DIPLOMA IN CIVIL ENGINEERING

FINAL YEAR PROJECT

TITLE: CASE STUDY OF WATER SUPPLY DISRUPTION IN TAMAN TTDI JAYA, SHAH ALAM, SELANGOR.

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Abstract

Water is widely recognized as an essential element for all living things on this planet. The lack of clean water could lead to several chronic crises in the short and long term. Because of this, this study will highlight the water supply disruption that has become an awaited event for the local people living in Selangor. The main site of this study will be Taman TTDI Jaya, Shah Alam, Selangor. For resources and networking, several online verification methods were conducted, e.g. B. ReadBlogs, social media, news articles and other scholarly literature available online. The investigation shows that the cause of the water supply disruption in Selangor is due to many factors, some of which are due to mismanagement by the water utilities and even lack of consideration by the government. for the benefit of the citizens. The impact on this issue will cause difficulties towards patrons and create complicated problems. This phenomenon changed the course of daily life for people.

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CHAPTER 1

INTRODUCTION

1.1 Background

Water resources are a critical component of human life; without them, it is difficult for humans to survive. However, the quantity of clean water sources is now reducing, while demand for it is growing in accordance with the state's current population growth. Increased demand for tap water is also being caused by the emphasis on the industrial sector. Perhaps the question arises in our minds as to why such a situation can occur, albeit on a regular basis, when we have sufficient water supplies all around us. Taman TTDI Jaya, or TTDI Jaya, is a prominent township in Shah Alam, Selangor. The town is around three (3) kilometres from Shah Alam, Selangor's capital. The water supply for the town is provided by the Air Selangor Water Treatment Plant Phase 1 (SSP1 WTP) at Bestari Jaya, Selangor. Sungai Selangor is the primary supply of raw water for the SSP1 WTP.

1.2 Problem statement

Recently, clean water supply has been often disrupted, while demand for clean water has increased in tandem with population growth. The issue emerges when residents have disagreements over a shortage of water supply. It has made life more difficult. People must go through a difficult process to obtain clean water.

On the other hand, industries such as companies and development projects were also disrupted, resulting in a stop in community advancement. Delays in projects and profitability result in significant financial and time losses.

Another issue is that it has an impact on residents' overall health. Water is essential for healing, and when water supplies are disrupted frequently, the community's health suffers, reducing productivity.

1.3 Objectives

Some objectives we have discovered for the purposes of this studies are:-

1. To study previous cases related to water supply disruption.

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2. To identify the causes of frequent water disruptions

3. To suggest the solution for frequent water disruptions.

1.4 Scope of studies

The major issue with the water supply disruption phenomena is that it occurs far too frequently, particularly in densely populated areas. That being stated, the research for this study will concentrate on the topic of water supply disruption, which is common in living communities.

We will research prior water supply interruption situations that have happened in various parts of Selangor in order to obtain more detailed knowledge about this issue. The core region we will be focused on, on the other hand, is located in Taman TTDI Jaya, Shah Alam, Selangor. The way of acquiring information, data, and doing research will be a hybrid approach, including both qualitative and quantitative research approaches.

Finally, after conducting research and accumulating evidence using the previously described approaches, we will brainstorm to uncover a pattern and find potential reasons of recurring water supply outages. After gathering the material, we will attempt to provide a feasible solution to this problem based on the information received and our own expertise of civil engineering research.

CHAPTER 2

LITERATURE STUDY

2.1 Introduction

A research based on literature is one that examines genuine theories that are applied to a variety of sectors that are connected to the main issue, such as journals, articles, books, or newspapers. Several hypotheses concerning the subject of this study will be given priority in this chapter, including the history and features. We all understand that water is a valuable resource. It serves as the foundation for natural processes, economic activity, and human existence and culture. The demand for water is rising faster than traditional sources of supply in many countries, though.

Prior, relevant literature should be considered for all research fields and initiatives. When reading an article, regardless of discipline, the author begins by presenting past research in order to map and appraise the research area in order to inspire the study's goal and explain the research question and hypotheses. This is known as a "literature review," "theoretical foundation," or "research backdrop." However, in order for a literature review to become a professional research technique, the necessary processes must be followed and action made to guarantee the review is exact, precise, and trustworthy. The value of an academic review, like the worth of any research, is determined by what was done, what was discovered, and the clarity of reporting (Moher et al., 2009).

This is causing a water management problem in many places, which is recognised in many international statements (United Nations 2001; 2003).

A wide range of technologies have been developed to address the gap between water supply and demand. These solutions may be generally classified into two approaches: boosting supply and lowering demand. Small-scale decentralized initiatives, such as water-saving household appliances, informal reuse of water, rainwater tanks, and household level wastewater treatment systems, are examples of supply-side solutions. Allon and Sofoulis describe the aforementioned developments (2006). Larger-scale centralized options include city-wide wastewater recycling systems and seawater desalination facilities, both of which are used in various areas across the world (see for example: Government of Western Australia 2003).

Despite Australia's propensity for drought, a policy escalation to address this through the augmentation of sources in several major urban centers only recently occurred. In parallel, more people in the nation were turning to other water sources. There is a growing need for study on the actual usage of these alternative water sources because recycled water use in Australia is rising and already makes up 4% of all consumption (Australian Bureau of Statistics, 2006). Increased appliance efficiency and water use limitations are two examples of demand-side (decreasing demand) solutions. When there are intermittent water shortages in Australia, these limitations are regularly placed on homes, businesses, and farms (Nancarrow et al. 2002). Other countries, such as China, also frequently impose restrictions (Rattay et al. 2006).

2.2 Water supply sources and distribution in Malaysia

Rainwater is the principal source of water supply in Malaysia, accounting for 90% of total water supply (EPU, 2010). Due to rapid economic growth, Malaysia has seen unprecedented demand on its water supply (Anang et al., 2019). Agriculture utilizes 62% of total water supply, followed by industry (21%), and households (17%). Malaysia's water use is expected to surpass 20 billion m3 by 2020, with agriculture being the largest consumer. Priority should be given to improving water consumption management rather than water supply management in preparation for this.

Water consumption in Malaysia rose considerably from 1980 (8.9 billion m3) to 2000 (15.5 billion m3) in agricultural, industrial, and home activities. Water scarcity will be exacerbated by rising population and urbanization (Chen et al., 2020).

The decline of Malaysia's water supply resources is a result of the emergence of emerging water issues such pollution, the destruction of water catchment regions, water waste, high non-revenue water (NRW), low tariffs, and a lack of public awareness of water conservation (Chan, 2004). Lai et al. (2016) assert that Malaysia's NRW problem is a result of both weak governance and management and technology issues. The study establishes that public participation in water policy is frequently undervalued. In terms of public involvement as a solution to the NRW issue, Malaysia's water utilities have come up with a number of encouraging examples.

In recent years, Selangor has had the worst water supply crisis in Malaysia. According to a Malaysian Water Association analysis, Selangor accounted for 49.5% of all water supply concerns in Malaysia. In 2017, the figure jumped to 62.4%. (Malay Mail, 2019). Water scarcity is no longer regarded as a natural calamity that must be endured and accepted, but rather as a man-made problem that can be addressed and resolved.

 Water continues to occur in Selangor since the state has relatively little treated water storage. In 2017, Selangor's water reserve margin reached zero percent, which was highlighted as one of the key causes of the state's water crisis. Water interruption is highly possible in specific sections of Selangor if a pipe breaks, a water treatment plant is damaged, or there is a significant spike in water demand, such as during the Christmas season.

Selangor's rapid development is a contributing factor to the ongoing water issue, but improvements to the water supply and distribution network have been slow for some time. Because the pipes were not built to handle the increasing pressure, they frequently burst because Selangor's water demand was lower at the time they were installed. Selangor used more water (234 litres per person) than the national average in the past year.

2.3 History of water supply disruptions in Selangor

Water interruptions in Selangor are becoming increasingly common, leaving millions of families without water for several days to perhaps a week with notification supplied only at the last minute, creating problems to companies and sectors relying on consistent water supply.

Sungai Semenyih and Sungai Selangor are the most polluted rivers. For example, water cutbacks have regularly struck Klang Valley, prompting critics to question the effectiveness of water management authorities.

From burst pipes to solvent-polluted river streams, here is a list of water interruptions throughout the state since the beginning of the year:

(Jerry Choong, "A history of water cutbacks in Selangor this year," *Malay Mail, 21 October* 2020)

- February 7th, 2020
  Due to a ruptured pipe at the Hulu Kelang pump house, 57 Gombak neighbourhoods experienced water interruption. The water supply returned to normal within 24 hours after the repair work was finished by 6.30 p.m. that day.

- 17 March 2020
  Odour contamination was discovered at the raw water intake source in Sungai Selangor, forcing the closure of the water treatment facilities in Sungai Selangor (LRA) Phases 1, 2, and 3 as well as Rantau Panjang. Only the next day did the water supply return in full.

- 16 April 2020
  1.2 million consumers in KL, Petaling, Klang, Shah Alam, Kuala Selangor, Hulu Selangor, Gombak, and Kuala Langat were affected by the closure of the Sungai Selangor Water Treatment Plant's Phases 1, 2, and 3 due to additional odour pollution.

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The water supply steadily returned to normal starting at midday over the next 24 hours, and operations resumed the next morning.

- 11 June 2020

In Klang, a water pipe in Jalan Langat ruptured, affecting Bandar Bistari, Batu 5, and Batu 6. The water supply was fully restored at 2am on June 12 after repair work was finished by 1.30pm that day.

- 14 July 2020

Due to planned maintenance and enhancement work at the Sungai Selangor Phase 3 Water Treatment Plant, around 300 communities had a water outage. By the time the repairs were finished on July 17 and the plant was running well by 5 o'clock, approximately 90% of the impacted people had their water supply restored.

- 11 August 2020

Due to the planned upgrading and replacement of crucial assets at the Sungai Gombak Water Treatment Plant, 20 areas in Gombak experienced yet another round of water interruptions. By 9.30 am the following day, the water supply was fully operational again.

- 3 September 2020

Following the shut down of the water treatment plants in Sungai Selangor Phases 1, 2, and 3 and Rantau Panjang due to odour pollution, which was later determined to have come from a factory in Rawang, 1,292 areas in the Klang Valley, Petaling, Klang/Shah Alam, Kuala Selangor, Hulu Selangor, Gombak, and Kuala Langat experienced an unscheduled water supply disruption. With the supply fully restored by 9am six days later, this was Selangor's longest supply interruption yet in 2020.

- 4 October 2020

274 localities in Petaling, Hulu Langat, Kuala Langat, and Sepang are without water as a result of the shut-down of the water treatment facilities in Semenyih and Bukit Tampoi at 4.30 p.m. The Nilai Industrial Estate in Negri Sembilan, which allegedly entered Sungai Semenyih from Sungai Batang Benar, was cited as the source of the odour pollution, which was the reason. On October 6, Sungai Semenyih operations were restarted, and the water supply was gradually restored over the course of the next 24 hours. Bukit Tampoi operations were then resumed on October 7.

- 20 September 2021

On a Saturday, Petaling Jaya residents in the USJ 1 to USJ 27 region in the Petaling district are dealing with interruptions in their water supply and poor water pressure (Nov 20). According to Air Selangor, the technical issue with the main distribution line that supplies water to the Sime UEP Water Pool at Kg Kenangan in Puchong caused the water outage in these districts.

- 13 October 2021

Due to maintenance and repair work at the Sungai Selangor Phase 1 water treatment facility, 1,000 locations in the Klang valley were without water for four days.

According to Air Selangor, the work was delayed from its initial plan for 2019 and 2020 because of occurrences of water contamination that resulted in large-scale water supply interruptions that were not anticipated. Priority was given to vital facilities like hospitals and dialysis centres while dispatching the approximately 105 water tankers to the impacted districts. From October 14 to October 16, 18 public water taps were also made available for anyone who needed water supplies.

2.4 Summary

The primary goal of this study is to investigate the causes and consequences of water supply interruption in the community in Selangor districts so that local governments may use this information to develop strategies to deal with water issues. According to the majority of the earlier findings, the main cause of the reproductive disorders that have a negative impact on health was caused by the water treatment plant's insufficient capacity. The climate, development activities, and other elements that have an impact on the economy, society, and political activities are to blame for the water issue.

