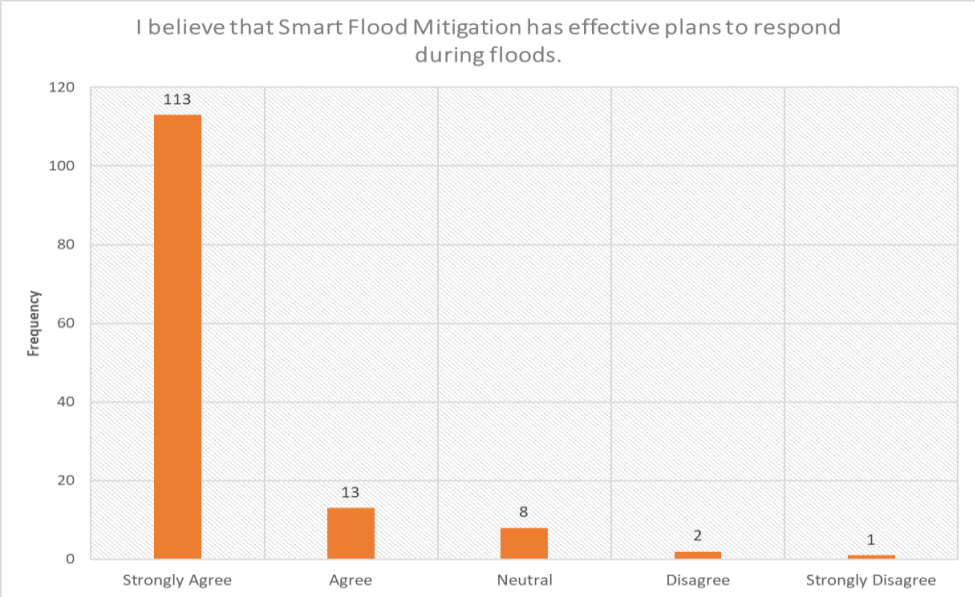

Figure 4.33: I Believe That Smart Flood Mitigation Has Effective Plans To Respond During Floods.

According to Figure 4.34, most of the respondents are agree that the State has enough preparation to overcome flooding issue with Smart Flood Mitigation as a total of 124 respondents (91%) had voted as agree while 5 of respondents (4%) are strongly agree to the statement. There are only 1 respondent (1%) is strongly disagreeing, 2 respondents (1%) are disagreeing, and the remaining 5 respondents (4%) felt neutral regarding the statement.

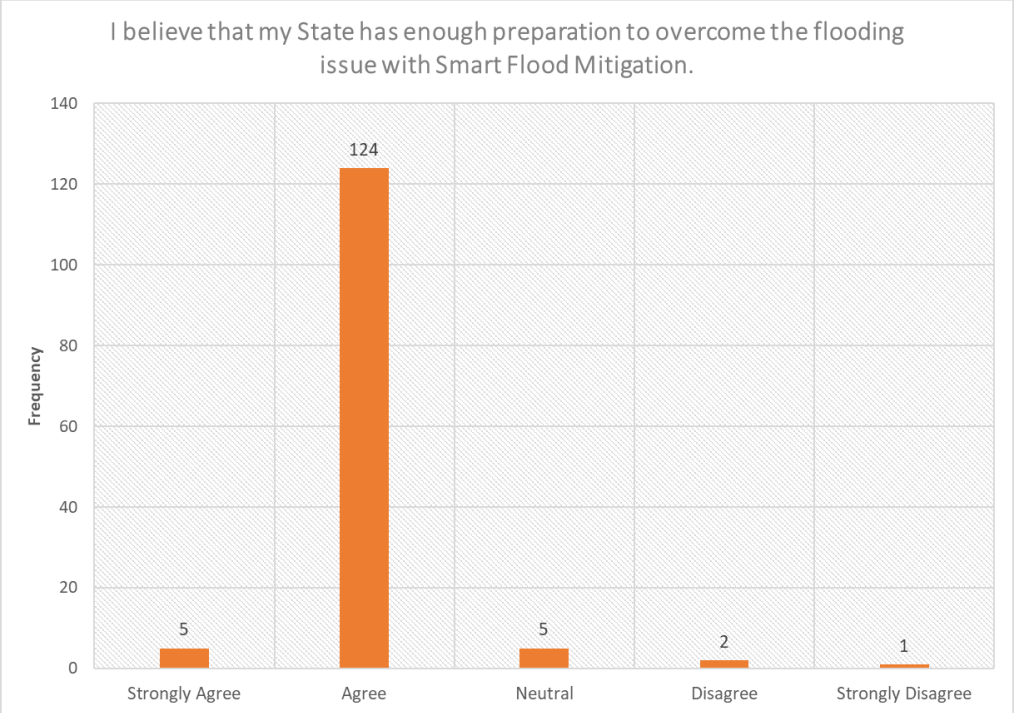

Figure 4.34: I Believe That My State Has Enough Preparation To Overcome The Flooding Issue with Smart Flood Mitigation.

4.5.4 Readiness

Figure 4.35 shows that 117 of the respondents (85%) voted agree regarding whether can they access to the information of Smart Flood Mitigation. Among all respondents, there are only 8 respondents (6%) strongly agree with the statement while 8 respondents (6%) voted neutral towards the statement. 4 respondents (3%) had opinion of disagreeing with the statement ranked as lowest among all.

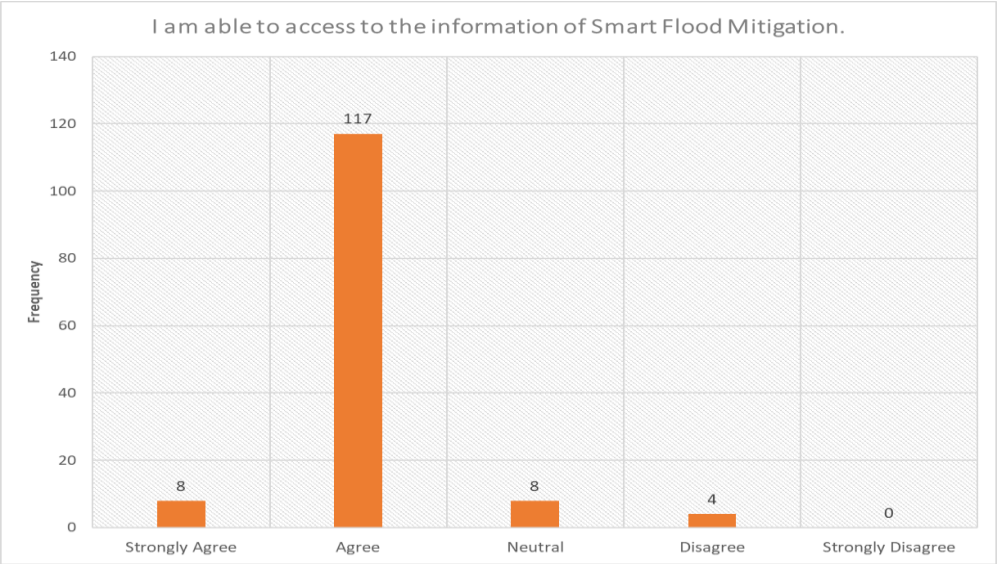

Figure 4.35: I Am Able To Access To The Information Of Smart Flood Mitigation.

By referring to Figure 4.36, majority of the respondents agree that they felt comfortable to support the Smart Flood Mitigation as per instructed with a population of 80 respondents (58%) followed by the 46 respondents (34%) that are strongly agree to the statement. Out of 137 respondents, there are 3 respondent (2%) that disagree with the statement while 8 respondents (6%) felt neutral regarding the statement.

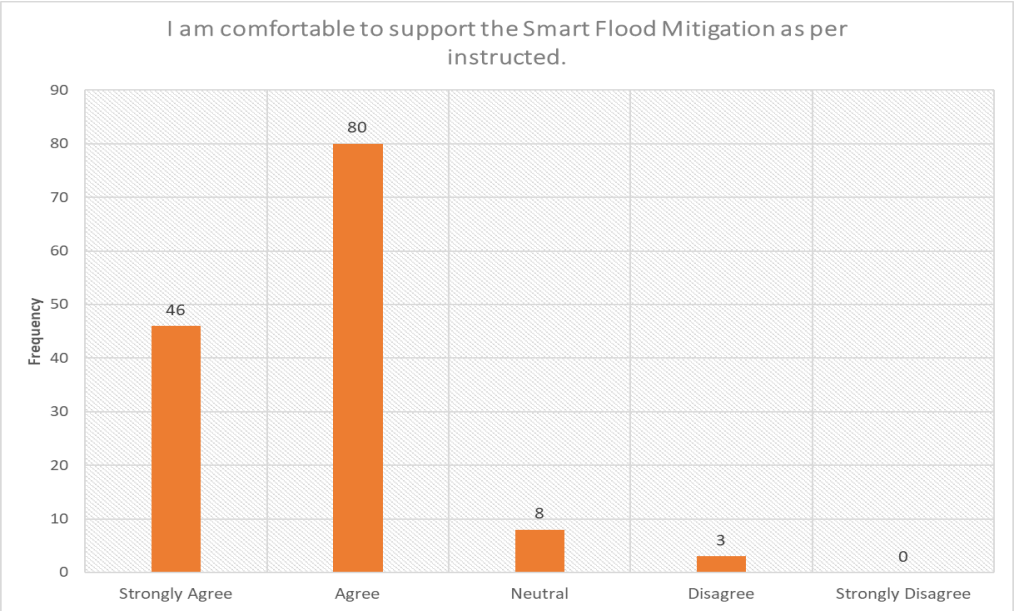

Figure 4.36: I Am Comfortable To Support Smart Flood Mitigation As Per Instructed.

According to the Figure 4.37, there is a total of 79 respondents (58%) agree to the statement of that they are willing to contributed to development of Smart Flood Mitigation. The second highest opinion among is the strongly agree with the amount of 50 respondents (36%). Other than that, there are 6 respondents (4%) , 2 respondents (2%) felt neutral and disagree respectively with the statement.

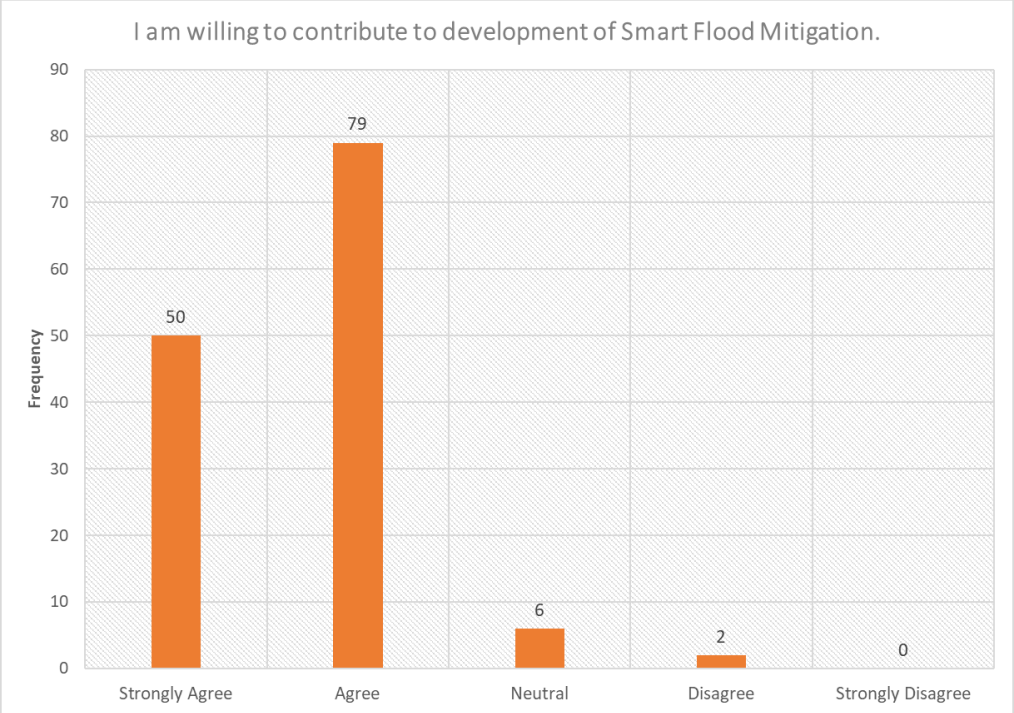

Figure 4.37: I Am Willing To Contribute To Development Of Smart Flood Mitigation.