In order to ensure continuous water supply services, Syabas has implemented a number of control measures, such as daily dam capacity monitoring, daily drainage optimization, cloud seeding, and user encouragement of water conservation. However, these measures are insufficient if the community is unaware. In order to ensure water sustainability, the local community in Selangor needs to take good care of and safeguard the water supply. The health of the community is guaranteed by clean water. To ensure that these problems are dealt with right away, the community must also be alert and concerned when they notice leaky pipes or other problems of this nature.

CHAPTER 3

METHODOLOGY

3.1 Introduction

The research methodology defines the approaches, methods, and procedures used to achieve the study's objectives and goals. The research strategy makes the study more systematic and the research journey more focused on achieving the goals. This study is extremely good as the reasons and impacts of water supply disruption in Taman TTDI Jaya, Shah Alam, Selangor. The research methods for this study will be described in this chapter. Studies and strategies for acquiring information and data utilizing certain parameters.

3.2 Research design

The graphic below depicts the research framework and conceptual framework. To attain the study conclusions, we will conduct research utilizing two data collection approaches, according to the research framework: primary data and secondary data. Meanwhile, for the conceptual framework that depicts research on the determinants and effects of water supply disruption in Shah Alam Selangor, which we will obtain by using items such as questionnaires and interviews to determine which variables and effects are the most influential on water supply disruption.

3.2.1 Project Type of study

Data collection studies
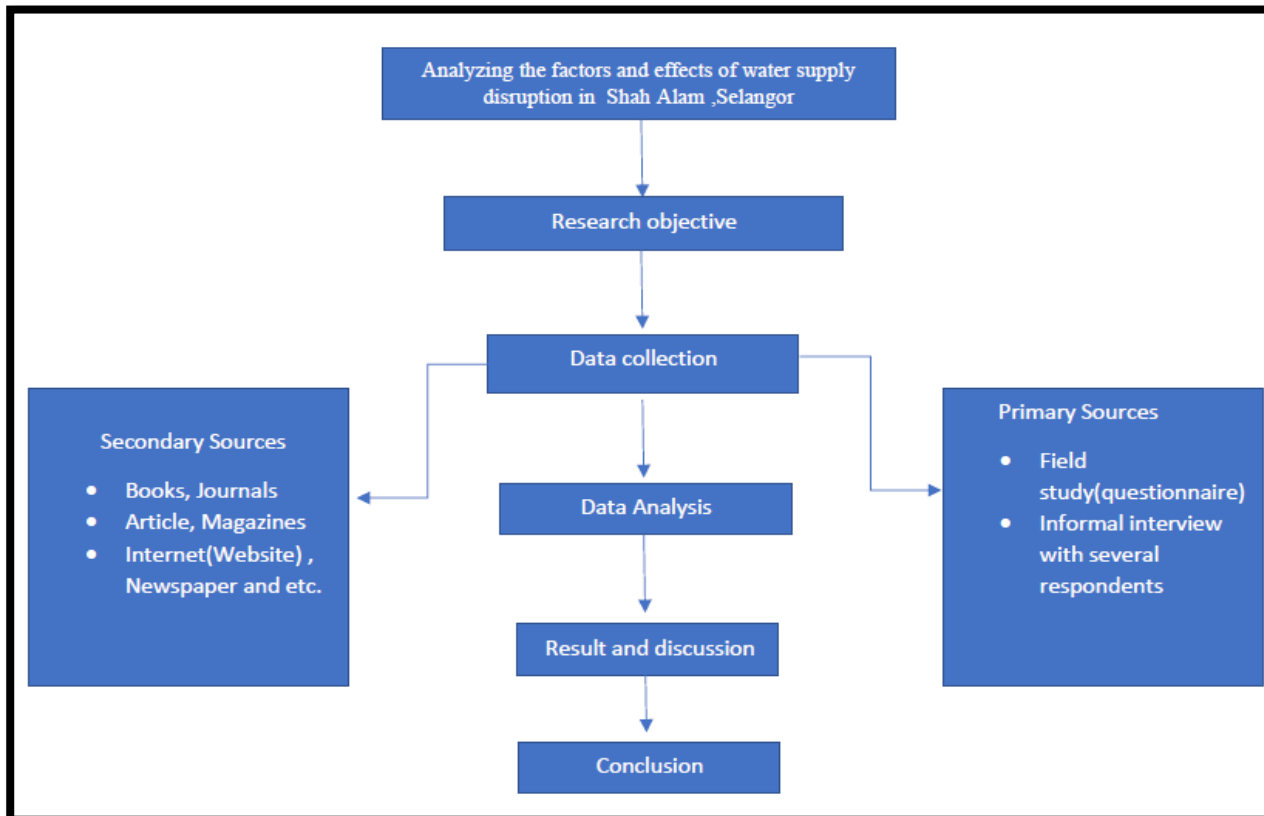
This study makes use of two sorts of data sources: primary data and secondary data. A questionnaire session and a qualitative approach (interview) were used to collect primary data from inhabitants of Shah Alam, Selangor. Phone and email will be used to contact respondents. They will be instructed on the aim of the study as well as their rights as they have replied. All talks and discussions will be audio recorded and documented. As a researcher, we will pick a sample of respondents using random sampling.

Using this random sampling approach, we will identify and pick the study sample based on the opportunity and likelihood of the population to be the sample in this study. Respondents must be of varied ethnicities, ages, educational levels, and family sizes. As a result, a questionnaire session was held to get input from the respondents. This study also made use of secondary data. Secondary data were gathered from books, articles, journals, and newspapers about water problems and study themes.

Data Analysis Methods

The data for this study was analyzed using two ways: quantitative research methods and qualitative research methods. To acquire primary data, a questionnaire session and a qualitative technique (interviews) with locals were employed. Respondents must be diverse in terms of color, age, educational level, and family size. Secondary data on water concerns and study subjects were acquired from books, articles, journals, and newspapers.

Called researchers, we retain records, which means we refer to previously existing dependable documents and comparable sources of information as data sources. This information may be used in our research to learn more about our case study depending on our location. Throughout the analysis phase, the gathered data will be analyzed, and the results will be presented in the form of pie charts, bar graphs, and tables.

We will turn the statistics and information into various visualizations such as charts and graphs once we have obtained all of the data and information we want from our research techniques. We shall be able to disassemble and determine the information we receive much more easily using images. To summarize, readers will be able to picture and absorb the material, gaining a better comprehension of the tales behind the miscellaneous findings from our research.

3.3 Summary

To conclude this chapter, in the beginning stage, the study design, data collecting methods, techniques, and data analysis methods are made systematically in the study methodology to know the facts and information to support and describe this study more clearly. Referring to the data we obtain, problems can be identified and with that, several solutions can be made to be given as suggestions for water agencies such as LUAS, local authorities or even the local government. In best case scenario, these agencies can retrieve ideas from our research. They will be able to conduct multiple ways to manage this reoccurring cycle of water disruptions issue, so in the future, the possibility of this issue happening will be less common.

CHAPTER 4

ANALYSIS AND FINDINGS OF THE STUDY

4.1 Introduction

This chapter summarizes the research findings from the case study samples. The interview is the primary source of information, which is supported with library research. The results will be presented in accordance to the study's research objectives. The data analysis method is already covered in the methodology section. Information gathered by means of primary sources are not obtained anywhere else except through the efforts of the researchers themselves. Methods that are used to obtain primary sources such as testimonies gathered from respondents . Questionnaires will also be issued to the people that has been staying at Taman TTDI Jaya.

4. 2 Analysis of Questionnaire

The questionnaire was distributed by online in google form. There were 12 usable questionnaires collected from online subheading includes a data description for the descriptive analysis of the respondent's questionnaire. The questionnaire is divided into three sections: Section A, Section B, and Section C. Section A relates with the respondent's profile. Section B provides information about the respondent's background. Finally, section C will discuss the problems and solutions associated with the water disruption.

4.2.1 Demographic Analysis of Respondents's Profile

DemographicRespondent Based On Gender
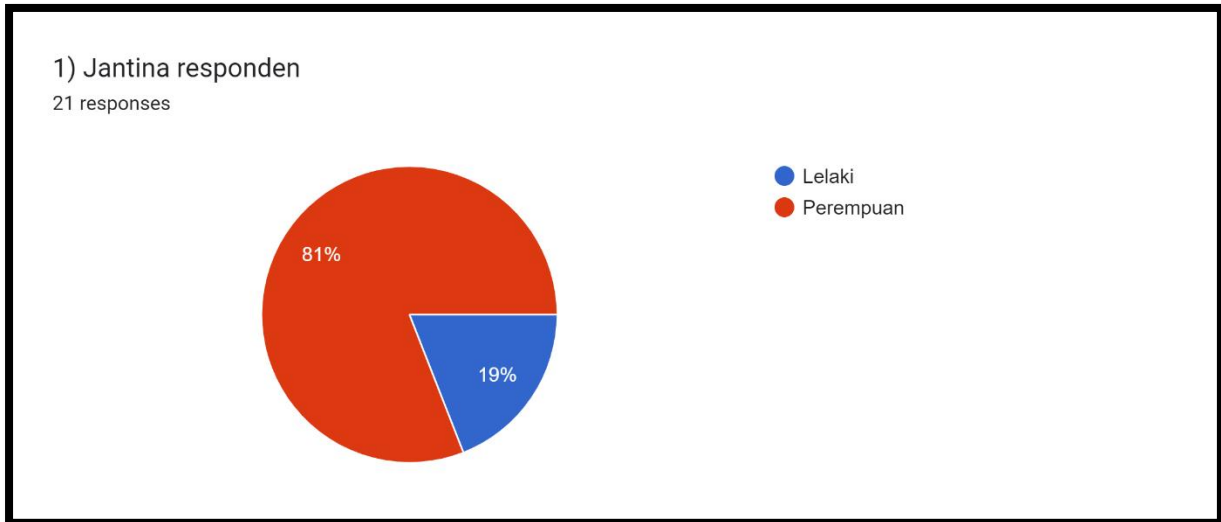
Pie Chart: Gender

Source: Questionnaire

No	Gender	Total People	Percentage
1	Female	17	81%
2	Male	4	19%

Table 1: Gender

Source : Questionnaire

This featured 21 respondents, with 81% (17 people) female respondents from Taman TTDI
Jaya and 19 (4 people) male respondents. Based on these figures, we may conclude that
female respondents outnumber male respondents. This is due to a gender imbalance in the

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number of responders. It is challenging to achieve the same number of responders for each gender.

Demographic Respondent Based On Age
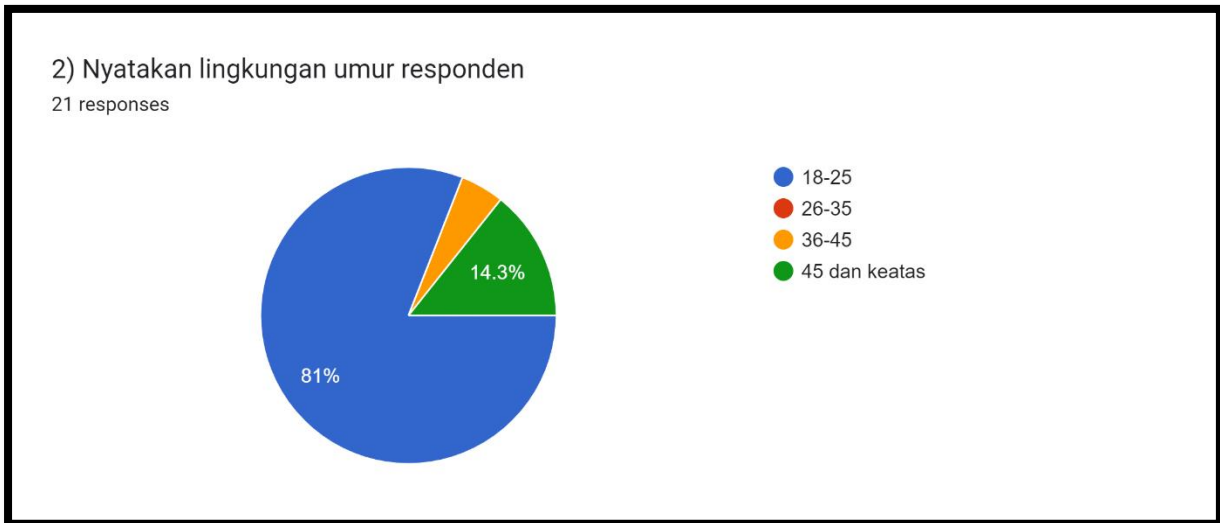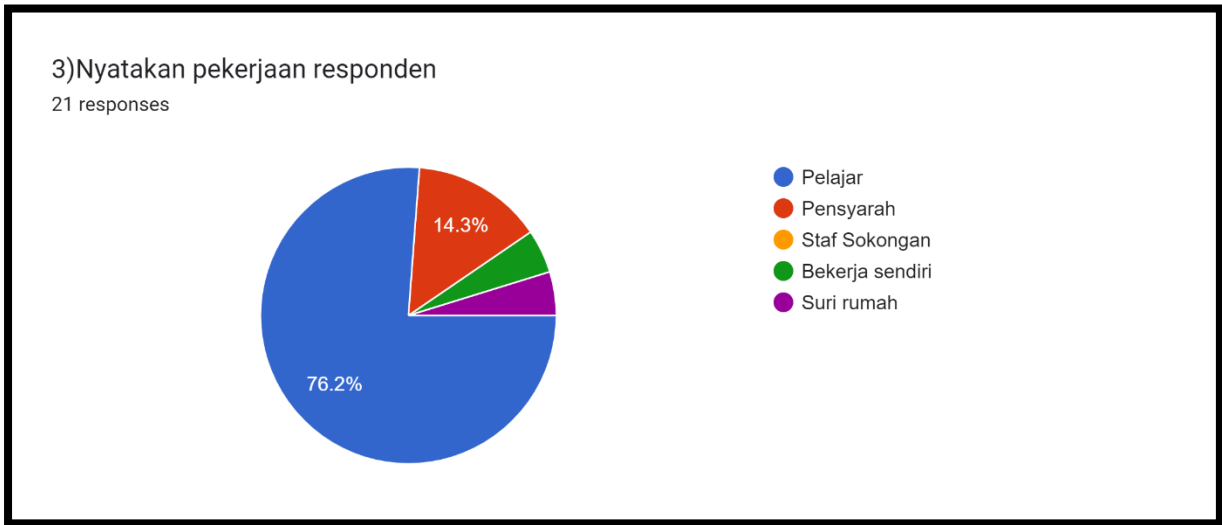

Pie Chart: Age

Source : Questionnaire

No	Age	Total People	Percentage
1	18-25	17	81%
2	26-35	0	0
3	36-45	1	4.8%
4	45 and above	3	14.3%

Table 2: Age Respondent

Source: Questionnaire

The graph depicts the respondents' ages. The respondents' ages range from 18 to and beyond, and they are classified into four categories. The first category consists of 81% (17 individuals) of those aged 18 to 25. The second group is from those aged 26-35 years old, which comprises 0%, the third category is from those aged 36-45 years old, which comprises 4.8%(1 person), and the last category is from those aged 45 years and above, which comprises 14.3%. (3 people)

Demographic Respondent Based On Profession Work

Pie Chart : Profession Work Respondent

Source : Questionnaire

| No	Profession work	Total People	Percentage(%)
1	Student	16	76.2%
2	Lecture	3	14.3%
3	Self-employed	1	4.8%
4	Housewife	1	4.8%

Table 3: Profession Work Respondent

Source: Questionnaire

The figure depicts the respondent's line of employment. Students make up the majority of respondents (76.2%). (16 people). The second most common occupation is lecturer, which accounts for 14.3% of all occupations (3 people). Third, 4.8% are self-employed and housewives (1 person in each)

4.2.2 Demographic Analysis of Respondents's Background

Demographic Respondent Based On Settlement Period of Respondent
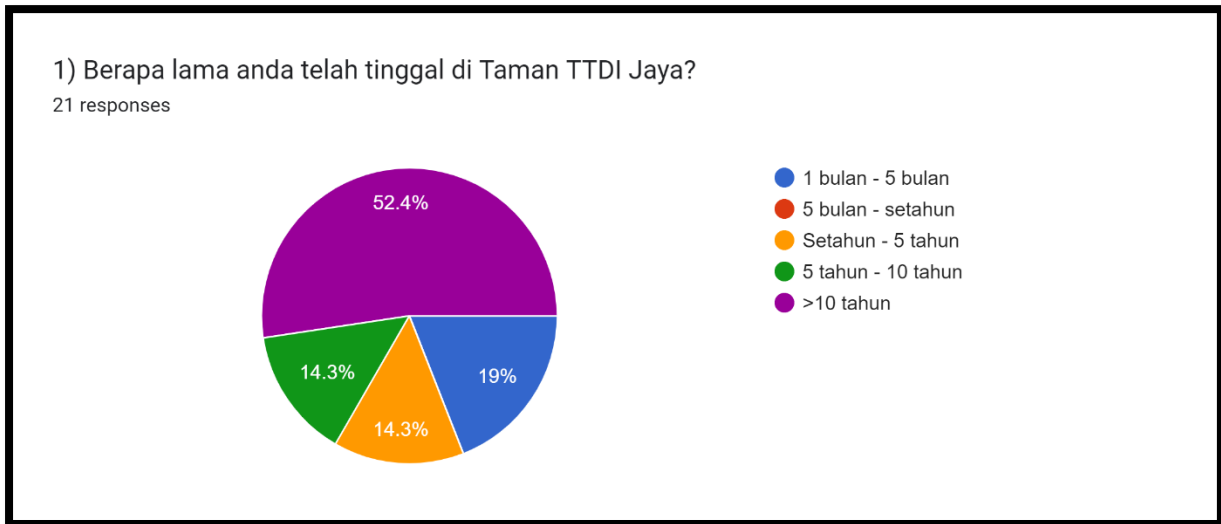
Pie Chart: Settlement Period Of Respondent

Source: Questionnaire

No	Settlement period of respondents in TTDI Jaya	Total	Percentage
1	1 months to 5 months	4	19%
2	5 months to one year	0	0
3	1 years to 5 years	3	14,3%
4	5 years to 10 years	3	14.3%
5	10 years above	11	52.4%

Table 4: Settlement Period Of Respondent

Source: Questionnaire

The graph depicts the respondents' TTDI Jaya population settlement time. The population settling duration ranges from one month to ten years and is classified into five groups. The first category, which comprises 19%, is for those who settle for one to five months (1people).

Second, 0% of respondents settled for a period of one month to one year. Third, 14.3% of respondents are planning to stay for one to five years (3 people). However, children aged 5 to 10 years account for 14.3% (3 individuals), while those aged 10 and over account for 52.4%. (11people).

Demographic Respondent Based On Types of Respondent's Residence
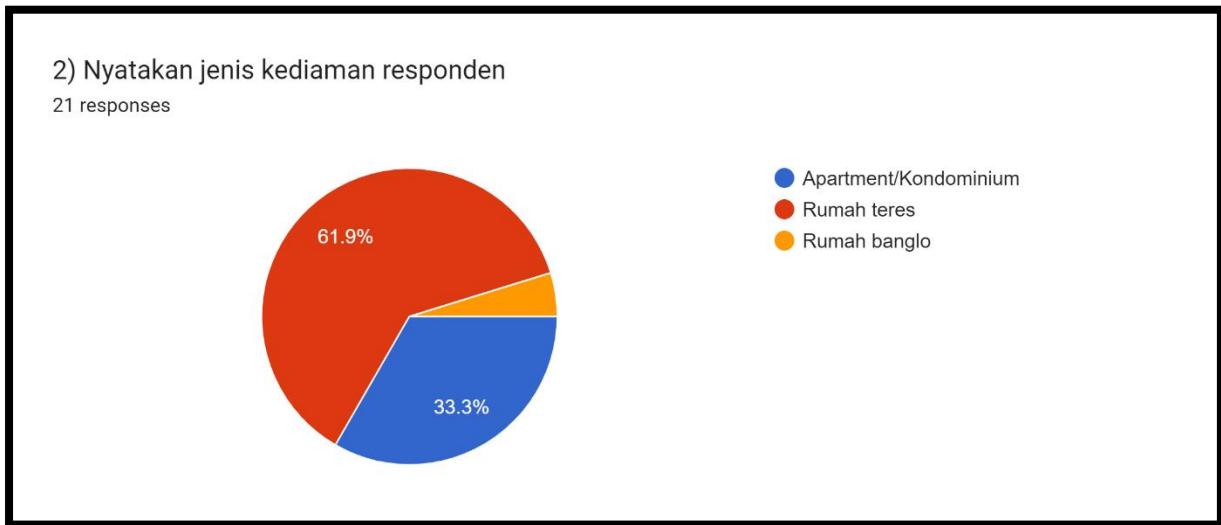
Pie Chart : Types of Respondent's Residence

Source: Questionnaire

No	Type of respondent's residence	Total People	Percentage(%)
1	Terrace House	13	61.9%
2	Bungalow House	7	33.3%
3	Apartment/Condominium	1	4.8%

Table 5: Types of Respondent's Residence

Source : Questionnai

The graph depicts the kind of respondent's dwelling. Three types of houses have been classified. The first group will be respondents who reside in terrace houses (63.20%). (12 people). Second, 33.3% of respondents live in a bungalow (7 people). The third component is the apartment/condominium house, which accounts for 4.8% of the total (1 people) The majority of responders live in terrace houses, which are readily impacted by this water disturbance.

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Demographic Respondent Based On Source of Water Supply
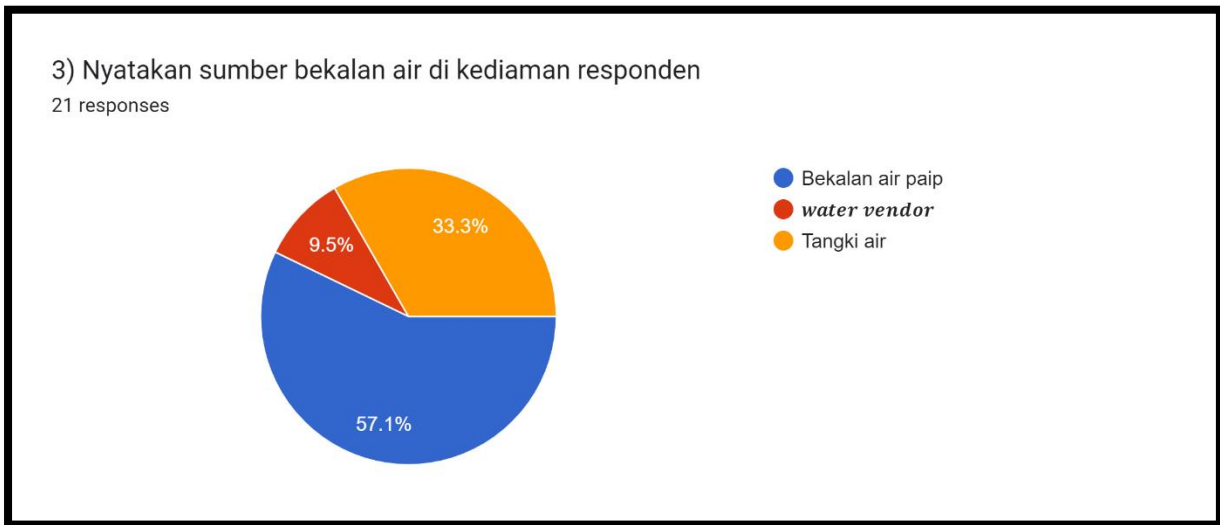
Pie Chart: Source of Water Supply

Source: Questionnaire

No	Source of water Supply	Total People	Percentage(%)
1	Tap water	12	57.1%
2	Tank Water	7	33.3%
3	Water Vendor	2	9.5%

Table 6: Sources of Water Supply

Source: Questionnaire

The diagram depicts the source of water supply. The majority of respondents (57.1%) get their water from taps (12 people). but the water tank received 33.3% (7 people). Finally, there is the 9.5% water vendor (2 people). According to these statistics, the majority of inhabitants use tap water as a source for their everyday activities.