Figure 4.38 shows that 19 respondents (14%) strongly disagree that Smart Flood Mitigation is less effective than ordinary flood mitigation. The favorable opinion among the 5 options is the disagree as 84 respondents (61%) voted disagree to the statement. 30 respondents (22%) felt neutral regarding this while 4 respondents (3%) agree to the statement.

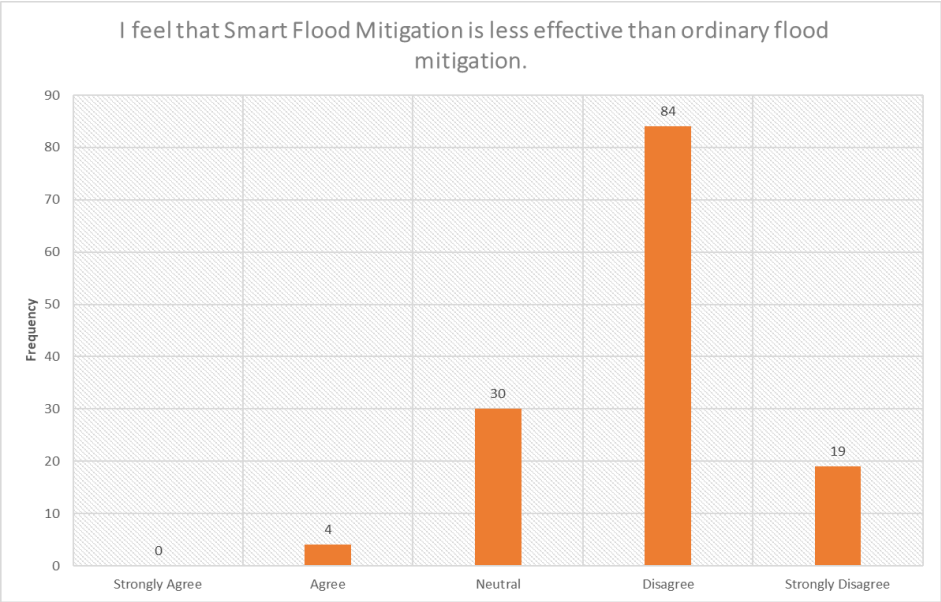

Figure 4.38: I Feel That Smart Flood Mitigation Is Less Effective Than Ordinary Flood Mitigation.

Based on the Figure 4.39, huge number of respondents felt that understand more about the Smart Flood Mitigation will be beneficial to flood mitigation as 117 respondents (85%) voted strongly agree. Agree was the second favorite option for the respondents as 12 respondents (9%) voted agree. 6 respondents (4%) voted neutral, and 2 respondents (2%) voted disagree towards the statement.

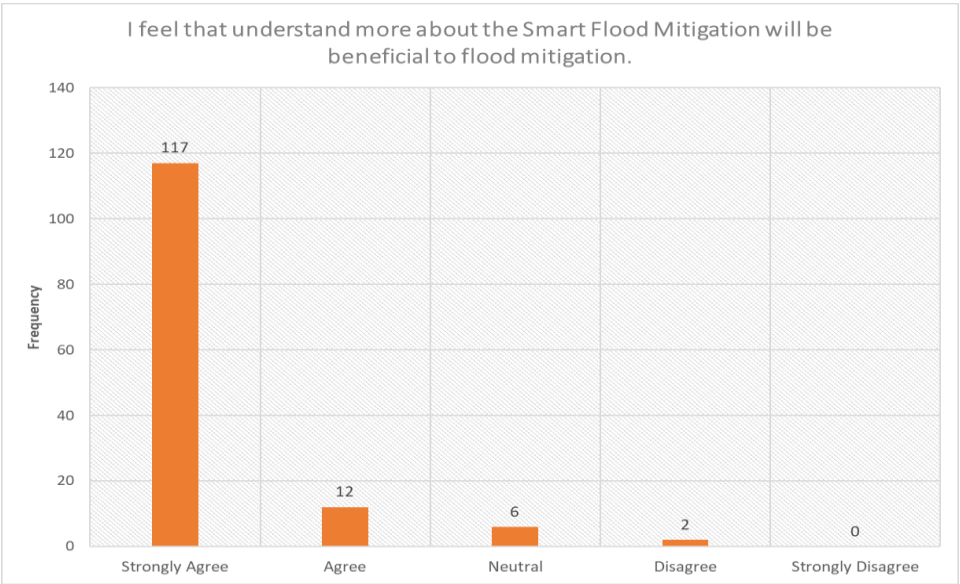

Figure 4.39: I Feel That Understand More About The Smart Flood Mitigation Will Be Beneficial To Flood Mitigation.

Based on Figure 4.40, 117 respondents (85%) felt neutral towards the development of Smart Flood Mitigation in Malaysia. There are 6 respondents (4%) that are strongly agree and 10 respondents (7%) agree towards the statement. 4 respondents (3%) disagree with the statement that asked whether they are comfortable with the development of Smart Flood Mitigation in Malaysia.

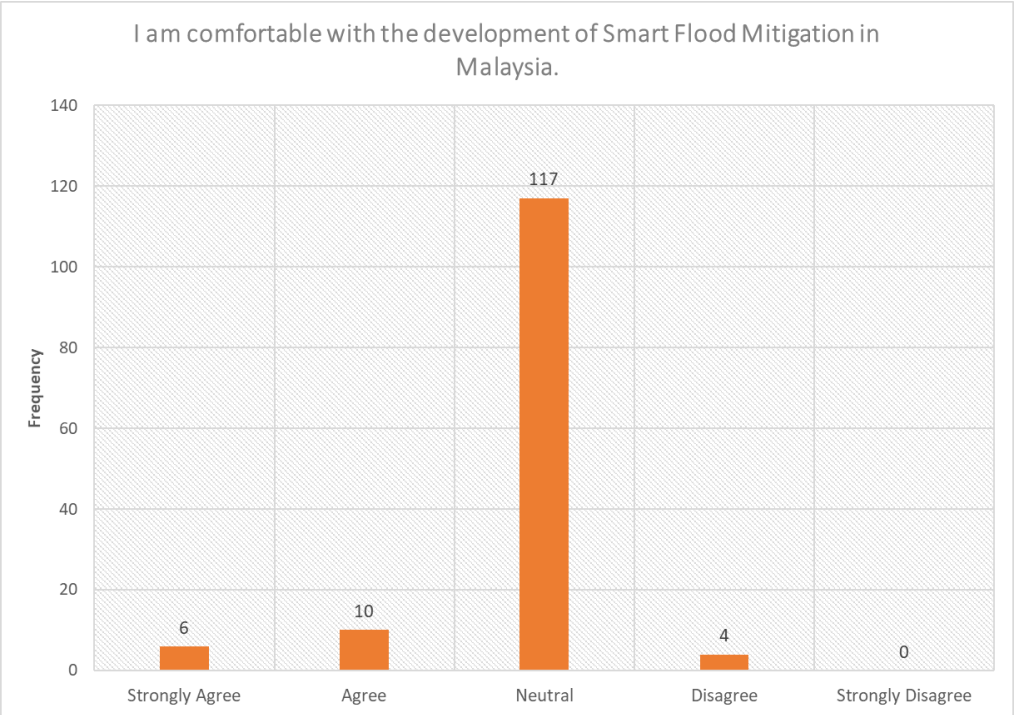

Figure 4.40: I Am Comfortable With The Development of Smart Flood Mitigation in Malaysia.

Based on the Figure 4.41, it shows that the respondents' opinion is mainly agreeing towards that studying the past event would be beneficial to the Smart Flood Mitigation in Malaysia as a total of 122 respondents (89%) are agreeing the question while 7 respondents (5%) felt strongly agree with the statement. Only 7 of the respondents (5%) voted for neutral and 1 out of 137 respondents (1%) voted as disagree toward the statement.

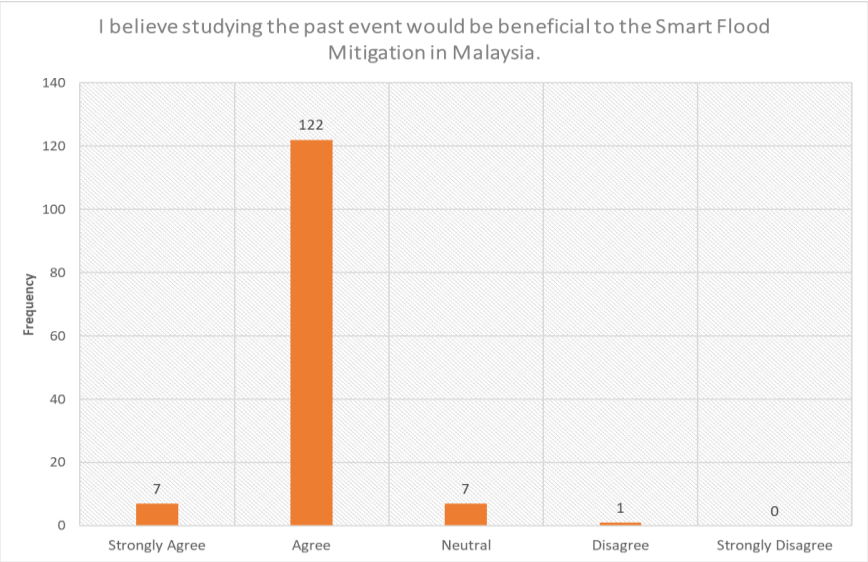

Figure 4.41: I Believe Studying The Past Event Would Be Beneficial to the Smart Flood Mitigation in Malaysia.

4.5.5 Acceptance

By referring to the Figure 4.42, a total of 123 respondents (90%) had voted agree as they think Smart Flood Mitigation will enable the public to get information of the floods quickly. Apart from that, 7 respondents (5%) are strongly agreeing to the statement. 4 respondents (3%) and 3 respondents (2%) are neutral and disagreeing the statement respectively.

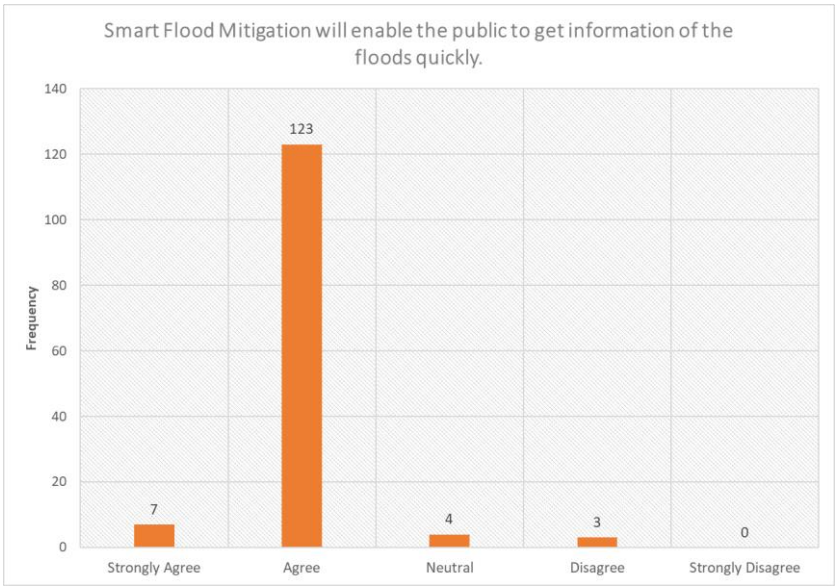

Figure 4.42: Smart Flood Mitigation Will Enable The Public To Get Information Of The Floods Quickly.

Figure 4.43 proved that undeniably that majority of the respondents are strongly agree with the statement that stated Smart Flood Mitigation allows the authorities to follow up the floods condition from far away as 114 respondents (83%) chose strongly to agree among the options. Apart from strongly agree, 14 respondents (10%) voted for agree towards to statement. However, 8 respondents (6%) felt neutral, and 1 respondent (1%) voted for strongly disagree to the statement.