Demographic Respondent Based On Main Usage of Water Supply
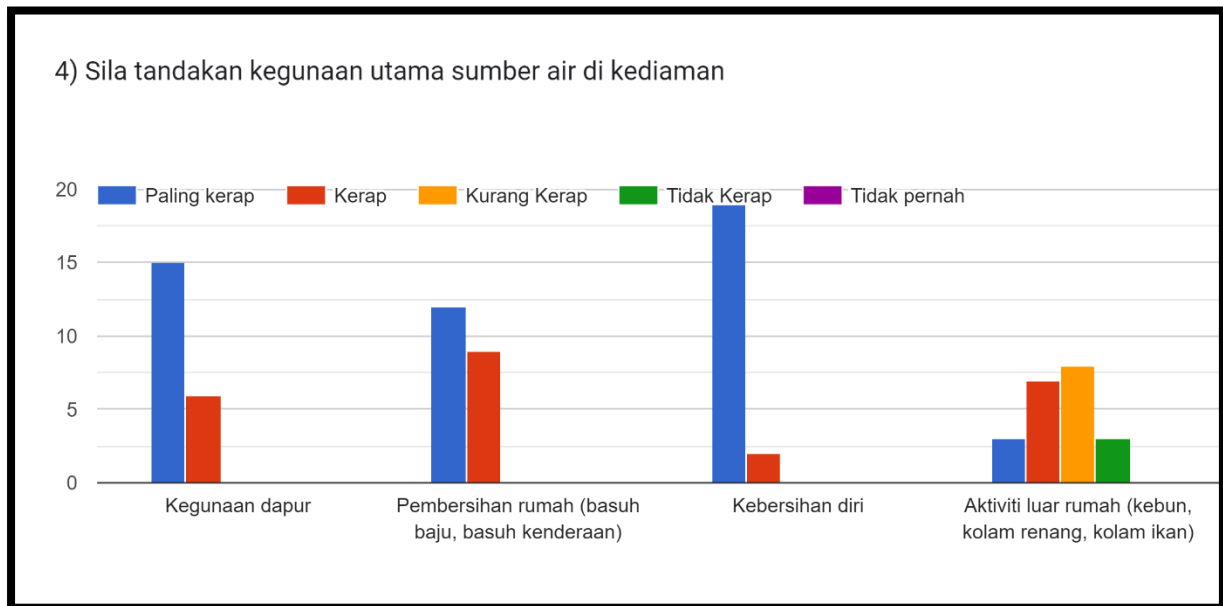
Clustered Column Chart: Main Usage of Water Supply

Source : Questionnaire

Main use	Frequently	Frequent	Less Frequent	Not frequent	Never
Kitchen use	15	6	0	0	0
House cleaning	9	9	0	0	0
Hygiene	19	2	0	0	0
Oudoor activities	3	7	8	3	0

Table 7: Main Usage of Water Supply

Source : Questionnaire

The diagram depicts the primary usage of water resources in the home. It has been divided into four categories: kitchen use, house cleaning (washing clothing and vehicles), hygiene, and outdoor activities (gardening, swimming pool and fish pond). For kitchen usage, static reveals that the most commonly used by respondents is 15, while the least frequently used by respondents is 6. Second, the respondents' most frequent usage for house cleaning is 9, while their least common use is 9. For hygiene, the most usually used is 19, while the least

frequently used is 2. Finally, outdoor activity is commonly represented by 3, usually represented by 7, and less frequently represented by 3.

4.2.3 Descriptive Analysis of Respondents's Profile

Demographic Respondent Based On Experience in water disruption
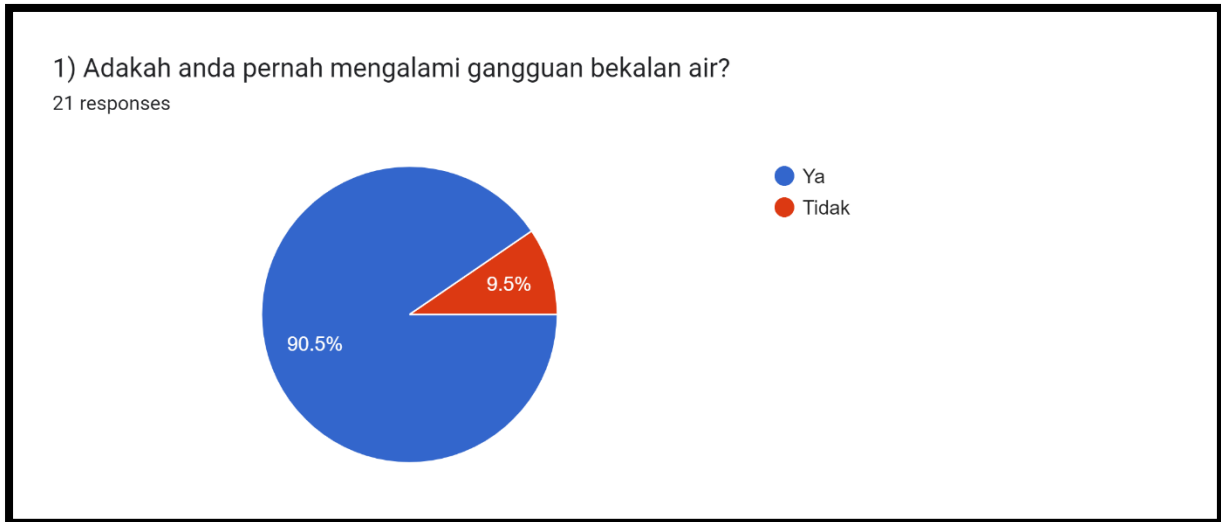
Pie Chart : Experience in Water Disruption

Source: Questionnaire

No	Respondents' experiences with water disruption using the question yes or no	Total people	Percentage(%)
1	Yes	19	90.5%
2	No	2	9.5%

Table 8: Experience In Water Disruption

Source: Questionnaire

The graph illustrates respondents' responses to the yes or no question about water disruption. Yes, said 90.5% of respondents (19 people). The lowest percentage was 9.5%. (Two persons).

Demographic Respondent Based On Frequency Interruption

2) Berapakah kekerapan berlakunya gangguan bekalan air di kawasan kediaman anda?
21 responses

- Sekali dalam 1 minggu ke 5 minggu
- Sekali dalam 1 bulan ke 5 bulan
- Sekali dalam 6 bulan ke 12 bulan
- Sekali dalam 1 tahun - 2 tahun
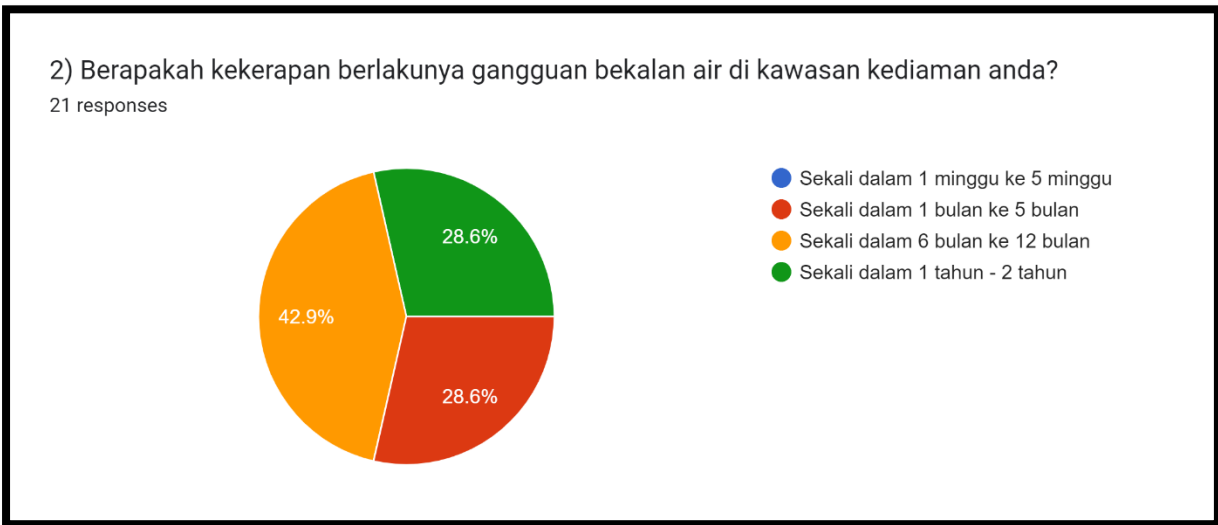
Pie Chart: Frequency Interruption

Source : Questionnaire

No	Frequency of water supply interruptions in the respondent's residential area in TTDI Jaya.	Total People	Percentage(%)
1	1 week to 5 week	0	0
2	1 years to 2 years	6	28.6%
3	1 months to 5 months	6	28.6%
4	6 months to 12 months	9	42.9%

Table 9: Frequency Interruption

Source: Questionnaire

The graph depicts the frequency of water supply disruptions in the respondent's TTDI Jaya residential neighborhood. Taman TTDI Jaya has the highest frequency of interruotions, with 42.9% occurring once every 6 months to 12 months (9 people). However, 28.6% occur once

every one to two years (6 people). Second, 28.6% of the population is aged 1 to 5 months (6 people).There are no answers from 1 week to 5 weeks.

Demographic Respondent Based On Preparation before water disruption

3) Apakah persiapan responden dalam menghadapi gangguan bekalan air?
21 responses

- Menggunakan baldi atau bekas besar
- Mencatu bekalan air yang sedia ada
- Membeli bekalan air (air botol dan lain-lain)
- Menggunakan perkakasan dapur pakai buang

9.5%
9.5%
81%

Pie Chart: Preparation Before Water Disruption

Source : Questionnaire

No	Preparation of facing on water disruption	Total People	Pecentage(%)
1	using pile or larger container	17	81%
2	Buying water supplies (bottled water and other)	2	9.5%
3	Rationing the existing water supply	2	9.5%
4	Disposable kitchen utensils	0	0

Table 10: Preparation Before Water Supply

Source : Questionnaire

The diagram depicts the preparedness for dealing with water disruption. The majority of respondents (81%), responded to utilizing a pile or larger container (17 people). Second, 9.5% will be spent on water supplies (bottled water and such) (2 people). However, the present water supply is 9.5% for respondents who practice rationing (2 people). Finally, 0% of respondents use disposable cooking utensils.

Demographic Respondent Based On Water Supply Issue of Supply Cut off

Pie Chart : Water Supply Issue Of Supply Cut Off
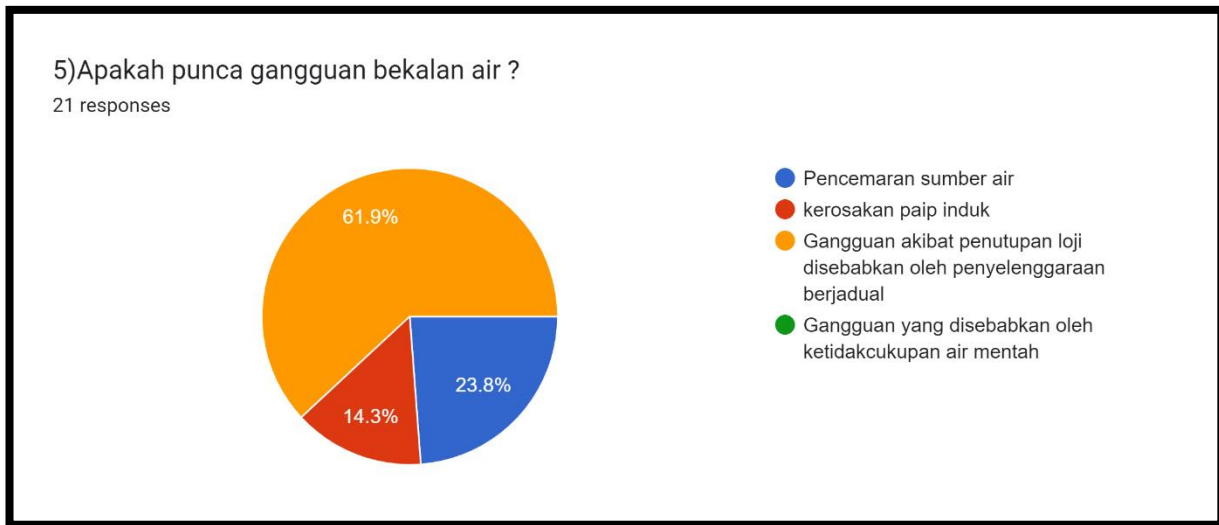
Source : Questionnaire

No	Water supply issues that respondents face other than after supply cut off	Total People	Percentage(%)
1	Water is not clean	9	42.9
2	Rusty water	9	42.9%
3	Smelly water	3	14.3%

Table 11: Water supply issue of supply cut off.