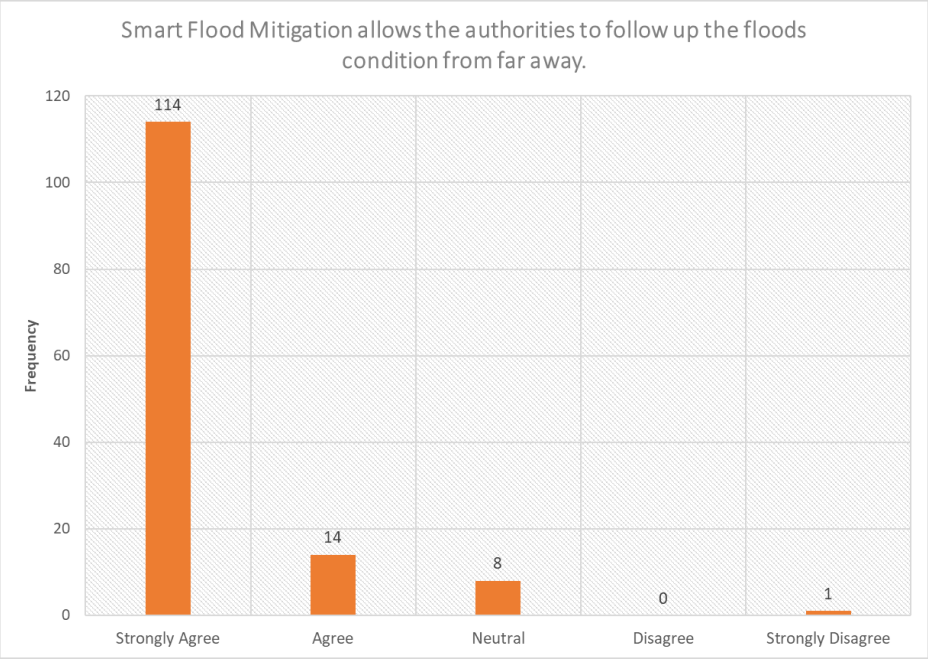

Figure 4.43: Smart Flood Mitigation Allows The Authorities To Follow Up The Floods Condition From Far Away.

Referring to Figure 4.44, strongly agreeing with the statement regarding that Smart Flood Mitigation is useful in the rapid retrieval of information from the flood condition turned up to be the highest among all which have a population of 73 respondents (53%). Respondents with have opinion of agree is the second highest which contain of 56 respondents (41%) followed by neutral opinion with 6 respondents (4%). 1 respondent (1%) disagree with the statement while another respondent is strongly disagreeing to the statement.

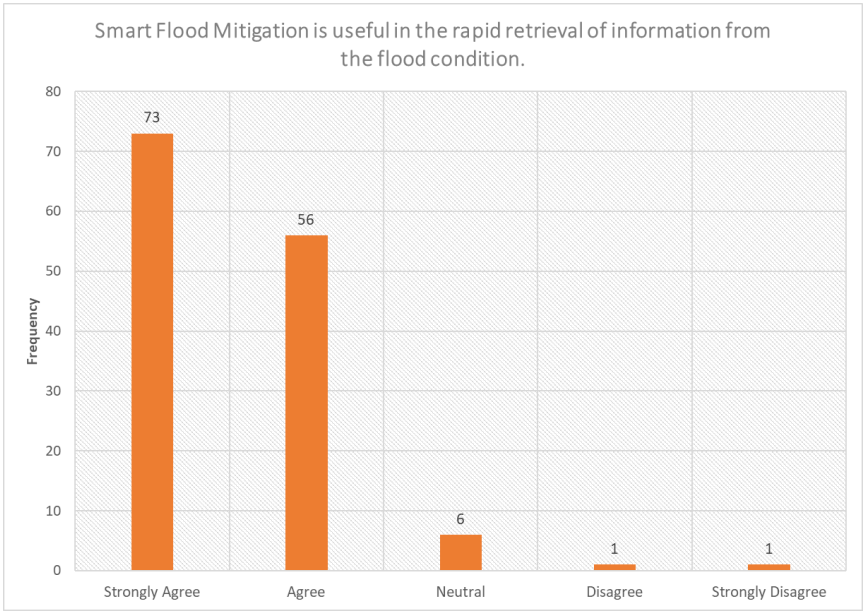

Figure 4.44: Smart Flood Mitigation Is Useful In The Rapid Retrieval Of Information From The Flood Condition.

Based on the Figure 4.45, it shows that the respondents' opinion is mainly agreeing towards that Smart Flood Mitigation will reduce time required for the flood response as a total of 89 respondents (65%) are agreeing to the statement while 42 respondents (30%) felt strongly agree with the statement. Only 5 of the respondents (4%) voted for neutral and 1 out of 137 respondents (1%) voted as disagree toward the statement.

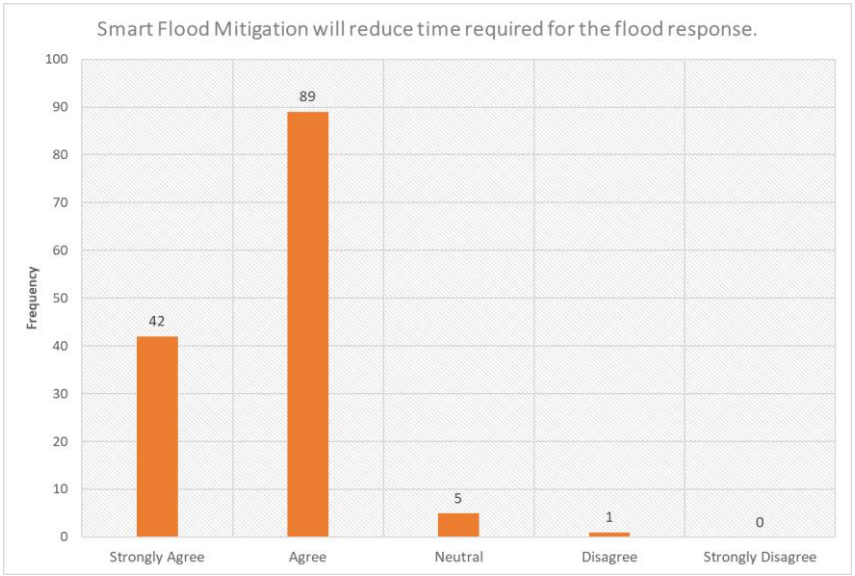

Figure 4.45: Smart Flood Mitigation Will Reduce Time Required For The Flood Response.

Figure 56 proved the respondents' opinion towards the statement regarding to the implementation Smart Flood Mitigation will reduce the flood risks. Strongly Agreeing with the statement is the highest among all options which have a population of 118 respondents (86%). Respondents which have agree opinion is the second highest which contain of 14 respondents (10%). Besides, there were 3 respondents (2%) felt neutral and 2 respondents (1%) felt disagree.

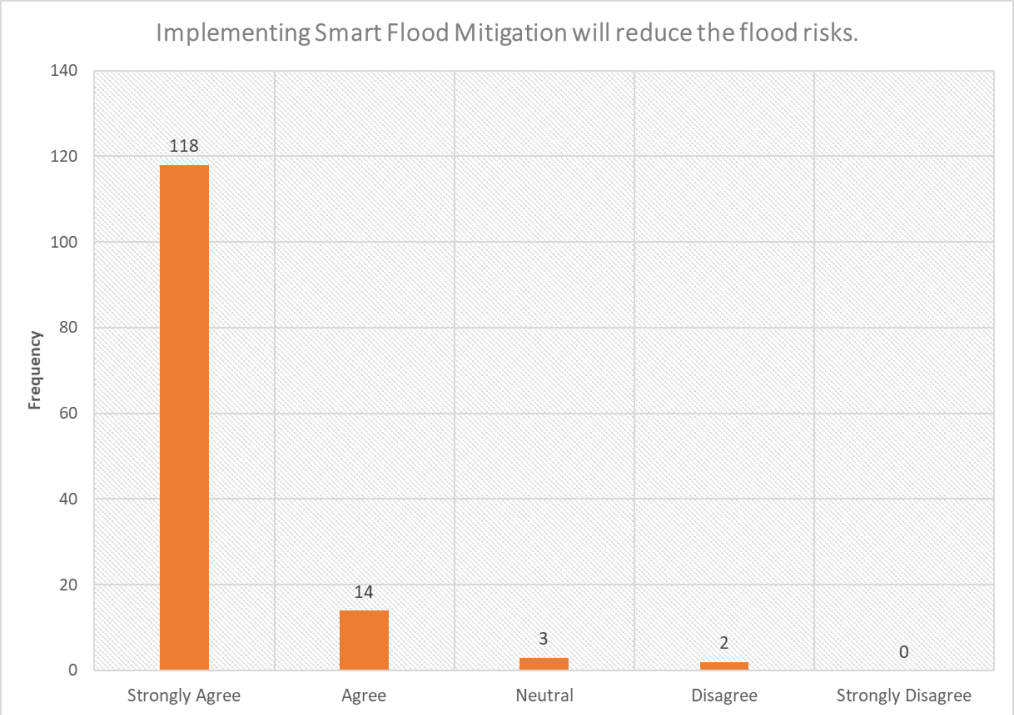

Figure 4.46: Implementing Smart Flood Mitigation Will Reduce The Flood Risks.

According to the Figure 4.47, there are total of 60 respondents (44%) felt neutral to the statement that they feel participating in Smart Flood Mitigation would be ease for them. The second highest opinion among is the disagree with the amount of 46 respondents (33%) followed by agree with 30 respondents (22%). Other than that, there are respectively 1 respondent (1%) disagree and strongly disagree with the statement.

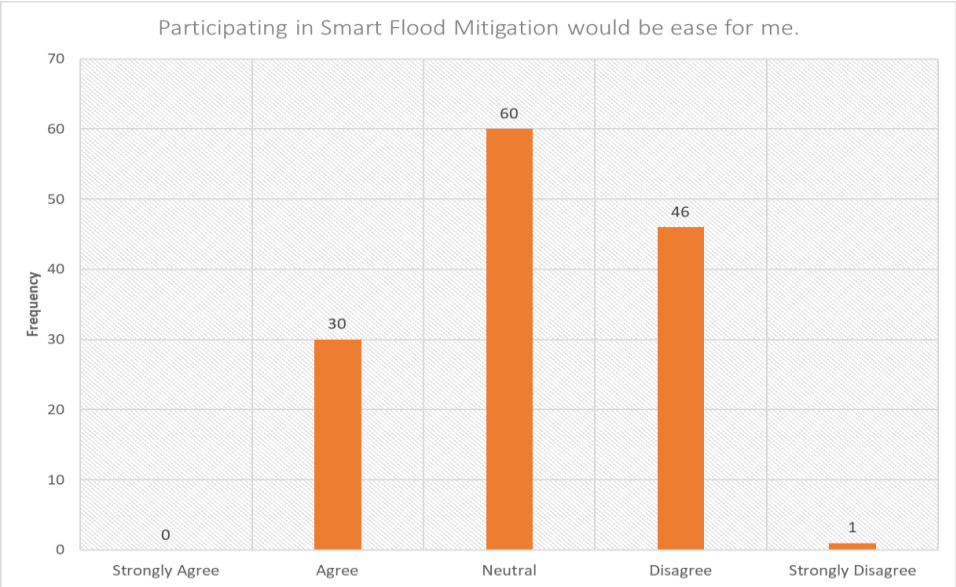

Figure 4.47: Participating in Smart Flood Mitigation Would Be Ease For Me.

According to Figure 4.48, 84 respondents (61%) are strongly agreeing to they find it easy to use mobile applications of Smart Flood Mitigation, 32 respondents (23%) felt agree toward this statement. There are 19 respondents (14%) and,1 respondent (1%) voted for neutral and disagree respectively. Throughout 137 respondents, there were 1 respondent (1%) that voted for strongly disagree against this statement.

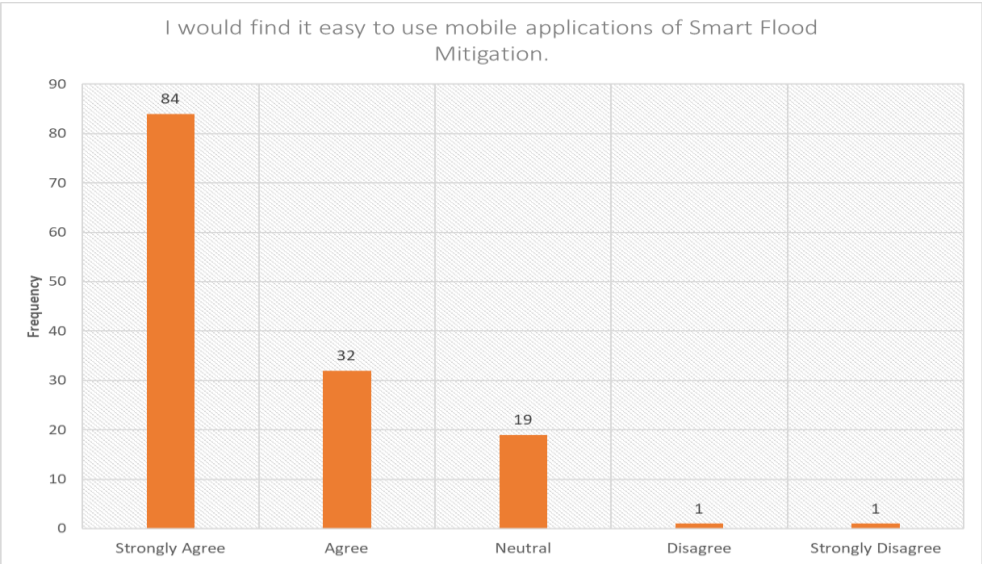

Figure 4.48: I Would Find It Easy To Use Mobile Applications Of Smart Flood Mitigation.

By referring to Figure 4.49, majority of the respondents agree that they believe that Smart Flood Mitigation will increase the ability to prevent flood from happening with a population of 96 respondents (69%) voted agree followed by 41 respondents (29%) felt strongly agree to the statement. Out of 137 respondents, there are 1 respondent (1%) that disagree with the statement while 2 respondents (1%) felt neutral the statement.

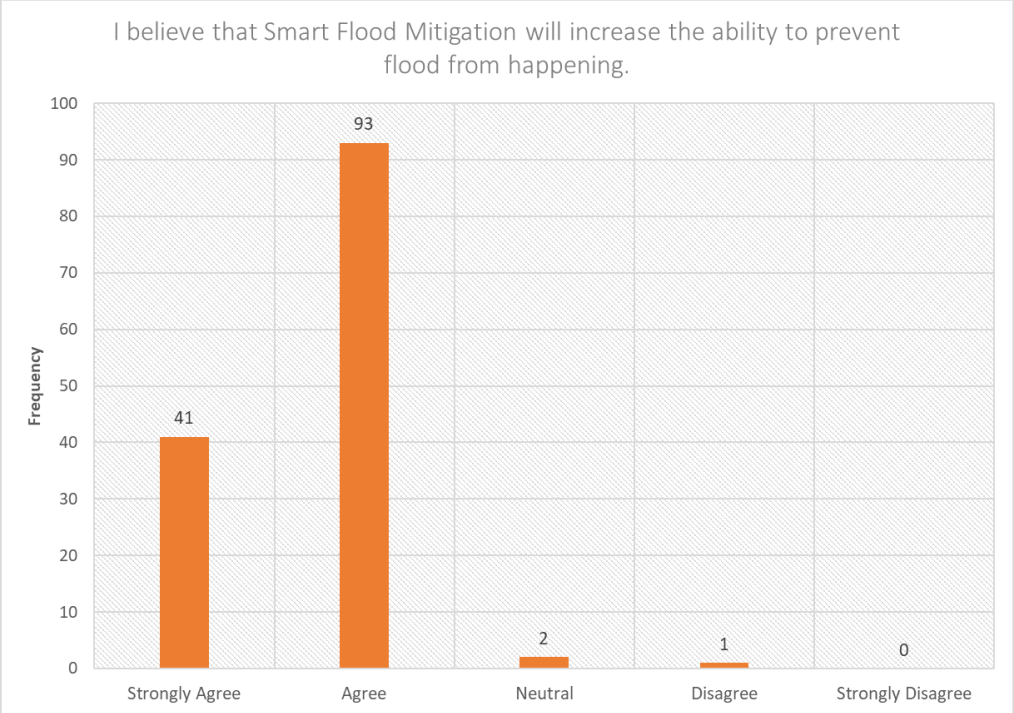

Figure 4.49: I Believe That Smart Flood Mitigation Will Increase The Ability To Prevent Flood From Happening.

4.6 Reliability Test

According to Mishra (2018), scale of measurements is performed in order to provide the insight regarding the data collected from questionnaire survey. In order to ensure all the data collected are reliable and can be proceed for data analysis, all the result must be undergoing the reliability test in Statistical Package for the Social Sciences (SPSS) to obtain the Cronbach's Alpha. Figure 4.50 shows the results of the reliability test for the Perception variable.

Reliability Statistics

Cronbach's Alpha	N of Items
.725	6

Figure 4.50: Reliability Test Result for the Perception Variable.

Figure 4.51 shows the reliability test result for the awareness variable using SPSS software.

Reliability Statistics

Cronbach's Alpha	N of Items
.714	7

Figure 4.51: Reliability Test Result for the Awareness Variable.

Figure 4.52 shows the reliability test result for the preparedness variable using SPSS software.

Reliability Statistics

Cronbach's Alpha	N of Items
.724	7

Figure 4.52: Reliability Test Result for the Preparedness Variable.

Figure 4.53 shows the reliability test result for the Readiness variable using SPSS software.

Reliability Statistics

Cronbach's Alpha	N of Items
.726	7

Figure 4.53: Reliability Test Result for the Readiness Variable.

Figure 4.54 shows the reliability test result for the acceptance variable using SPSS software.

Reliability Statistics

Cronbach's Alpha	N of Items
.702	8

Figure 4.54: Reliability Test Result for the Acceptance Variable.

According to the Table 4.2, the summary of the reliability test result shown that all the Cronbach Alpha value obtained via the reliability test in SPSS are larger than 0.7. Taber (2018) stated that Cronbach's Alpha larger than 0.45 is considered as sufficient and when the Cronbach's Alpha value is larger than 0.7, its described as good for social science study. All the 137 data collected were included inside the reliability test and it reflects that the respondents do not face difficulty in reading, understanding, and answering the questionnaire questions. It is concluded that all the 137 data for this questionnaire survey are able to be proceed for data analysis to discover more insight.

Table 4.2: Summary of the Reliability Test Result.

Variables	Cronbach Alpha	Strength of Reliability
Independent Variables		
Perception	0.725	Good
Awareness	0.714	Good
Preparedness	0.724	Good
Readiness	0.726	Good
Dependent Variable		
Acceptance	0.702	Good

4.7 Multicollinearity Test

As all the data passed the reliability test, the data was then analyzed with multicollinearity test. To ensure that the data passed the multicollinearity test, the value for the Variance Inflation Factor (VIF) are required to be stay within

the range of 1 to 5 to ensure that the variable is moderate correlated. Table 4.3 shows the results of all the independent variables question in multicollinearity test. In the table, P1 stands for perception question 1, A2 stands for awareness question 2, PR3 stand for preparedness question 3 while the R4 stands for readiness question 4. According to Bhandari (2024), Multicollinearity may result in fluctuating and untrustworthy coefficient approximations, complicating result interpretation and hindering drawing substantive inferences from the model. Detecting and mitigating multicollinearity is crucial to maintain the integrity and resilience of regression models.

Table 4.3: Results of the Multicollinearity Test.

Coefficients[a]

Model		Correlations		Collinearity Statistics	
		Partial	Part	Tolerance	VIF
1	(Constant)				
	P1	-.014	-.006	.493	2.030
	P2	-.099	-.040	.525	1.904
	P3	.122	.050	.411	2.433
	P4	-.242	-.101	.487	2.054
	P5	-.225	-.093	.364	2.746
	P6	-.051	-.021	.291	3.434
	A1	.022	.009	.540	1.853
	A2	-.038	-.016	.147	3.798
	A3	-.018	-.007	.141	3.067
	A4	.079	.032	.359	2.783
	A5	-.039	-.016	.387	2.581
	A6	.017	.007	.164	2.091
	A7	.274	.115	.365	2.743
	PR1	.075	.031	.173	4.797
	PR2	.261	.109	.020	4.856
	PR3	-.037	-.015	.073	3.616
	PR4	-.224	-.093	.153	1.534
	PR5	.191	.079	.012	2.429
	PR6	.112	.045	.142	4.028
	PR7	-.318	-.135	.020	2.674
	R1	.525	.249	.079	1.718
	R2	.053	.021	.474	2.109
	R3	-.115	-.047	.035	2.807
	R4	.067	.027	.619	1.616
	R5	.262	.110	.090	3.118
	R6	-.468	-.214	.194	2.144
	R7	-.027	-.011	.177	4.640

a. Dependent Variable: AC5

In this multicollinearity test, Awareness question 1 has the highest tolerance value if 0.540 and the lowest tolerance value of 0.02 fall to

Preparedness question 2. All the VIF values for the independent variables question are within the range of 1 to 5. Thus, there is no correlation between independents variables and the data can be proceeded to analyze in the Partial Least Square - Structural Equation Modelling (PLS-SEM).

4.8 Reflective Measurement Model Assessment

After the results had been passed through the reliability test and multicollinearity test in Statistical Package for Social Sciences (SPSS), the result is going to be undergo the reflective measurement model assessment by using the Partial Least Square – Structural Equation Model (PLS-SEM) in Smart PLS 4.0. According to Fauzi (2022), the outer loading for each question should be more than 0.708 in order to ensure adequate convergence. To begin the measurement, the latent variable and all the data must be transferred to Smart PLS 4.0 from the SPSS with comma separated value (.csv) file. Figure 4.55 shows the connection of latent variables and indicators in SmartPLS 4.0.

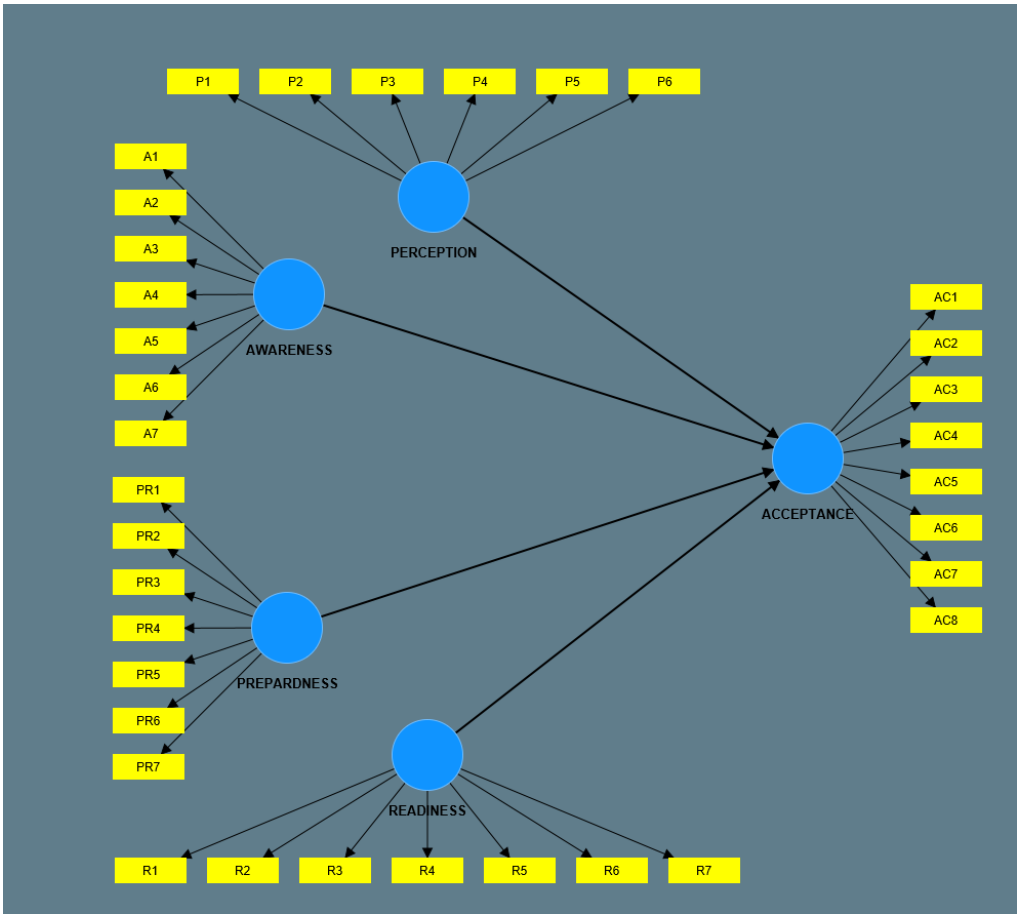

Figure 4.55: Latent Variables and Indicators in SmartPLS 4.0.