Source : Questionnaire

According to statistics on water supply concerns that respondents confront other than after service is turned off, water is not clean, rusty, or stinky. Water contamination is a common problem at Taman TTDI Jaya. It reveals that 42.9% (9 people). Second, 42.9% of the rusty water is made up of iron (9 people). Finally, stinky water (14.3%). (3 people).

Demographic Respondent Based On Causes of Water Supply Disruption

Pie Chart : Causes Of Water supply disruption

Source : Questionnaire

No	Causes of Water supply disruption	Total People	Percentage
1.	Disruption due to plant shutdown to scheduled maintenance.	13	61.9%
2.	Main pipe damage	3	14.3%
3.	The pollution of Water Sources	5	23.4%
4.	Perturbations induced by insufficient raw water	0	0

Table 12: Cause Of Water Supply Disruption

Source : Questionnaire

In general, 61.9% (13 persons) of responses mentioned disruption due to plant shutdown to scheduled maintenance. However, the pollution of water sources accounts for 23.4% (5 persons), while the main pipe damage accounts for 14.3%. (3 people). Finally, there were no responses to perturbations induced by insufficient raw water.

4.3 Interview with engineers and official agency

This section of the chapter presents the findings and analyses, as well as the data acquired from the interview. As part of the information-gathering process. We conducted interviews with various engineers and an official agency, Lembaga Urus Air Selangor (LUAS), on the frequent water supply disruptions in Selangor. We were able to meet the goal of this research and comprehend the background and operation of the water delivery system in Selangor thanks to this interview.

Mr Haji Muhamad Sofi Bin Ibrahim, a former Melaka Water Resource employee, was the first person we interviewed. He is currently employed as a water engineering contractor in Shah Alam. He has offered extensive explanations on numerous aspects related to the water disruption as well as the operation system in Selangor. The interview was held on Friday, October 21, 2022, at 9 a.m.

4.3.1 General Questions and the background

We learned from this conversation that the size of the city has an impact on the potential of a water supply outage. The network of water distribution systems must be cared for and often improved to keep up with the city's population development trend. If the city population index rises, so must the network of water distribution systems to prevent water shortages for individuals and companies alike. However, a larger network of water supply distribution systems carries a greater cost and increases the likelihood of accidents and crises occurring. A larger network of water supply distribution systems implies overseeing several distribution networks for a region, offering an even greater chance of accidents leading to a catastrophe.

As a result, if a water crisis occurs, action must be done swiftly to prevent exacerbating the already-existing situation. Several authorities bear enormous responsibilities for dealing with and managing water crises, including water supply outages. These are the local state water licensing authorities, known as Selangor Water Works in Selangor. The Selangor Water Works Department is in charge of supplying water to the state of Selangor as well as other areas in Malaysia, such as the federal territories of Kuala Lumpur and Putrajaya.The Pengurusan Air Selangor.Sdn. Bhd (Air Selangor), formerly known as Syarikat Bekalan Air Selangor (SYABAS), manages the Selangor Water Works. The second agency in charge of dealing with the Selangor water crisis is Suruhan Perkhidmatan Air Negara, or SPAN for short. SPAN is the national regulatory body for water and sewerage in Peninsular Malaysia and the Federal Territory of Labuan.

The general inquiry we asked the former engineer was about the background of the water supply for the Taman TTDI Jaya region, which is Taman TTDI Jaya, or TTDI Jaya. The town is around three (3) kilometres from Shah Alam, the capital of Selangor. The Air Selangor Water Treatment Plant Phase 1 (SSP1 WTP) in Bestari Jaya, Selangor, provides the Water-filled town Sungai Selangor is the primary supply of raw water for the SSP1 WTP. The pipe burst index is used to calculate the rate of pipe burst per 100 kilometres per year. Second, we inquire if the size of the city influences the likelihood of a water disruption occurring. In larger cities, a wider network of water system distribution is established, and it has become more complex as the population index has increased. It is, however, not a direct factor to the

possibility of water supply interruption situations. Instead, the city's age does have a role in causing water problems. This is owing to the age of the pipe utilised in the city's water distribution system. Old pipes utilised in a city that is decades old frequently experience water interruption due to the pipe's age. Next, we inquire about the agencies in charge of managing the water supply interruption and their functions, as the water service system in Malaysia is overseen by the Ministry of Environment and Water on behalf of the government, or KASA for short. Under KASA, there is an agency known as Surahanjaya Perkhidmatan Air Negara, or SPAN, which governs all Malaysian water operators. The Akta industrial perkhidmatan Air governs all activities and decisions. During water supply distribution, there is no one entity that manages the issue; instead, the source of contamination is LUAS, a state agency that regulates rivers in Selangor. Apart from that, there is Jabatan Alam Sekitar and Air. They are responsible for ensuring that only essential maintenance, improvement, or maintenance work is performed in order to avoid a water crisis, as well as taking enforcement proceedings against any source of pollution.

4.3.2 Factors on water supply disruption

The factors of water supply disruption is disruption caused by insufficient raw water; disruption due to plant shutdowns due to scheduled maintenance, disruptions due to plant closures are caused by unforeseen factors such as water source pollution, power supply interruptions, plant equipment damage, or main pipe damage caused by third parties .

Water source pollution contaminated by various factors including the discharge of toxic ammonia waste from rubber factories, land use activities that are too high, especially house development areas. Incidents of unscheduled disruptions are beyond the control of the water operator. Among them it happens when there is a case of contamination of raw water sources by irresponsible parties, or deterioration of the quality of water sources. This caused the affected LRA to be closed because the LRA was unable to treat the contaminated water. LRA operations can only resume operations once the raw water quality returns to normal and is free of residual contaminants that can affect the treatment process and harm users. The duration of an unscheduled outage depends on the length of time required to restore raw water quality to a safe level for treatment as well as the length of time to treat and distribute the water back to users.

Among other factors that cause unscheduled outages to occur are when there are incidents of equipment damage in the plant and unexpected burst/leaking pipes. The cause of such incidents is due to the operator's inability to carry out scheduled maintenance and replacement due to financial constraints. Based on 2020 National Water Service Commission (SPAN) data, 42,076 km long AC type pipes are still in use in Peninsular Malaysia and the Federal Territory of Labuan. Water operators need to replace old pipes, especially Asbestos Cement (AC) type pipes that have been used for a long time and break easily.2The duration of this unscheduled outage depends on the length of time required to repair equipment damage and replace broken pipes on site so that water can be treated and resupplied to consumers.

The pipe burst index is used to calculate the rate of pipe burst per 100 kilometres per year. On average, there are 19 occurrences of burst pipes in 2017. In 2022, there will be 5 instances every 30km of pipe in KL, Putrajaya, and Selangor. Aside from burst pipes, which employ asbestos cement pipe, which is not robust, brittle, and does not last long and requires quick replacement work, there are situations involving third parties, which are on the rise as a result of building activities. Construction companies and foreign contractors who damage water system assets Non-scheduled water interruption is substantially more difficult to manage since it involves a third party. Every party's cooperation is required, including the government, the state water agency, and the customer, if they face any issues that might lead to water disruptions. To submit reports to the agencies. In terms of the types of neighbourhood residences affected by water supply disruption, water supply disruption does not diffuse and equally affects all types of residences concerned. The water supply system for apartment buildings is supported by a bulk metre and distributes to the living home. Internal pipes will be damaged as a result of poor maintenance, causing disturbance. However, water supply disruptions have no greater or lesser impact on apartment residents than on other types of residents.

A water distribution system is a component of a water supply network that transports potable water from a centralized treatment plant or wells to consumers to meet residential,

commercial, industrial, and fire fighting needs. A water supply disruption can be classified as gravity system, pumped system, or combined gravity and pumped system. The water source in gravity systems is typically a spring, river, or impounded reservoir located at a higher elevation. Water is transported from the source to the treatment plant via an intake structure and transmission mains. Treatment plants are typically located at a lower elevation than the source and also close to the source.

Because the targeted area is lower in elevation than the distribution reservoir, treated water is carried to the reservoir and distributed to consumers by gravity flow. Following that, a pumping system (the Pump) is utilized to deliver water to the transmission mains, which carries water to the treatment plant. Water is purified and stored in reservoirs before being delivered to customers through pumps. A gravity and the pumped system combines a gravity system and a pumping system. In this system, purified water is pumped and stored in a high reservoir, where gravity delivers it to the user.

The pipe system that are established in Selangor is known as the water distribution system. It can be divided into several categories for stages from the main source to the consumer meter pipe. The main distribution system consists of water plant and water balancing reservoir systems is the main sources of water supply. The major pipes ranging from 1000mm to 15000mm and 2000mm diameter is strategically used. The pipes in these stages requires meticulous maintenance work and rarely has similar cases of pipes burst in the main distribution system.

The water distribution system is the pipe system that has been created in Selangor. It is separated into many phases from the primary source to the consumer meter pipe. The primary sources of water supply include the main distribution system, which comprises of water plants and water balancing reservoir systems. The major pipes with diameters ranging from 1000mm to 15000mm and 2000mm are strategically used. Pipes in these stages require meticulous maintenance, and similar cases of pipes bursting in the main distribution system are uncommon. The water supply is disseminated from the main distribution to the reticulation pipes, which are distributed from the service at the community areas to the customers' resident's meter. The communication pipe was a smaller poly pipe with a half-inch diameter that was used in the reticulation pipe to meter service pipe. Among all pipe phases, the most commonly burst pipes are between reticulation and communication pipes.

There are around 30 km of pipelines in Selangor that have been installed since the 1960s and 2920s. For water supply distribution, several types and sizes of pipes are utilized, some of which are mild steel cement pipes that require replacing. For asbestos cement pipes, roughly 60km have been used for decades and are being replaced with modern pipes. Every year, 200 to 300 million dollars are spent to replace their pipes, which amounts to about 150km per year over a 30-year plan for pipe replacements. There is also ductile iron pipe, and HDPE pipes are widely used in coastal locations to prevent corrosion. Galvanized steel pipes are employed, but in a limited capacity; they are mostly used for interior plumbing systems within construction structures. It is not often used in water supply interruption networks because it has a shorter shelf life than pipes such as mild steel or ductile iron pipes.

For the previous 10 years. Water supply disruptions have increased, however they have been trending downward since 2021. Which is the year in which the state alliance introduced a raw water security initiative on a large scale. Cases of scheduled and unscheduled water disruption recorded have decreased to cases in 2020 compared to 10 cases in 2021, the majority of which are caused by river pollution and other related causes. Only one occurrence of water interruption caused by river contamination was documented in 2022. This decreased number of occurrences demonstrates an improvement in water disruption cases..
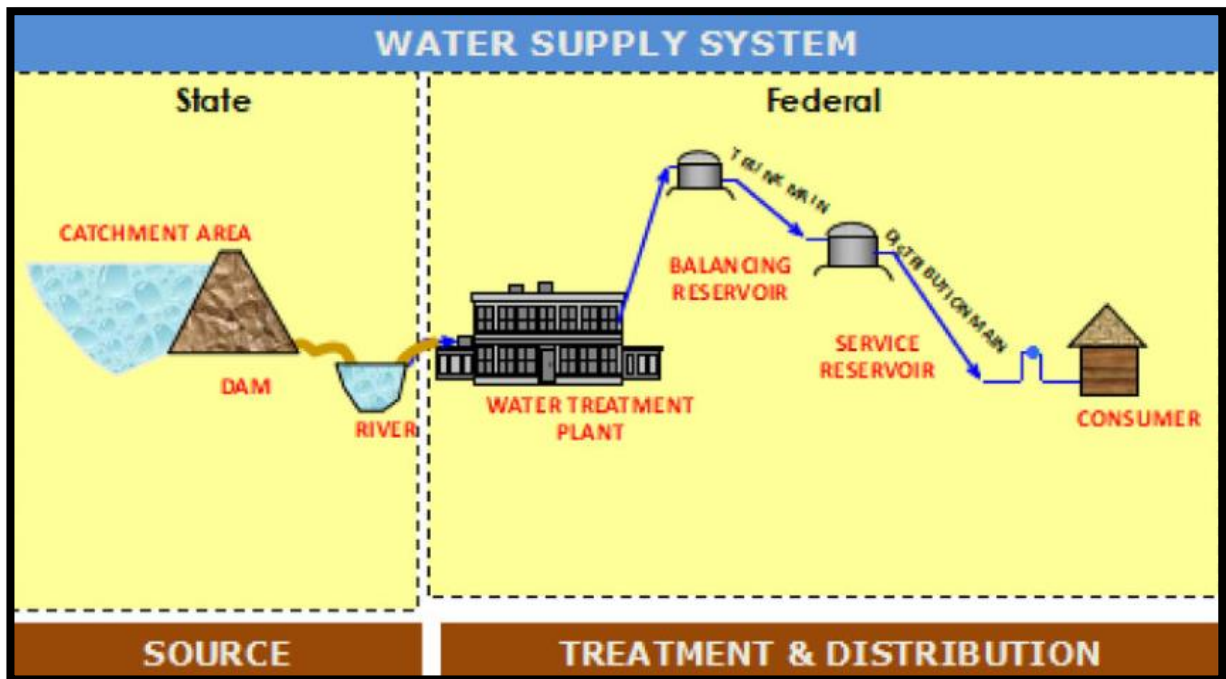
Figure 1: Water Supply Distrubtion

Emergency Case in Lembangan Sg Langat throughout the year 2019

No	Name of River	Type of Pollution	Number of cases	Causes
1	Sungai Rinching	-Smelly (26/6)	1	-Odour pollution was detected in the 'sump' receiving effluent from the Ngo Chew Hong
2	Sungai Selangor	-Smelly (19/7) -Oil (21/7)	2	-Odour pollution at IWK Wastewater Treatment Batang Kali -Diesel oil pollution from sand
3	Sungai Rasa	-Turbidity (8/7) -Turbidity(20,29,30/9) -Turbidity (2,4,7,12,15,16,17,18,20,23,24,26,27,28,30/10)	3	-Not identified and thought it happened because of heavy rain -Not identified and thought it happened because of heavy rain -There is earthwork for agriculture but it is small scale and thought to be due to heavy rains
4	Sungai Labu	-Smelly(15/1)	1	-Not identified. However the pollution originates from the upstream of Sungai Labu which is in Negeri Sembilan
5	Sungai gompak	-Turbidity(10/4)	1	-There are vulnerable areas without mitigation measures
6	Sungai Rumput	-Turbidity (30/4)	1	-Heavy rain weather reached 330NTU.

7	Sungai Batangkali	-Smelly(19/7)	1	-Odor pollution at IWK Batang Kali Sewage Treatment Plant
8	Sungai Ampang	-Turbidity(January- December)	1	Project EKVE
9	Gabung-Sungai Berang Sungai Semenyih	-Smelly(28/9) -Smelly(21/12) *Date and Months	2	-There is a solvent smell coming from IWK Bandar Bukit Mahkota Bangi -There is a solvent smell coming from IWK Bandar Bukit Mahkota Bangi

Table 13: Emergency Case in Lembangan Sg Langat throughout the year 2019

Based on data from Luas (Lembaga Urus Air Selangor), the table illustrates emergency water supply instances in Lembangan Sungai Langat throughout 2019. This emergency case in Lembangan Sg Langat involves Sungai Rinching, Sungai Selangor, Sungai Rasa, Sungai Labu, Sungai Gombak, Sungai Rumput, Sungai Batangkali, Sungai Ampang and Sungai Berang, Sungai Semenyih . Smelly pollution includes oil and turbidity. Among all of this odorous and turbid pollution, the most significant pollutant to the river is that which causes the water supply.

According to statistics, Sungai Rasa had the highest number of emergency cases in 2019. On July 8th, Sungai Rasa was polluted by turbidity. The causes have not been discovered, although it occurred as a result of severe rains, as mentioned by the Agency LUAS. On the same year, on the 20th, 29th, and 3rd of September, which were also polluted by turbidity and the causes have not been discovered, and it happened due to severe rains, as mentioned by the agency LUAS on the 8th of July. On October 2nd, 4th, 7th, 12th, 15th, 16th, 17th, 18th, 20th, 23rd, 24, 25th, 26th, 27th, 28th, 29th, and 30th, which was also contaminated by turbidity and the reason is the earthwork for agriculture, although it was on a limited scale and assumed to be due to severe rains that the Agency LUAS mentioned.

Emergency Case throughout the year 2020 (Code Red)

No	Name of Rivers	Types of Pollution	Number of Cases	Causes
1	Sungai Selangor	-Smelly(13/2) -Diesel oil(27/3) -Smelly(16/4) -Smelly(26/4) -Smelly(3/9) -Smelly(10/11) -Smelly(7/12) -Spilled oil(27/4) -Effluent Industry(16/10) -Smelly -Smelly -Smelly	12	-Carcass Smell (Aquaculture Effluent) -Diesel pollution from refineries -The smell of carcasses (Aquaculture effluents) -Catfish pond cleaning and pumping works -Effluents of heavy machinery premises -Effluent of IWK -Fish pond effluent -Not identified -Building materials factory effluents -The smell of solvent in the air and suspected from the premises of processing palm products -Residual odor from IWK effluent -Reservoir cleaning work

2	Sungai Gong	-Smelly(16/3) -Solvent smell(19/10) - Nope identified	3	-Factory maintain heavy machinery - Premise maintenance heavy machinery - The flow of the Gong River black in color
3	Sungai Sembah	-Smelly(18/11)	1	-Colored water flow black results pond dredging near
4	Sungai Semenyih	-Oil (13/11) -Black oil(8/12) -Black oil (17/12)	3	-Oil removal scheduled in the plant IWK -Unidentified - Premises maintain heavy machinery
5	Sungai Langat		5	
6	Sungai Bernam	-Diesel oil (275)	1	-Tanker accident diesel oil in Km 389.5 south direction Highway PLUS near Behrang
7	Sungai Lolo	-Turbidity(17/8)	1	Turbidity from

				natural rock material
8	Sungai Dusun	-Turbidity(18/8)	1	-Deepening work river
9	Sungai Larut-Ijok	-Diesel oil (14/10)	1	Truck accident carry concrete
10	Sungai Balak	Engine oil Vehicle(27/10)	1	-Oil removal vehicle engine to groove Balak River water
11	Sunagi Beranang	Diesel Oil (28/10)	1	-Diesel oil leak from the contractor's excavator maintain the river
12	Sungai Kuang	The Black Waste burns(30/10)	1	-Processing plant burning plastic in Sg Kuang
13	Gabung-Sungai Btg Benar – Sg Pajam – Sg Beranang - Sungai Semenyih	- Carcass smell (4/10) *Date and Months	1	-Area Nilai industry, Negeri Sembilan

Table 14: Emergency Case throughout the year 2020 (Code Red)

Emergency situation till the year 2020 (Code Red). This information comes from the agency LUAS, which stands for Lembaga Urus Air Selangor. From January to December 2020, a total of eighteen(18) difficulties were effectively resolved, compared to fifteen (15) water treatment Plant(LRA) stoppage issues that affected water supply to customers, particularly those involving raw odor pollution. There are twelve (12) LRA blockage difficulties in the Lembangan Langat River. Through 2020, there were 5 pollution reasons that resulted in Code Red and four (4) Code Yellow causes that arose from industries and establishments.

Emergency Case in Lembangan Sungai Langat throughout the year 2021

No	Name of Rivers	Type of Pollution	Number of Cases	Causes
1	Sungai Semenyih	-Colored water and Smells(23/10 - Water flow from activities metal smelting iron(11/2) -Turbidty(21/4) -Turbidity(12/5) -Turbidity(5/6) -Smelly water (31/8) -Spilled oil (4/9) - Colored water black inside pool near river (2/11)	8	-Pollution from the area Industrial Nilai 3 -Discharge of colored water black in Taman Semenyih Permata. Cause of activities of smelting premises iron metal. -The reservoir pool release overflow effluent at coordinates 2.905545, 101.809618 before flows into Sg. Rinching by Company Advancecon Infra Sdn Bhd. -Caused by the situation heavy rain in upstream Sg Buah and surface flow of ground opening in coordinates (N 2' 52' 52 , E 101'46'09) -Cause not found -Internal machinery service activities

				Ban Lung Machinery premises which releases the flow oil spill inside drain outside the premises. -Cattle Farming Activities -Flow like oil from mixed washing water diesel from Ban Lung premises Machinery and flow to in culverts and then go to in Sg Semenyih.
2	Sungai Chinchang	-Effluent discharge forbidden to hole sewer public	1	PureCircle Sdn Bhd, PT23419, Lengkuk Teknologi, TechPark, @ENSTEK,71760 Bandar Enstek, Negeri Sembilan
3	Sungai Langat	-Spilled chemical substances(2/2) -Turbidity (21/4) -Turbidity (18/5)	3	-chemical waste illegally in the river langat. Open space in front of house No.5, Taman Sri Reko, Taman Reko Jaya, 43000 Kajang, Selangor. -Area water reservoir pool washing of excess project waste Langat 2 by Syarikat Waja Kembara Logistik Sdn Bhd flow into the stream before meeting the river Michu.

49				-Suspected to be caused by reservoir overflow water with mud white color belongs to the Company Waja Kembara Logistik Sdn Bhd. (KSSB). Possible the overflow has flowed enter the stream of children of Sg Michu during heavy rain following occurs increase in pool water level same as felling. -
4	Sungai Rinching	-Spilled oil (14/6) -Smelly water(3/9) - Sparkling Water (15/12)	3	-Palm oil spill from the Ngo Chew Hong factory Oils & Fats (M) Sdn Bhd at coordinates 2.920547,101.858964. Attributable overflow from the tank factory processing then flow into the premises drain and Rinching River. -The final cause of pollution was found at a distance16km from Muka Sauk.Suspected from the Ngo factory Chew Hong Oil & Fats. -Ahimsa Vege Health FactoryFood Industries Sdn Bhd releasing frothy effluent in a nearby drain

5	Sungai Balak	-Oil Pollution (3/10)	1	-Storage tank leak palm oil from the premises AB Mauri Sdn Bhd to the groove water in Jalan KB 1/9, Kg.Baru Balakong
6	Gabung:- -i.Sg Gahal ii. Sg Sab iii. Sg Michu iv. Sg Langat -i. Sg Batang Benar,Neg eri Sembilan ii. Sg Pajam iii. Sg Beranang iv. Sg Semenyih	-Turbidty(29/3) -Water became colur (12/4) *Date and Months	2	-i. Second silt trap pond tire has broken on location sand washing owned by Waja Kembara Logistik Sdn Bhd and overflowing into drainage near Sg Michu. i. Earthwork activities /East Klang development Valley Expressway (EKVE) contribute to turbidity to Sg Sub and Sg Loud. iii. Quarry activities run by Sunway Quarry Industries Sdn Bhd at Lot 5704 & 5705, Sg Lemongrass, Hulu Langat and effluent discharge enter Sg Sub's son and Sg. Sub. -Water flow from work extinguishing the fire as a result Tao Paint factory fire (Malaysia) Sdn Bhd in Nilai 3 which enters Sg Batang Benar, Negeri Sembilan.

Table 15: Emergency Case in Lembangan Sungai Langat throughout the year 2021

The table below depicts emergency water supply events in Lembangan Sungai Langat during 2021, based on data from Luas (Lembaga Urus Air Selangor). This emergency situation in Lembangan Sg Langat includes Sungai Rinching, Sungai Langat, Sungai Balak, and other sungai. contaminated water, odours, turbidity, contaminated water black, effluent discharge, spilled chemicals, sparkling water, and oil pollution that pollutes rivers Sungai Semenyih, the source of the river's water supply, is the most major contaminant. The total number of instances on Sungai Semenyih is eight, with various types of causes and pollutants. One of them was an instance from Sungai Semenyih on October 23rd, when the water turned coloured and smelled, due to pollution from the Industrial Nilai 3.