In Figure 4.55, it shown that all the independent variables (awareness, perception, preparedness, readiness) is connected to each variable's questions. Apart from that, the independent variables are linked to the dependent variables (acceptance) which also connected to its' questions. According to Joseph (2020), the outer loading for each question is required to be above 0.708 to prove the indicator reliability. Figure 4.56 shows the initial outer loadings of each indicator. To ensure adequate convergence, any indicators below 0.708 are advised to be removed.

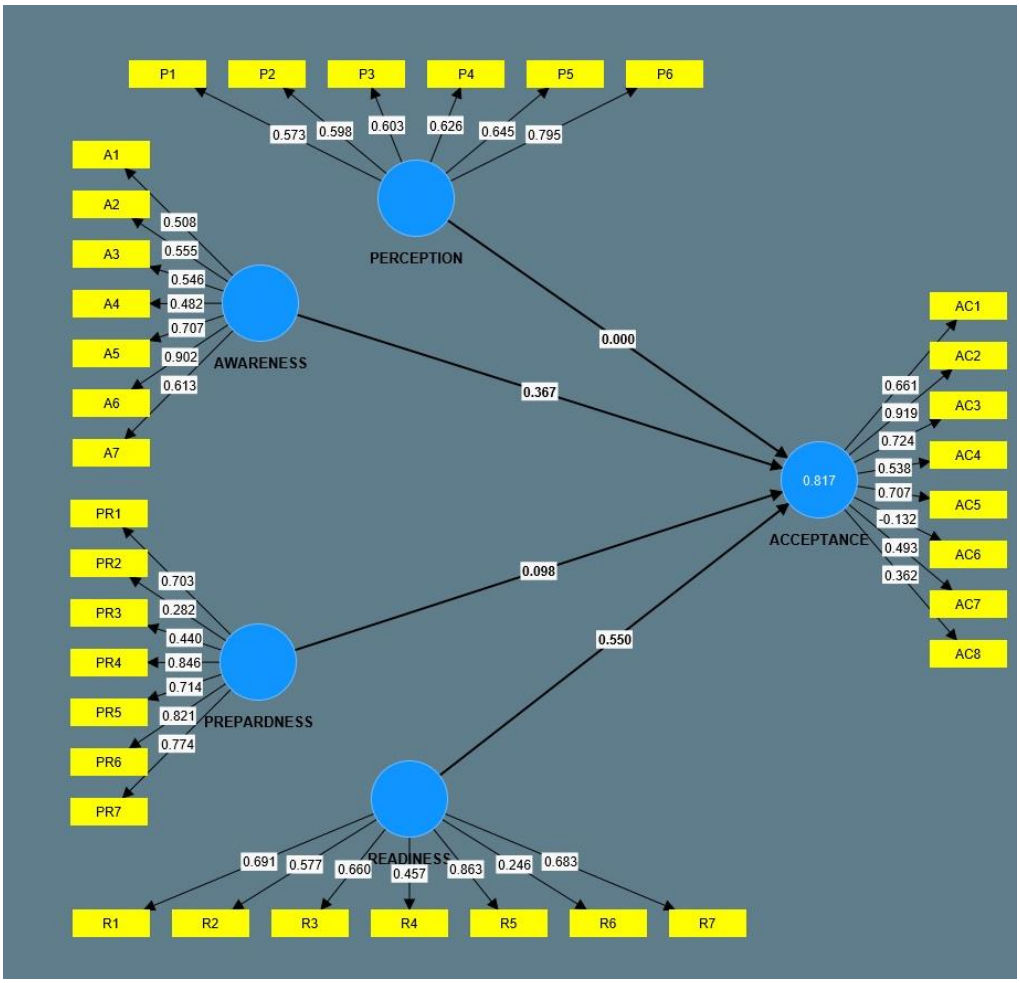

Figure 4.56: Initial Outer Loading of Each Indicator in SmartPLS 4.0.

Before removing the indicators that does not achieve the desired outer loading, the Average Variance Extracted (AVE) were measured. Table 4.4 shows the results of the AVE before the indicators are being removed. It's obviously shown that the Average Variance Extracted (AVE) are not acceptable as it should be larger than 0.5. In statistics, the Average Variance Extracted

(AVE) serves as a metric indicating the proportion of variance explained by a construct compared to the variance attributable to measurement error (Santos, 2020). According to Cheung (2023), Average Variance Extracted (AVE) is typically considered acceptable when it is greater than or equal to 0.5, indicating a satisfactory level of convergent validity.

Table 4.4: Construct Reliability and Validity in SmartPLS 4.0.

Construct reliability and validity - Overview

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
ACCEPTANCE	0.710	0.828	0.785	0.374
AWARENESS	0.733	0.790	0.815	0.398
PERCEPTION	0.730	0.756	0.808	0.415
PREPARDNESS	0.787	0.845	0.849	0.466
READINESS	0.748	0.821	0.803	0.390

In this case, all the AVE for the variables were failed before the removal of unwanted indicators. Therefore, in order to increase the AVE value and ensure the outer loadings of each indicator, certain indicators were removed. The removal process is necessary to provide an acceptable level of convergent validity for data analysis. According to Joseph (2020), as a notable outer loading could still potentially be relatively feeble, a widely accepted guideline suggests that the standardized outer loadings ought to be 0.708 or greater. Figure 4.57 shows the outer loadings of each indicator after removal in SmartPLS 4.0.

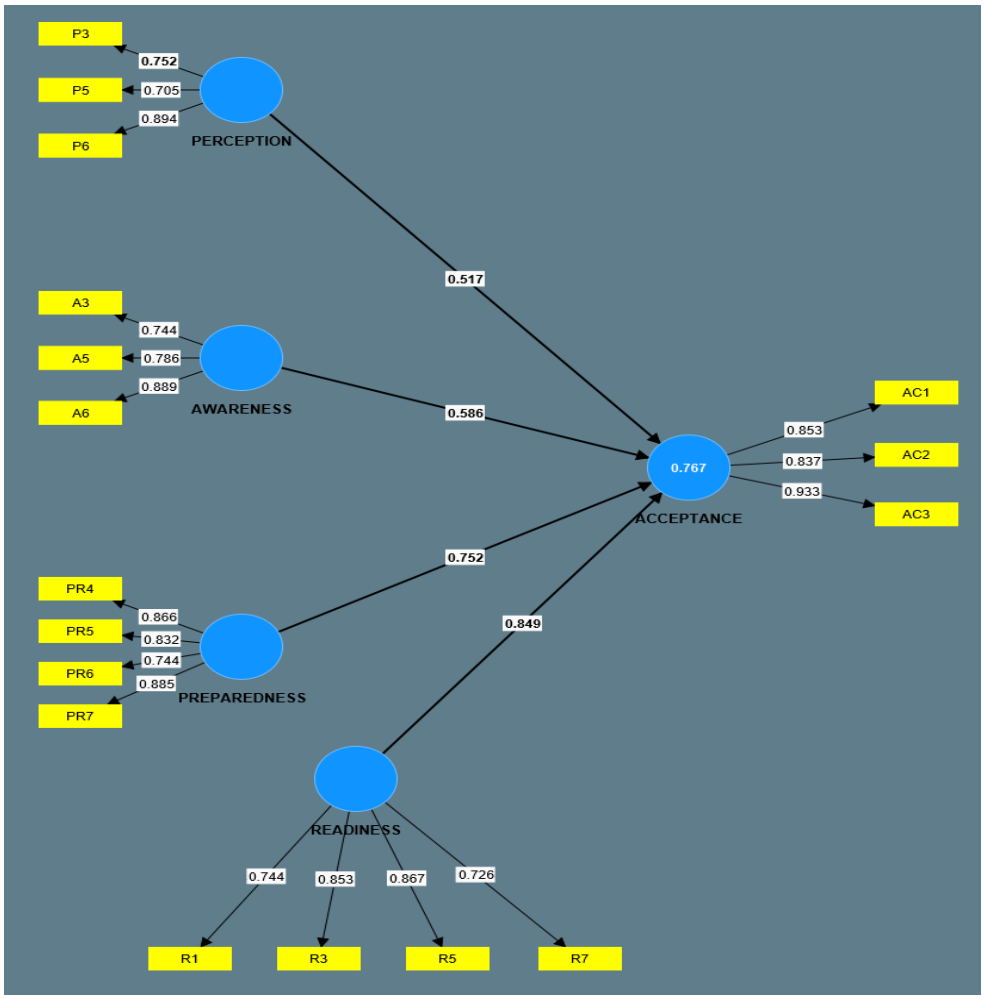

Figure 4.57: Outer Loading of Each Indicator After Removal in SmartPLS 4.0.

After removing P1, P2, P4, A1, A2, A4, PR1, PR2, PR3, R2, R4, R6, AC4, AC5, AC6, AC7, outer loadings of all indicators are higher than 0.708. Apart from that, the Average Variance Extracted (AVE) after the removal of indicators are all larger than 0.5 that could be contribute to reflective construct. Table 4.5 shows the construct reliability and validity after the removal of indicators.

Table 4.5: Construct Reliability and Validity After Removal of Indicators in SmartPLS 4.0.

Construct reliability and validity - Overview

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
ACCEPTANCE	0.789	0.839	0.864	0.618
AWARENESS	0.763	0.890	0.889	0.800
PERCEPTION	0.856	0.866	0.798	0.667
PREPARDNESS	0.852	0.857	0.900	0.692
READINESS	0.769	0.866	0.858	0.669

Then, the last step of the reflective measure model assessment is to determine the discriminant validity of the data collected. In this research study, only the heterotrait-monotrait ratio (HTMT) will be focused apart from the Fornell-Larker and cross-ladings criterion. According to Hamid (2017), HTMT is able to achieve higher specificity and sensitivity compared to the other options. Azolimines (2022) stated that the suggested HTMT value are required to be lower than 0.85 or 0.9 to establish the discriminant validity between two reflectively measured constructs. Table 4.6 shows the result of the Heterotrait-monotrait ratio (HTMT) before indicators removal.

Table 4.6: Result of the Heterotrait-Monotrait Ratio (HTMT) Before Indicators Removal.

Discriminant validity - Heterotrait-monotrait ratio (HTMT) - Matrix

	ACCEPTANCE	AWARENESS	PERCEPTION	PREPARDNESS	READINESS
ACCEPTANCE					
AWARENESS	0.984				
PERCEPTION	0.768	0.829			
PREPARDNESS	0.950	0.978	0.752		
READINESS	1.017	0.806	0.682	0.877	

Before the indicators were being remove, 4 HTMT values were higher than the desired values. Thus, certain indicators were removed as shown in the Figure 67. Table 4.7 shows the result of the Heterotrait-monotrait ratio (HTMT) after indicators removal.

Table 4.7: Result of the Heterotrait-Monotrait Ratio (HTMT) After Indicators Removal.

Discriminant validity - Heterotrait-monotrait ratio (HTMT) - Matrix

	ACCEPTANCE	AWARENESS	PERCEPTION	PREPARDNESS	READINESS
ACCEPTANCE					
AWARENESS	0.780				
PERCEPTION	0.853	0.806			
PREPARDNESS	0.900	0.725	0.769		
READINESS	0.725	0.564	0.703	0.828	

After the removal of certain indicators mentioned above, all the HTMT values were all achieved the desired value which are below 0.9. It indicates that all the variables held acceptable discriminate validity with respect to each other. After the Heterotrait-monotrait ratio (HTMT) had been examined, the data analysis can be proceed with the formative measurement model assessment.

4.9 Formative Measurement Model Assessment

After ensuring the reliability and validity of the construct measure through the reflective measurement model, the data would be undergoing the formative measurement model assessment. In formative measurement model, there are certain value to be observed which are the Variance Inflation Factor (VIF), T-Values and the P-Values of each indicator. Figure 4.58 shows the formative measurement model.