Emergency Case in Lembangan Sungai Selangor throughout the year 2021

No	Name of Rivers	Type of Pollution	Number of Cases	Causes
1	Sungai Selangor	-Turbidity(27/4) -Turbidity (19/5)	2	-Turbidity in Sg Rening caused by activity land clearing for agricultural purposes -Caused by the spread in The Selangor River likely from natural weather factors, rain thick, high tide and strong river currents.
2	Sungai Rening	-Turbidity (1/5)	1	-Water head and flow from the opening of the land perform activity farming with flow straight to Sg. Rening by Syarikat Golden Meridian Sdn.Bhd.

| 3 | Sungai Gong | -Chemical substances released(17/1)
- Sludge on water surface at in culverts (20/1)
- Foamy water(21/1)
-Turbidity (16/5)
- Foamy & Smells(13/10) | 5 | -Smart Novus Sdn Bhd, No. 12, INR 1 Road, Park Rawang Nautical Industry.
- Unknown cause sure and deep monitoring.
- The flow of elevated water causes foamy water and is natural effect.

-Owned reservoir Synergy Development Sdn Bhd in front of the Rawang toll not maintained with good and no closure grass on the face of the earth to control sedimentation.

-Global factory fire plastic Resource (Warehouse recycled plastic) at Mangrove River, Rawang |
| | | *Date and Months | | |

Table 16: Emergency Case in Lembangan Sungai Selangor throughout the year 2021

Based on data from Luas, the table represents emergency water supply occurrences in Lembangan Sungai Selangor for 2021. (Lembaga Urus Air Selangor). Sungai Selangor, Sungai Rening, and Sungai Gong are all part of this critical situation in Lembangan Sungai Selangor. Pollutants in the river include turbidity, chemical material discharge, sludge on the water surface in culverts, foam water, and odor. Sunagi Gong has the most instances of all these rivers. There are 5 incidents, each with a particular sort of pollution and reason. One example is the sungai gong, which was poisoned by a chemical material produced by Smart Novus Sdn Bhd, No12, lIR1 Road, Park Rawang Nautical Industry.

Emergency Case in Lembangan Sungai Klang throughout the year 2021

No	Name of River	Types of pollution	Number of Cases	Causes
1	Highway Guthrie	Spilled waste oil of palm(22/4) *Date and Years	1	-Tanker accident palm with no. NDC 4463 registration belongs to JASA BUMI SERVICE LOGISTICS SDN. Ltd
2	Sungai Ampang	-Turbidity (21/4) (22/4) (24/4) (11/5) (12/5) (13/5) (14/5) (17/5) (18/5) (25/5) (31/5) (12/6) 14/6) (20/6) (28/6) (5/7) (8/7) (10/7) (5/8) (8/8)\ (11/8) (18/8) (25/8) (13/9) (4/11) (10/11) (21/11) (10/12) (18/12) *Date and Months	36	-Heavy rain and flooding mud as a result of earthwork activities EKVE construction project.

Table 17: Emergency Case in Lembangan Sungai Klang throughout the year 2021

Based on data from Luas, the table represents emergency water supply occurrences in Lembangan Klang in 2021. (Lembaga Urus Air Selangor). Sungai Ampang and Highway Guthrie are included in this emergency circumstance at Lembangan Klang. Spilled waste oil of palm and turbidity are two types of pollution that have occurred this year. Among these two rivers, Sungai Ampang has the highest number of cases, with 36 cases polluted by turbidity caused by heavy rain and flooding mud as a result of earthwork activities for the EKVE construction project.

Emergency Case in Lembangan Sungai Langat throughout the year 2022

No	Name of Rivers	Type of Pollution	Number of Cases	Causes
1	Sungai Pajam	-Water became Black	1	-Suspected to be caused by the flow river from Negeri Sembilan river following points the last check is upstream bordering river Negeri Sembilan
2	Sungai Langat	-Turbidity (2/3) -Diesel smell (11/5) -Palm oil (25/5) -Turbidity (2/6) -Diesel smell(9/6) -Water became colour(10/6) -Oil Pollution (19/7) -Diesel oil (28/7)	8	-Prolonged heavy rain - Horsepower M Auto premises service (3.044625, 101.776257) the vehicle workshop suspected cause cause an effect like diesel in the drain public close to Sg Langat. -Oil truck accident palm (Commercial Right Sdn Bhd) at KM 27.6 SKVE west direction. -Caused by turbidity Sompo River (2.8727440,101.8709528) due to heavy rain in Negeri Sembilan a day before. -Not identify - LAGlove Factory (m) Sdn Bhd Glove manufacturing factory hands have let go white water flow to the river langat without through the final discharge

				is supposed. -Not identify -Accidents Involving A Truck On The Highwayc PLUS KM 294.9 nearby with the Langat River.
3	Sungai Rinching	-Smelly water Solvent(30/3) -Spilled oil (16/4) -Smelly water like oil palm (23/6) -	3	-Suspected to be caused in the vicinity nearby watercourse Ngo Chew Hong factory who met with Rinching River. -There was an incident oil spill in front of Ngo premises Chew Hong Sdn Bhd from a truck tank oil. -Treatment pond overflow and sump leaks treatment from Ngo Factory Chew Hong Oil & Fats Sdn Bhd
4	Sungai Semenyih	-Diesel smell	1	-Not identify

5	Sungai Batangkali	-Turbidity (29/10) -Turbidity (2/3) -Turbidity (7/3) -Turbidity (17/3) -Turbidity (11/5) -Turbidity(14/5) -Turbidity (16/5) -Turbidity(17/5) -Turbidity (24/5)	9	-Not identify -Cause can't identified. -Three activities that identified as potential cause an increase turbidity level at River Batang Kali. These activities which involving companies: i. Messrs. Gensa Sdn Bhd (Sg Pancheras) i. Mr. NCT Platinum Sdn Bhd (Guest Sg) iii. Kumpulan SemestaSdn Bhd (Sg Batang Kali) Potential be the cause the occurrence of turbidity high in Sg Batang Kali. -Similar findings as was the case on March 7 2022. -No information get Land opening area development project phased by the Company NCT Platinum SDN BHD on coordinates (3.475214,101.682725) & (3.471797, 101.682274). There are 3 pools owned silt reservoir the premise releases water effluent which is cloudy. -In addition, the location on coordinates (3.4698977, 01.6859797) is believed murky water flows from the catchment silt and has been flow in River Tamu on coordinates (3.4698879, 101.6862774)

				-Similar findings as was the case on May 14 2022.
				-Similar findings as was the case on May 14 2022.
6	Sungai Guntong	-Fire Area Industry(16/7)	1	-Fire incident near the river Guntong that has been entering the monsoon drain (3.405415,101.560880)
7	Sungai Kabul	- Colored water White (14/2) -Diesel Smell (1/5) - Colored water and Smells (21/7)	2	-Suspected to be caused by premises of Daikei (M) Sdn Bhd following effects discovery of white on the meeting drain the extent of the final release very noticeable. - Suspect NSL Eastern factory Pretech Malaysia Sdn Bhd. Caused by activity cube test mold washing using water and the fluid is suspected to be oil. Meecon Engineering Factory & Trading Sdn Bhd. Smell strong oil in the air. There is a flow through under the premises and sampling run found a smell is b 2 TON -Not identify

| 8 | Gabung
-i.Sg Semenyih
 ii.Sg Beranang
iii.Sg Jai
 iv.Sempadan Negeri Sembilan

-i.Sg Kabul
ii.Sg Beranang
iii.Sg Semenyih

i.Sg Perimbun & Sg Langat

i Sungai Langat
ii. Sungai Semarang

ii.Sungai Gong dan Sungai Kundang

i.Sungai Pencheras & Sungai Batang Kali | -Turbidity(24/4)
-Diesel smell(3/5)
- Permeable Soluble Water (leachate)(5/6)
-Diesel oil(28/7)
- The water smells bad/ carcass(12/2)
- Carcass smell(17/2) | 6 | -Turbidity flow from Negeri Sembilan river.
- Odor effect likely from oil absorption on Oil Old boom.
-Ban on Black Water Lake, Crown City of Cheras has broken due to rain thick It drains water leaching from activity garbage disposal illegally on location the said.

- The accident involving a truck land load and a trucks carrying oil oil palm at KM36. 8 north direction (Nilai Utara intersectionBandar Serenia)
- There is a pile trash and carcasses in along the river reserve kundang and logboom.

-Land dumping activities in PT3713 (HSD27996), Genting Highlang, Mukim Batang Kali, Hulu District Selangor.
Coordinates: (3.411930,101.761368) |

Table 18: Emergency Case in Lembangan Sungai Langat throughout the year 2022

Through the year 2022, there will be an emergency case in Lembangan Sungai Langat. This information comes from the agency (LUAS), which stands for Lembaga Urus Air Selangor. The table depicts the emergency water supply case in Sungai Langat through the year 2022, which includes Sungai Pajam, Sungai Kabul, Sungai Langat, Sungat Rinching, Sungai Semenyih, Sungai Ampang, Sungai Batangkali, Sungai Guntong, and others. The most severe emergency case for 2022 occurs in Sungai Ampang, which is contaminated by turbidity and

caused by heavy rain and flooded muck as a result of earthwork activities associated with the EKVE development project.

The total number of emergency cases in water pollution through 2022 has been concentrated on three rivers: Lembangan Sg Langat, Lembangan Sg Selangor, and Lembangan Sg Klang. According to the Lembangan Sungai langat, code green has three cases, code yellow has fifteen, and code red has just two. There are a total of 20 Lembangan Sg Langat instances. However, for Lembangan Sg Selangor, code green has one instance, code yellow contains eleven cases, and code red contains none. There are a total of 12 lembangan Sg Selangor instances. So the sum of both situations is 32. For the Lembangan Sg klang code yellow, there are 16 examples, which also reflect the total.

Emergency Case in Lembangan Sungai Klang throughout the year 2022

No	Name of Rivers	Type of pollution	Number of Cases	Causes
1	Sg Ampang	Turbidity (28/1) (29/1) (14/2) (26/2) (8/3) (17/3) (25/3) (12/4) (15/4) (16/4) (20/4) (1/5) (14/5) (12/7)	15	-Heavy rain and mud floods as a result of the earthworks activities of the EKV construction project
2	Sg Rumput, Gombak	Turbidity (20/6)	1	Heavy rain and likely to happen fallen tree incident

				and incidence of spread land in the Area terrestrial forest upstream of Sg Rumput

Table 19: Emergency Case in Lembangan Sungai Klang throughout the year 2022

Based on statistics from Luas, the table below represents emergency water supply occurrences in Lembangan Klang for 2022. (Lembaga Urus Air Selangor). Sungai Ampang and Sungai Rumput, Gombak are included in this emergency scenario in Lembangan Klang. Among these two rivers, Sungai Ampang is the most contaminated by turbidity.

Overall Emergency Cases In Sg Selangor 2019-2022

Emergency Cases In Sg Selangor 2019-2022

	Odour	Oil	Effluent	Turbidity
■ 2021		2		2
■ 2020	9	2	1	
■ 2019	2	1		

■ 2019 ■ 2020 ■ 2021
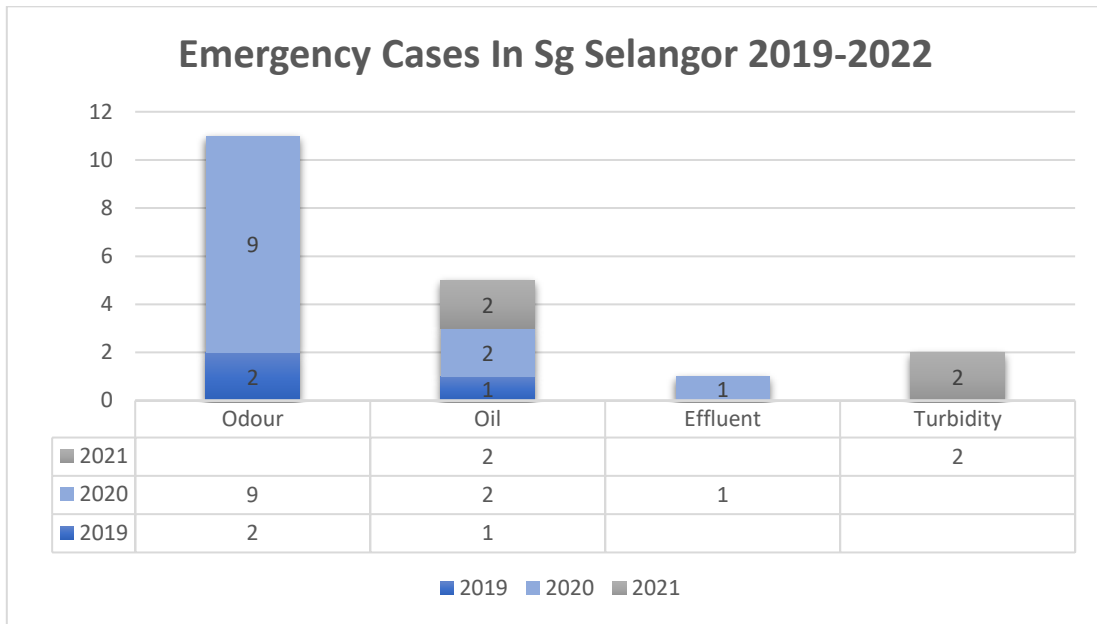
Clustered Colum Chart

This graph depicts the number of emergency cases in Sg Selangor from 2019 to 2021. Based on this, we can easily determine how many incidents occur each year and draw the conclusion that we need to tackle the problem by finding a way to reduce the number of cases that occur in order to avoid this water interruption.