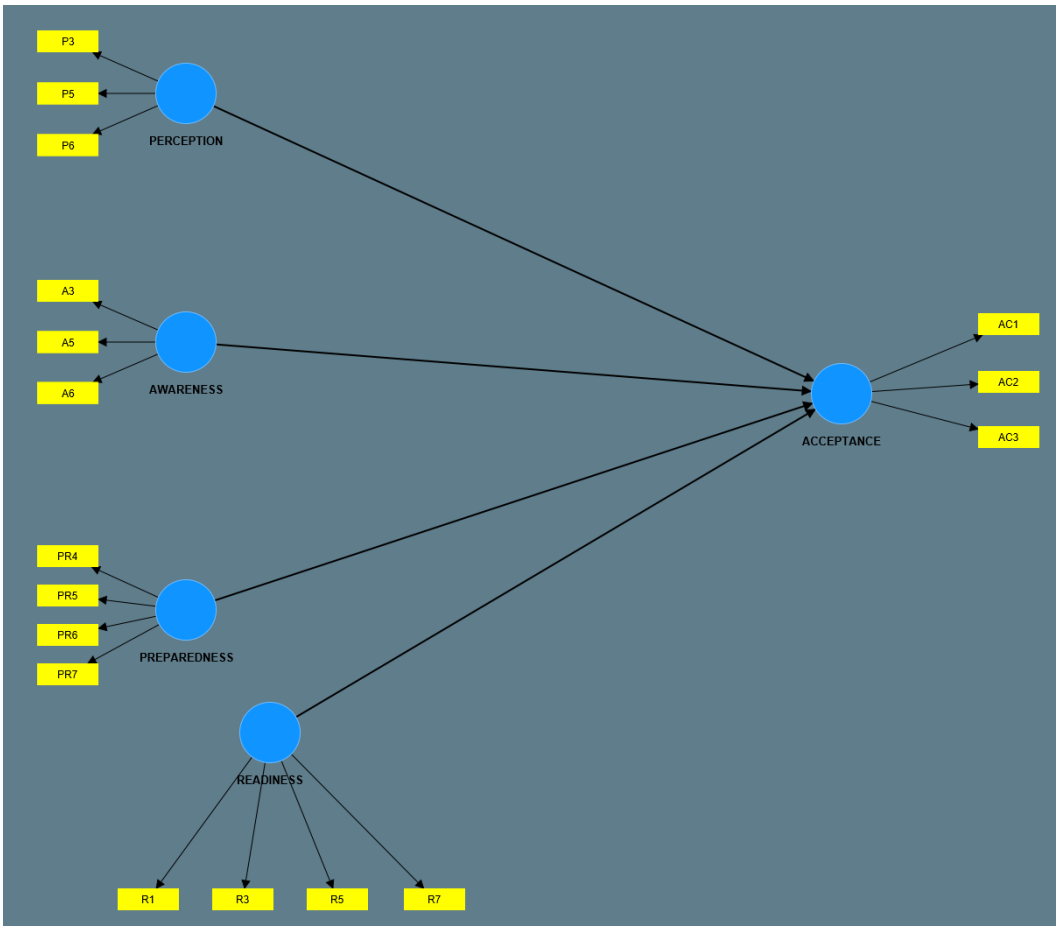

Figure 4.58: Formative Measurement Model.

To begin the formative measurement model assessment, the initial assessment is to undergo the collinearity statistics test to identify the collinearity issues between the indicators. According to Jamal (2017), VIF values fall between 1 and 5 indicates that there are moderate collated, when the VIF values are larger than 10 there are collinearity issues. Table 4.8 shows the VIF values of each indicator.

Table 4.8: Variance Inflation Factor (VIF) for Each Indicator.

Collinearity statistics (VIF) - Outer model	
	VIF
A3	1.188
A5	1.639
A6	1.712
AC1	2.598
AC2	1.814
AC3	3.554
P3	1.149
P5	1.239
P6	1.405
PR4	2.314
PR5	2.328
PR6	1.562
PR7	2.948
R1	1.827
R3	1.739
R5	1.736
R7	1.353

As shown in the Table 4.8, there are no collinearity issue among the all the indicator as all the VIF value were in between 1 and 5. Thus, the formative measurement model assessment could be proceeded by assessing the significance and relevance of the formative indicators in order to establish validity. Bootstrapping of 5000 subsamples were done to identify the outer weights to explain a significant portion of the variance of a formative construct. T-value and P-value are required to be observed as T-value measure the size of the difference relative to the variation where P-value evaluate the significance of outer weights. According to Hair (2017), recommended value for the T-value is larger than 1.96 while the recommended value for P-value is smaller than 0.05. Table 4.9 shows the outer weights of each indicator.

Table 4.9: Outer Weights of Each Indicator.

Outer weights - Mean, STDEV, T values, p values					
	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
A3 <- AWARENESS	0.374	0.375	0.067	5.606	0.000
A5 <- AWARENESS	0.328	0.336	0.075	4.345	0.000
A6 <- AWARENESS	0.545	0.534	0.113	4.840	0.000
AC1 <- ACCEPTANCE	0.349	0.354	0.045	7.692	0.000
AC2 <- ACCEPTANCE	0.406	0.404	0.056	7.220	0.000
AC3 <- ACCEPTANCE	0.389	0.398	0.039	9.980	0.000
P3 <- PERCEPTION	0.294	0.302	0.123	2.395	0.017
P5 <- PERCEPTION	0.418	0.391	0.141	2.960	0.003
P6 <- PERCEPTION	0.610	0.608	0.131	4.660	0.000
PR4 <- PREPAREDNESS	0.322	0.329	0.058	5.533	0.000
PR5 <- PREPAREDNESS	0.270	0.266	0.023	11.836	0.000
PR6 <- PREPAREDNESS	0.276	0.289	0.084	3.282	0.001
PR7 <- PREPAREDNESS	0.329	0.324	0.049	6.655	0.000
R1 <- READINESS	0.249	0.246	0.070	3.575	0.000
R3 <- READINESS	0.230	0.224	0.045	5.155	0.000
R5 <- READINESS	0.443	0.443	0.080	5.557	0.000
R7 <- READINESS	0.390	0.380	0.078	5.025	0.000

As shown in the Figure above, all the T-value were above than 1.96 and all the P-values were smaller than 0.05. As all the values fall in the acceptable range, it indicates that the Outer Weights of the data is statistical significance and can be proceed for next step. After accessing the T-value and P-value for Outer Weights, it is required to access to the T-value and P-value of the Outer Loadings. Table 4.10 shows the outer loadings of each indicator. In the table, it shown that all the data for Outer Loadings provided statistical significance due to all the T-value is larger than 1.96 and all the P-value are lower than 0.05.

Table 4.10: Outer Loadings of Each Indicator.

Outer loadings - Mean, STDEV, T values, p values					
	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
A3 <- AWARENESS	0.689	0.685	0.080	8.600	0.000
A5 <- AWARENESS	0.786	0.778	0.071	11.106	0.000
A6 <- AWARENESS	0.889	0.879	0.077	11.620	0.000
AC1 <- ACCEPTANCE	0.853	0.845	0.090	9.447	0.000
AC2 <- ACCEPTANCE	0.837	0.818	0.090	9.304	0.000
AC3 <- ACCEPTANCE	0.933	0.926	0.048	19.466	0.000
P3 <- PERCEPTION	0.543	0.533	0.152	3.561	0.000
P5 <- PERCEPTION	0.705	0.663	0.155	4.552	0.000
P6 <- PERCEPTION	0.894	0.886	0.076	11.699	0.000
PR4 <- PREPAREDNESS	0.866	0.858	0.069	12.536	0.000
PR5 <- PREPAREDNESS	0.832	0.811	0.080	10.449	0.000
PR6 <- PREPAREDNESS	0.744	0.743	0.118	6.312	0.000
PR7 <- PREPAREDNESS	0.885	0.862	0.098	9.032	0.000
R1 <- READINESS	0.693	0.677	0.164	4.212	0.000
R3 <- READINESS	0.697	0.674	0.122	5.730	0.000
R5 <- READINESS	0.867	0.871	0.046	18.670	0.000
R7 <- READINESS	0.726	0.715	0.135	5.363	0.000

4.10 Structural Model Assessment

As the data was ensured with required level of validity and reliability, it is required to assess the structural model. To begin the structural model assessment, the inner Variance Inflation Factor (VIF) is required to be examining. According to Hair (2017), recommended value for inner VIF should be lower than 5 to ensure there are no collinearity issues. Table 4.11 shows the Inner VIF Values for structural Model.

Table 4.11: Inner VIF Values for Structural Model.

Collinearity statistics (VIF) - Inner model - Matrix

	ACCEPTANCE	AWARENESS	PERCEPTION	PREPAREDNESS	READINESS
ACCEPTANCE					
AWARENESS	1.973				
PERCEPTION	2.152				
PREPAREDNESS	2.569				
READINESS	2.433				

All the inner VIF values between the independent variables and the dependent variable were all lower than 5 indicates that the structural model does not imply collinearity issues. The next step for the structural model assessment was to assess the path coefficients' significance by applying bootstrapping of 5000 subsamples to examine the T-value and P-value. Table 4.12 shows the path coefficients of the structural model.

Table 4.12: Path Coefficients of the Structural Model.

Path coefficients - Mean, STDEV, T values, p values

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
AWARENESS -> ACCEPTANCE	0.146	0.127	0.103	1.986	0.000
PERCEPTION -> ACCEPTANCE	0.603	0.603	0.093	2.227	0.003
PREPAREDNESS -> ACCEPTANCE	0.284	0.294	0.242	1.972	0.000
READINESS -> ACCEPTANCE	0.620	0.603	0.208	2.988	0.003

Similar to the formative measurement model assessment, the recommended T-value is larger than 1.96 while the P-value is required to be lower than 0.5. Table 4.12 proved that all the independent variables had passed the required values. Then, it is required to assess to the coefficient of determination which is R^2 of the endogenous constructs. According to Hair

(2011), R^2 ranges from 0 to 1, the higher the value the higher the greater explanatory power. The R^2 value can be divided into 3 stages where 0.25, 0.50 and 0.75 indicates as weak, moderate, and substantial respectively. Table 4.13 shows the result of the R^2 Value.

Table 4.13: Result of R^2 Value.

R-square - Overview

	R-square	R-square adjusted
ACCEPTANCE	0.767	0.760

As shown in the Table 4.13, the R^2 value is 0.767 and it proved that the model's explanatory power is considered as substantial. The next step after assessing the coefficient of determination (R^2), it is required to examine the effect size of change (f^2). Effect size of change explains the effect of the removal of independent variable towards the dependent variable. According to Cohen (1988), f^2 value larger or equal to 0.02, 0.15, 0.35 indicates that the effect is small, medium, and large respectively. Table 4.14 shows the result of the f^2 value.

Table 4.14: Result of f^2 Value.

f-square - Matrix

	ACCEPTANCE
ACCEPTANCE	
AWARENESS	0.046
PERCEPTION	0.026
PREPAREDNESS	0.135
READINESS	0.679

Based on the Table 4.14, it clearly shown that awareness, perception, and preparedness indicate a small effect toward the acceptance. However, the effect of readiness toward the acceptance is large impact. Lastly, the predictive relevance (Q^2) are required to be determined with the PLSpredict function in SmartPLS 4. Q^2 assesses the ability of the model to predict endogenous latent

variables based on the exogenous latent variables in the model. According to Hair (2017), Q^2 larger than 0 indicates that the model has predictive relevance for the latent variables. The Q^2 value larger or equal to 0.02 is small, >= 0.15 is medium and >= 0.35 is strong predict relevance. Table 4.15 shows results of Q^2 value. Based on the Table 4.15, the Q^2 value for acceptance is 0.594 which is equal to strong predict relevance.

Table 4.15: Result of Q^2 Value

LV prediction summary - PLS-SEM			
	Q^2predict	RMSE	MAE
ACCEPTANCE	0.594	0.716	0.281

4.11 Discussion

Based on the demographic analysis, majority of the respondents are Malaysian male with the age groups vary from 20 to 50 years old. In this research, most of the respondents held a bachelor's degree and currently employed full time. It is crucial that most respondents' accommodation located in Puchong area and experienced rainy season in Puchong in order to assure this research's validity. However, a huge number of respondents rated the efficiency of the flood system in Puchong with a score of 5 out of 10. Although there were numbers of news had reported regarding the flooding issues happened in Puchong, many respondents remained neutral towards the flood system in Puchong.

By answering to the first objective of the research study, the variable affecting the public acceptance on smart flood mitigation in Puchong are identified. Four variables that affect the public acceptance on smart flood mitigation in Puchong are the Perception, Awareness, Readiness and Preparedness. In this research study, questions based on the independent variables and the dependent variables were set to the respondents to collect their opinion. After that, the data collected undergone analysis to study the relationship between the independent variables and the dependent variables.

Apart from the general questions, multiple set of questions were set to understand the opinions of the public towards the smart flood mitigation in Puchong. Based on the questionnaire survey, most of the respondents have

perception, prepared, and accept the smart flood mitigation in Puchong. However, the respondents are not ready and aware of the smart flood mitigation in Puchong. It had relatively big step for the authorities to improve the awareness and readiness of the public towards the smart flood mitigation in Puchong.

By using the Statistical Package for Social Science (SPSS), the reliability of the data collected through the questionnaire survey were assured by undergoing the reliability test. The Cronbach's Alpha of the data proved that the data are reliable to be used for analysis. Multicollinearity test was conducted before the data were exported to SmartPLS 4. Variance Inflation Factor (VIF) generated from the multicollinearity test indicates that no correlation between the variables, thus the data can be further analyzed in Partial Least Square - Structural Equation Modelling (PLS-SEM).

In the PLS-SEM analysis, the data went through measurement model assessment and the results presented that the data collected were valid and reliable based on the indicator reliability, internal consistency, convergent validity, and discriminant validity. Following by the structural model assessment, the relationship between the independent variables and dependents variable was identified. In the structural model assessment, the inner Variance Inflation Factor (VIF) and the path coefficient were then analyzed, and it proved there is no multicollinearity issue, size of the difference relative, and the significance of outer weights fall within the recommended range.

Furthermore, the coefficient of determination (R^2) of the endogenous constructs were determined. As the coefficient of determination of this structural model were proven as the substantial level, it explained that the independent variables have a relatively strong explanatory power towards the dependent variables. In a simpler term, the substantial coefficient of determination (R^2) has a strong relationship between the independent variables and dependent variables. Apart from that, the effect size of change (f^2) was determined to find out which independent variable bring significant effect toward the dependent variable. In this research study, public readiness has the highest effect toward the public acceptance of the Smart Flood Mitigation in Puchong compared to the rest of the independent variables. Besides, the predictive relevance (Q^2) of the dependent variable was determined and the

result indicate that the independent variables are strongly effective in predicting the dependent variable.

Lastly, the hypothesis based on the research question were tested based on the value obtained from the structural model measurement.

Objective

To investigate the relation between independent variables and dependent variables towards the public acceptance on smart flood mitigation in Puchong.

Research Question

What is the relation between the independent variables and dependent variables towards the public acceptance on smart flood mitigation in Puchong?

Hypothesis 1: Perception

- H_o: There is no relationship between perception and acceptance level of the public towards smart flood mitigation in Puchong.
- H_1: There is a relationship between perception and acceptance level of the public towards smart flood mitigation in Puchong.

In the structural model assessment, the effect size of change (f2) for the perception variable is measured with a value of 0.046 which indicates a small effect towards the public acceptance. In this case, H_o is accepted as the effect of the public perception are relatively small. Thus, it concludes that there is no relationship between perception and acceptance level of the public towards smart flood mitigation in Puchong.

Hypothesis 2: Awareness

- H_o: There is no relationship between awareness and acceptance level of the public towards smart flood mitigation in Puchong.
- H_1: There is a relationship between awareness and acceptance level of the public towards smart flood mitigation in Puchong.

In the structural model assessment, the effect size of change (f2) for the awareness variable is measured with a value of 0.026 which indicates a small effect towards the public acceptance. In this case, H_o is accepted as the effect of the public perception are relatively small. Thus, it concludes that there is no

relationship between awareness and acceptance level of the public towards smart flood mitigation in Puchong.

Hypothesis 3: Preparedness

- H_o: There is no relationship between preparedness and acceptance level of the public towards smart flood mitigation in Puchong.
- H_1: There is a relationship between preparedness and acceptance level of the public towards smart flood mitigation in Puchong.

In the structural model assessment, the effect size of change (f2) for the preparedness variable is measured with a value of 0.135 which indicates a medium effect towards the public acceptance. In this case, H_1 is accepted as the effect of the public perception is considered as medium impact. Thus, it concludes that there is a relationship between preparedness and acceptance level of the public towards smart flood mitigation in Puchong.

Hypothesis 4: Readiness

- H_o: There is no relationship between readiness and acceptance level of the public towards smart flood mitigation in Puchong.
- H_1: There is a relationship between readiness and acceptance level of the public towards smart flood mitigation in Puchong.

In the structural model assessment, the effect size of change (f2) for the readiness variable is measured with a value of 0.679 which indicates a medium effect towards the public acceptance. In this case, H_1 is accepted as the effect of the public readiness is considered as large impact. Thus, it concludes that there is a relationship between readiness and acceptance level of the public towards smart flood mitigation in Puchong.

To answer to the third objective in this research study, the impact of the independent variables towards the public acceptance on smart flood mitigation in Puchong, the structural model assessment in PLS-SEM had proven that public readiness had caused largest impact towards the public acceptance on smart flood mitigation. Apart from the public readiness, public perception and public awareness only caused small impact towards the public acceptance while the

public preparedness caused moderate impact towards the public acceptance on smart flood mitigation in Puchong.

4.12 Summary

Chapter 4 discussed regarding the results analyzed from the data collected via the questionnaire survey with the aid of the computer software. In the beginning, the demographic of the data was analyzed following by the descriptive analysis of each variable. Then, the primary data analysis was conducted which includes the reliability test and multicollinearity test by using the SPSS software. Following this, SmartPLS 4 was utilized to conduct both the measurement model assessment and structural model assessment to gauge the relationships between the independent variables and the dependent variable. Subsequently, hypothesis testing was performed based on the relationships identified within the software.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In this chapter, the overview of the research study will be included which the insight of the analysis of the data collected through questionnaire survey to measure the public acceptance on smart flood mitigation in Puchong. The recommendation of study will be discussed in this chapter. The conclusion of this research study will be included by answering to the objectives of this research study.

5.2 Conclusion

Based on the data collected via the questionnaire survey, it proven that most bachelor's degree holders showed high awareness towards the smart flood mitigation in Puchong regardless of ages. It can be concluded that higher education background has direct influence towards the public awareness on the smart flood mitigation in Puchong and it would bring impacts towards the public acceptance on smart flood mitigation in Puchong. Therefore, the authorities should focus on promoting the public awareness on the smart flood mitigation in Puchong in order to elevate the public acceptance on smart flood mitigation in Puchong.

In this research study, three objectives were established to measure the public acceptance on smart flood mitigation in Puchong. For the first objective, variables that affecting the public acceptance on smart flood mitigation had been identified and the variables are the perception, awareness, readiness, and preparedness. Apart from the first objective, the relationship between the independent variables and dependent variables had been identified. With the aid of the computer software, the relationship of the personality trait (perception, awareness, readiness, preparedness) had been analyzed and it shown that the readiness has the most positive significant relationship with the acceptance followed by the preparedness, perception, and awareness.

In the data analysis, based on the results from the Smart PLS 4 that adapted the Partial Least Square – Structural Equation Modelling (PLS-SEM), it has proven that among four independent variables, readiness of the public had significant impacts towards the dependent variable which is the public acceptance in this research study. From the data analysis, public perception and the public awareness only caused a small impact towards the public acceptance on smart flood mitigation in Puchong. The result obtained from the present study indicates that public readiness has the greatest impact on the public acceptance on smart flood mitigation in Puchong and this has answered to the third objective in this research study.

Additionally, the coefficient of determination (R^2) of the public acceptance on smart flood mitigation in Puchong was measured at 0.767, which indicates that the structural model has a substantial explanatory power and 76.7% of the public acceptance is explained by the perception, awareness, readiness, and preparedness.

Moreover, the research emphasizes the significance of public acceptance concerning their perceptions, awareness, readiness, and preparedness regarding smart flood mitigation in Puchong, an area that has not received extensive attention from other scholars. This aspect merits exploration due to the unique challenges it poses and the potential obstacles it presents for government efforts to implement smart flood mitigation measures in Puchong.

Hence, understanding public acceptance can offer a nuanced insight into their attitudes and preparedness for smart flood mitigation initiatives in this area. Additionally, the study's focus on smart flood mitigation in Puchong offers a distinctive viewpoint on the influence of public acceptance, which can inform policymaking and industry strategies tailored to the specific context of Malaysia.

5.3 Recommendations

By conducting this research study to measure the public acceptance on smart flood mitigation in Puchong, there are several recommendations that could be done to improve the quality of this research study. One of the recommendations is increasing the area of research study that is outside of the Puchong area so we could be more clearly understand regarding the opinion of the respondets

outside the Puchong area. Apart from that, in the future studies, it is recommended to consider other independent variables that would possibly affect the public acceptance on smart flood mitigation in Puchong. Besides, it is recommended to design more detailed questions in questionnaire survey for each of the independent variables in order to clearly interpret each variable and abstract the opinion of the respondents.

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APPENDICES

Appendix A: Questionnaire Survey

UNIVERSITI TUNKU ABDUL RAHMAN (UTAR)

FACULTY OF ENGINEERING AND SCIENCE

Bachelor of Civil Engineering (Hons)

Dear respondent,

I am an undergraduate student of Bachelor of Civil Engineering (Hons)at Universiti Tunku Abdul Rahman (UTAR) and I am currently conducting a research study which is entitled "**Public Acceptance of Smart Flood Mitigation in Puchong**" for my final year project.

Smart flood mitigation employs advanced technology such as real-time sensors, predictive analytic and automated system to monitor and manage flood-prone area in order to response to the flooding issues.

This research study is compulsory subject to partially fulfill the requirement of our degree program. This questionnaire is carefully developed to be completed in no more than 15 minutes. The attached questionnaire will consist of a series of sections that involve measurement toward the **smart flood mitigation** on variables such as perception, awareness, readiness, preparedness, and acceptance.

I would deeply appreciate it if you would spend some of your time completing the enclosed questionnaire based on your own knowledge and understanding. Your cooperation is highly appreciated and thank you for spending your precious time filling in our questionnaire.

Lastly, your responses will be kept strictly **PRIVATE AND CONFIDENTIAL** as they will and only be used in this research study.

Supervisor		Student	
Name:	Ts Dr. Tan Ooi Kuan	Name:	Chong Jia Chen (190UEB2390)
Faculty:	Lee Kian Chian Faculty of Engineering and Science	Faculty:	Lee Kian Chian Faculty of Engineering and Science
Contact:	+603-90860288	Contact:	+6019-9808786
Email:	oktan@utar.edu.my	Email:	chen01@1utar.my

PERSONAL DATA PROTECTION STATEMENT

This is a Privacy Notice and shall govern UTAR in dealing with protection of personal data. To protect personal data, the Notice may be changed from time to time.

Personal Data Protection Act 2010 ("PDPA") came into force on 15 November 2013, therefore Universiti Tunku Abdul Rahman ("UTAR") is hereby bound to make notice and require consent in relation to collection, recording, storage, usage and retention of personal data.

A. What is personal data

Personal data refers to any information which may directly or indirectly identify a person which could include sensitive personal data and expression of opinion. Among others it includes:

i. Name
ii. Identity card
iii. Place of Birth
iv. Address
v. Examination Result
vi. Education History
vii. Employment History
viii. Medical History
ix. Blood type

x. Race

xi. Religion

xii. Photo

B. <u>Sources of personal data</u>

In processing relevant services, UTAR may obtain personal data from various sources such as:

i. Your self
    a. From your application forwarded to us. By submitting any application to us, you are hereby confirmed that you have obtained necessary consent for the information to be declared in the application.
    b. There could be capturing of images or audios e.g. CCTV for safety and/pr recording purposes. A notice will be displayed to the effect.

ii. Third parties
    a. UTAR affiliates in competition or survey or research or programmes.
    b. Your participation with other entities.
    c. Your guardian, legal representative or guarantor.
    d. There may be cross reference of your personal data for loan application or credit reference.
    e. Previous education institutions or employers.

iii. Third parties
    a. Your IP address is automatically login into our server. Generally, we do not link your IP address to identify each link unless in case of serious breach.
    b. You may adjust your browser to disable ‘cookies’ to prevent storage of certain information in your system.

C. <u>Purpose of personal data</u>

In servicing our obligations, the purposes for which your personal data may be used are inclusive but not limited to:

i. For assessment of any application to UTAR
ii. For processing any benefits and services
iii. For communication purposes
iv. For advertorial and news
v. For general information and record purposes
vi. For enhancing the value of education
vii. For educational and related purposes consequential to UTAR
viii. For replying any responds to complaints and enquiries
ix. For the purpose of our corporate governance
x. For consideration as a guarantor for UTAR staff/ student applying for his/her scholarship/ study loan

D. <u>Disclosure of personal data</u>

i. UTAR is under legal obligation to secure and protect confidential information including but not limited to personal data prior and after PDPA and it is out continuous and existing policy to do so.
ii. In order to be effective in providing continuous service, certain disclosure needs to be exercised. Your personal data may ne transferred and/or disclosed to third party and/or UAR collaborative partners including but not limited to the respective and appointed outsourcing agents for purpose of fulfilling out obligations to you in respect of the purposes and all such other purposes that are related to the purposes and also in providing integrated services, maintaining and storing records.
iii. In processing your welfare and/or providing our services, it is very important to transmit or share personal information to thirds parties, including but not limited to:
    a. Insurance company for processing insurance claims
    b. Financial institutions for payment of financial rewards eg scholarship, loan, allowance, salary

c. Entities/ affiliates for any loan/scholarship award or recognition and education-related activities
d. Your authorized third parties
e. Your guardian or legal representative or guarantor
f. Credit rating agency for credit reference in loan related application
g. Enforcement regulatory and governmental agencies or by any order of court or to meet obligations to authorities.

iv. Your data may be shared when required by laws and when disclosure is necessary to comply with applicable laws.

E. Retention of personal data

Any personal information shall be retained by UTAR in order to serve the above purposes and as required by relevant laws and shall be destroyed and/pr deleted in accordance with our retention policy applicable for us in the event such information is no longer required.

F. Our strict privacy policy

i. UTAR is committed in ensuring the confidentiality, protection, security and accuracy of your personal information made available to us and it has been our ongoing strict policy to ensure that your personal information is accurate, complete, not misleading and updated. UTAR would also ensure that your personal data shall not be used for political and commercial purposes.
ii. UTAR takes a high stand that protection of personal rights is well-established long before the introduction of PDPA. PDPA now serves as an apparent to Act to protect and defined tool to provide transparency and give public awareness in how personal data is dealt.
iii. Subject to relevant applicable laws, sensitive personal data shall only be disclosed upon your express consent from yourself.

G. Access to your personal data

You may access and update your personal data by writing to us at rgo@utar.edy.my (Attention: Ms Loh Siaw Yien). We may require further details or confirmations if necessary.

H. Access to your personal data

By submitting or providing your personal data to UTAR, you had consented and agreed for your personal data to be used in accordance to the terms and conditions in the Notice and our relevant policy.

I. Withdrawal of consent

i. You may withdraw consent at any time by writing to us. We may require further details or confirmations if necessary.

ii. If you do not consent or subsequently withdraw your consent to the processing and disclosure of your personal data, UTAR will not be able to fullfil our obligations or to contact you or to reward or to assist you in respect of the purposes and/or for any other purposes related to the purpose.

J. Dual Version

The Privacy Notice shall be in English and Malay. In the event of inconsistency, English version shall prevail.

Acknowledgment of Notice

[ ] I have been notified by you and that I hereby understood, consented and agreed per UTAR above notice.

[ ] I disagree, my personal data will not be processed

. ……

Name:

Date:

Section A

Instruction:

Please follow the instructions stated carefully and answer these questions.

Please select or state the answer for each question below according to your particulars.

1. Gender

   Male ☐

   Female ☐

2. Age

   20-year-old or below ☐

   21-30 ☐

   31-40 ☐

   41-50 ☐

   51-year-old or above ☐

3. Nationality

   Malaysian ☐

   Non-Malaysian ☐ (Please specify: _____)

4. Ethnic group

Malay ☐

Chinese ☐

Indian ☐

Others ☐ (Please specify: _____)

5. Education Background

Primary School ☐

Secondary School ☐

Certificate/ Diploma ☐

Bachelor's Degree ☐

Master's Degree ☐

Doctorate's Degree ☐

6. Employment status

   Employed Full-Time ☐

   Employed Part-Time ☐

   Self Employed ☐

   Unemployed ☐

   Student ☐

7. Is your accommodation located in the Puchong area?

   Yes ☐

   No ☐

8. Have you travelled to the Puchong area during raining season?

   Yes ☐

   No ☐

9. Have you suffered from flooding in the past?

   Yes ☐

   No ☐

10. From 1 to 10, how do you rate the efficiency of flood system at Puchong?

(1 is poor 10 is great)

Score: _____

Section B

Instruction:

Please respond to each statement or question below as honestly and accurately as possible. Each statement or question below will have five scales (SD, D, N, A and SA). You are requested to choose only ONE for each question below. Your honest and thoughtful responses are important to the study.

- Strongly Disagree (SD)
- Disagree (D)
- Neutral (N)
- Agree (A)
- Strongly Disagree (SA)

Perception

Perception is to understand how smart flood mitigation is regarded, understood, or interpreted in the Puchong area. The questions below are being utilized to investigate the public perception on the smart flood mitigation in Puchong.

No.	Questions	SD	D	N	A	SA
1	Smart Flood Mitigation will affect our life.	1	2	3	4	5
2	Smart Flood Mitigation will be relevant in our environment.	1	2	3	4	5
3	Smart Flood Mitigation will resolve the flooding issues.	1	2	3	4	5
4	I am concerned about the Smart Flood Mitigation.	1	2	3	4	5
5	I have experienced the benefits of Smart Flood Mitigation.	1	2	3	4	5
6	I know well about the Smart Flood Mitigation.	1	2	3	4	5

Source: Adapted from Broadbent, E., Wilkes, C., Koschwanez, H., Weinman, J., Norton, S. and Petrie, K.J. (2015). A systematic review and meta-analysis of the Brief Illness Perception Questionnaire. *Psychology & Health*, [online] 30(11), pp.1361–1385. doi: https://doi.org/10.1080/08870446.2015.1070851.

Awareness

Awareness is the level of consciousness of the respondent on the knowledge and understanding of the development of smart flood mitigation. The questions below are being utilized to investigate the public awareness on the smart flood mitigation in Puchong.

No.	Questions	SD	D	N	A	SA
1	I am aware that Smart Flood Mitigation is a global trend.	1	2	3	4	5
2	I am aware that the of the concept of Smart Flood Mitigation.	1	2	3	4	5
3	I am aware that the government had implemented Smart Flood Mitigation in Puchong	1	2	3	4	5
4	I am aware of the benefits of Smart Flood Mitigation.	1	2	3	4	5
5	I am aware of the importance of implementation of Smart Flood Mitigation to prevent flooding.	1	2	3	4	5
6	I am aware Flood Mitigation is the same strategies as Smart Flood Mitigation	1	2	3	4	5
7	I am aware that Smart Flood Mitigation could eliminate the flood risks.	1	2	3	4	5

Source: Adapted from Lapada, A.A., Miguel, F.F., Robledo, D.A.R. and Alam, Z.F. (2020). Teachers' Covid-19 Awareness, Distance Learning

Education Experiences and Perceptions towards Institutional Readiness and Challenges. *International Journal of Learning, Teaching and Educational Research*, 19(6), pp.127–144. doi: https://doi.org/10.26803/ijlter.19.6.8. And Kaushik, M., Agarwal, D. and Gupta, A.K. (2020). Cross-sectional study on the role of public awareness in preventing the spread of COVID-19 outbreak in India. *Postgraduate Medical Journal*, [online] 97(1154). doi: https://doi.org/10.1136/postgradmedj-2020-138349.

Preparedness

Preparedness is the state of being prepared of the respondent towards the smart flood mitigation development. The questions below are being utilized to investigate the public preparedness on the smart flood mitigation in Puchong.

No.	Questions	SD	D	N	A	SA
1	I find myself individually prepared to respond to Smart Flood Mitigation in Puchong	1	2	3	4	5
2	I think that the local government is prepared to implement Smart Flood Mitigation in Puchong	1	2	3	4	5
3	I think that the government is prepared implement Smart Flood Mitigation in Malaysia	1	2	3	4	5
4	I consider I have sufficient knowledge of Smart Flood Mitigation.	1	2	3	4	5
5	I consider that I have prepared adequate plans in responding to the Smart Flood Mitigation during floods.	1	2	3	4	5
6	I believe that Smart Flood Mitigation has effective plans to respond during floods.	1	2	3	4	5
7	I believe that my State has enough preparation to overcome the flooding issue with Smart Flood Mitigation.	1	2	3	4	5

Source: Adapted from Smith, P.J., Murphy, K.L. and Mahoney, S.E. (2003). Towards Identifying Factors Underlying Readiness for Online Learning: An Exploratory Study. *Distance Education*, 24(1), pp.57–67. doi: https://doi.org/10.1080/01587910303043.

Readiness

Readiness can be referred as the degree of readiness of respondent towards the smart flood mitigation. The questions below are being utilized to investigate the public readiness on the smart flood mitigation in Puchong.

No.	Questions	SD	D	N	A	SA
1	I am able to access to the information of Smart Flood Mitigation.	1	2	3	4	5
2	I am comfortable to support the Smart Flood Mitigation as per instructed.	1	2	3	4	5
3	I am willing to contribute to development of Smart Flood Mitigation.	1	2	3	4	5
4	I feel that Smart Flood Mitigation is less effective than ordinary flood mitigation.	1	2	3	4	5
5	I feel that understand more about the Smart Flood Mitigation will be beneficial to flood mitigation.	1	2	3	4	5
6	I am comfortable with the development of Smart Flood Mitigation in Malaysia.	1	2	3	4	5
7	I believe studying the past event would be beneficial to the Smart Flood Mitigation in Malaysia.	1	2	3	4	5

Source: Adapted from Smith, P.J., Murphy, K.L. and Mahoney, S.E. (2003). Towards Identifying Factors Underlying Readiness for Online Learning: An Exploratory Study. *Distance Education*, 24(1), pp.57–67. doi: https://doi.org/10.1080/01587910303043.

Acceptance

Acceptance is the action of respondent consenting to receive or undertake the development of smart flood mitigation. The questions below are being utilized to investigate the public acceptance on the smart flood mitigation in Puchong.

No.	Questions	SD	D	N	A	SA
1	Smart Flood Mitigation will enable the public to get information of the floods quickly.	1	2	3	4	5
2	Smart Flood Mitigation allows the authorities to follow up the floods condition from far away.	1	2	3	4	5
3	Smart Flood Mitigation is useful in the rapid retrieval of information from the flood condition.	1	2	3	4	5
4	Smart Flood Mitigation will reduce time required for the flood response.	1	2	3	4	5
5	Implementing Smart Flood Mitigation will reduce the flood risks.	1	2	3	4	5
6	Participating in Smart Flood Mitigation would be ease for me.	1	2	3	4	5
7	I would find it easy to use mobile applications of Smart Flood Mitigation.	1	2	3	4	5
8	I believe that Smart Flood Mitigation will increase the ability to prevent flood from happening.	1	2	3	4	5

Source: Adapted from Abu-Dalbouh, H.M. (2013). A QUESTIONNAIRE APPROACH BASED ON THE TECHNOLOGY ACCEPTANCE MODEL FOR MOBILE TRACKING ON PATIENT PROGRESS APPLICATIONS. *Journal of Computer Science*, [online] 9(6), pp.763–770. doi: https://doi.org/10.3844/jcssp.2013.763.770.

Thank you for your time and participation in this questionnaire, I am deeply appreciative of your kindness.