4.3.3 Effects of water supply disruption

The fundamental impact of this water disruption is that it pollutes natural water resources and reduces the supply of clean water. Worse, the disruption in the clean water supply occurs as underground water storage decreases. While subterranean water is a vital source of clean water supply, it must be protected. We will confront water shortages as a result of this problem and the occurrence of water restriction, which will prevent people from receiving water supplies. This will make it harder for households to meet their daily water demands. Projects in the development sector will be delayed owing to the disruption of the primary source of funding for the development project. Furthermore, the procedure of maintaining and restoring water quality is costly.

Natural disasters such as floods can also create water interruption. When floods occur, certain water treatment plants are unable to operate because systems such as pump houses and substations were drowned by the flood, resulting in the failure of water processing operations. In addition to floods, the flooding in 2021 has brought landslides and slope, which also causes break apart, and necessitates mandatory replacement, resulting in water supply disruption.

Various forms of water supply disruption affect the community. Water supply outages have a significant impact on the agency's cost losses. One of them is income loss, which occurs when the water supply cannot be provided due to that interruption. It will result in revenue loss since profit cannot be created due to a shortage of water, but more significantly, it will result in the expense of pipe replacement restoration management for consumer work such as water tank distribution. Water supply disruptions affect consumers' experiences and result in a decline in taking to agency, which produces revenue,

4.3.4 Solution

Agencies have specialized response tests for water disruption cases. With this method, they have been able to reduce and repair works for water supply disruption take for 24 hours. For

bigger distribution network, it takes longer time to do repair work due to the size and complexity of the system, because cases for bigger distribution network occurs deep in the ground, and various extra works such as excavation, transferring and replacement equipment which are had to obtain, which all required longer time. So in general, repair work as main the distribution system takes longer from the reticulation and communication pipes. The repairment works hours follows the performance indicator (KPI) which dictates the maximum repairing hour for different pipe categories.

A water control programme was implemented to find the source of WSD in order to prevent it. As an illustration, in a leak detection procedure known as the leak inspectors, a team of professionals will examine the water pipe network in order to locate leaks using the proper tools. Before any repairs are made, the devices are used to find burst pipes. In addition, an artificial intelligence system is used to collect data, access different dates, such as procedure and pipe age, and predict the likelihood of a specific pipe burst. When a third party is involved, there are times when the local authority must work in cooperation with the third party if development or construction work is planned. The parties involved in this development work, which involves intelligent water supply systems, must obtain a permit from the agencies.

In general, it is possible to prevent water supply disruptions, but it comes at a very high cost per capacity. The economic off-scale and repair must be balanced where it must be adjusted to the current tariff, and the water tariff plays a significant role in being able to available amount of water tariff in Selangor. A suitable water tariff must be implemented in order to ensure the prevention of water supply disruptions. Insisiatif Skim Jaminana Air Mentah was released for the state government, and it contains several initiatives for overall water supply improvement using various methods and perspectives such as technology, geography, and law enforcement..

For Air Selangor, it is necessary to guarantee adequate water storage in order to keep up with population growth over the next 20 to 30 years. Water treatment plants that are built in growth areas, like the new one, must undergo continuous improvement. Both the old asset refurbishments, where old assets are renovated, and the pipe replacement program regularly replace old pipes with new ones.

4.4 Summary

Overall, the study's findings have been thoroughly presented in this chapter based on all research tools, namely questionnaire, interview and other sources as well. From this chapter , we able to understand the factors, causes and effects of water disruption. We also able to understand the operation of the water delivery system in Selangor. From this we able to find solution for this water supply disruption.

CHAPTER 5

CONCLUSION

5.1 Dicussion

This research finding indicates the most influential factors of disruption of water supply disruption is the lack of capacity of water treatment plants and the least influential factors is because of the weakness in water management. The main factor of water disruption happen that most people are not concerned about this water distruption. This study also analyses other factors that might be influencing water disruptions such as maintenance work, contaminated water supply , leaking water pipes, and other poor attitude on water supply consumption. Moreover, this study also shows that effect that influences water disruption in Selangor. The finding shows the effect of water supply disruption is the domestic activity, poor water quality, and affected economic activity. It is important to note that many studies have discussed the factors and effects to water supply related to the issues or research studies in water disruption.

5.2 Conclusion

When the project began, the researchers established three goals: to analyse prior occurrences of water supply interruption, to determine the causes of frequent water disruptions, and to provide a remedy for frequent water disruptions. Finally, all of the general objectives were met. The researchers used an interview and a questionnaire to accomplish the three goals. The findings suggest that the most significant component was a lack of capacity at the water treatment plant, while the most significant consequence was creating reproductive illnesses that have a negative impact on health. The water issue is caused by a number of variables, including climate change and development activities, which have an impact on society in economic, social, and political sectors and activities. Many control mechanisms, such as

optimising daily drainage, have been implemented by the water management to provide uninterrupted water supply services. Awareness must be raised to guarantee that catchment areas are managed and monitored, and that any activity that may contaminate or harm the reservoir is avoided. Industrial waste disposal must be monitored and adhere to strict guidelines. Controlled circumstances can provide a sustained source of raw water. Water quality should always be taken seriously. Quality standards are not to be compromised. Pollution of the provided water will injure consumers and accelerate the spread of infectious illnesses that are difficult to regulate.

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Appendix

Gantt Chart For August to November 2022

No	Activity	Start Date	End Date	Duration	Status Project
1	**FYP 2**				
	ISOLMS Seminar	29/8/2022	29/8/2022	1 days	100%
	FYP briefing with students and supervisors	30/8/2022	30/8/2022	1 days	100%
	Meeting with supervisor	30/8/2022	30/8/2022	1 days	100%
	Register Project fyp 2	30/8/2022	30/8/2022	1 days	30%
	Update isolms and Buku Log	30/8/2022	30/8/2022	1 days	50%
2	**Collecting Data**				
	Meeting with supervisor	6/9/2022	28/9/2022	4 weeks	60%
	Doing some research about agency	13/9/2022	21/9/2022	2 weeks	40%
	Doing Interview question and questionnaire	13/9/2022	25/9/2022	2 weeks	90%
	Prepare a permission letter for the agency	13/9/2022	25/9/2022	2 weeks	100%
	Calling or email them for appoinmnet	14/9/2022	17/9/2022	4 days	70%
	Get data for the questionnaire	3/10/2022	13/10/2022	2 weeks	100%
	Update Isolms and Buku Log	3/10/2022	4/10/2022	2 days	70%
	Seminar Chapter 4 and 5	30/9/2022	30/9/2022	1 days	100%
3	**Preparing for Project progress presentation**				
	Meeting with supervisor	4/10/2022	14/10/2022	2 weeks	100%
	Update isolms and Buku Log	4/10/2022	10/10/2022	1 weeks	100%
	Prepare powerpoint presentation	6/10/2022	16/10/2022	2 weeks	100%
4	**Project Progress Presentation**	18/10/2022	18/10/2022	1 days	100%
5	**Preparing for finals Presentation**				
	Recollect the data	19/10/2022	24/11/202	6 week	70%
	Redoing the slide	19/10/2022	24/11/2022	6 week	100%
	Update Isolms and Buku Log	19/10/2022	24/11/2022	6 week	100%
	Doing Task Video	16/10/2022	28/11/2022	6 week	62%
	Doing Abstract Report	22/11/2022	28/11/2022	2 week	50%
	Doing Poster	22/11/2022	2/12/2022	2 week	50%
	Doing with report	19/10/2022	30/11/2022	7 week	95%
	Meeting with supervisor	22/11/2022	25/11/2022	4 days	100%
6	**Final Presentation**	29/11/2022	29/11/2022	1 days	100%
7	**Submition of Overall Report**				
	Submit poster	28/11/2022	28-Nov	1 days	80%
	Submit task video	2/12/2022	2/12/2022	1 days	95%
	Submit Report	30/11/2022	30/11/2022	1 days	100%
	Submit Abstract	28/11/2022	28/11/2022	1 days	90%

Table 20: Gantt Chart

Permission Letter For Syabas Agency

POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH
KEMENTERIAN PENGAJIAN TINGGI MALAYSIA
Persiaran Usahawan, Seksyen U1,
40150 Shah Alam
SELANGOR, MALAYSIA

POLITEKNIK
MALAYSIA

Tel.: 603-5163400
Faksimili:603-55691903
Laman Web: www.psa.edu.my
Facebook: pssaas

Ruj. Kami : PSA.700-1/7/1(71)
Tarikh   : 28 September 2022

Kepada sesiapa yang berkenaan,

Tuan,

KEBENARAN MENGUMPUL MAKLUMAT KAJIAN BAGI PELAJAR JABATAN KEJURUTERAAN AWAM POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

Dengan segala hormatnya, perkara di atas adalah dirujuk.

2.   Adalah dimaklumkan bahawa pelajar jabatan ini perlu mengumpulkan maklumat kajian untuk memenuhi keperluan kursus yang sedang diikuti yang merupakan salah satu syarat penganugerahan diploma.

3.   Butiran kajian dan pelajar terlibat adalah seperti di lampiran.

4.   Sehubungan dengan itu, kerjasama dari pihak tuan amatlah diharapkan untuk membenarkan pelajar tersebut mendapatkan maklumat kajian yang berkaitan. Sekiranya terdapat sebarang pertanyaan, tuan bolehlah menghubungi pegawai seperti di lampiran.

5.   Segala kerjasama dari pihak tuan amatlah dihargai dan didahului dengan ucapan ribuan terima kasih.

Sekian.

"BERKHIDMAT UNTUK NEGARA"

Saya yang menjalankan amanah,

(DR. HJ MOHD ZAHARI BIN ISMAIL)
Pengarah,
Politeknik Sultan Salahuddin Abdul Aziz Shah.

Figure 2 : Permission Letter For Syabas Agency

Ketua Pegawai Eksekutif   *LAMPIRAN*
Pengurusan Air Selangor Petaling Jaya
Jalan Templer, Pjs 51,
46050 Shah Alam,
Selangor Darul Ehsan

Butiran kajian dan pelajar terlibat adalah seperti berikut.

Kursus & Kod Kursus : DCC50194 Final Year Project 2
Tajuk kajian: Case Study of Water Supply Disruption in Taman TTDI Jaya, Shah Alam, Selangor

BIL	NAMA PELAJAR	NO PENDAFTARAN	NO TELEFON
1.	Aina Binti Kamaruddin	08DKA20F1066	012-2043482
2.	Sweta A/P Nagaretnam	08DKA20F1068	011-11108933

Sekiranya terdapat sebarang pertanyaan, tuan bolehlah menghubungi penyelia projek iaitu Puan Jazlina Binti Muhammad di talian 019-3564191

Figure 3: Permission Letter For Syabas Agency

Permission Letter For Luas Agency

POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH
KEMENTERIAN PENGAJIAN TINGGI MALAYSIA
Persiaran Usahawan, Seksyen U1,
40150 Shah Alam
SELANGOR, MALAYSIA

POLITEKNIK MALAYSIA
Tel.: 603-5163400
Faksimili:603-55691903
Laman Web: www.psa.edu.my
Facebook: pssaas

Ruj. Kami : PSA.700-1/7/1(69)
Tarikh   : 28 September 2022

Kepada sesiapa yang berkenaan,

Tuan,

KEBENARAN MENGUMPUL MAKLUMAT KAJIAN BAGI PELAJAR JABATAN KEJURUTERAAN AWAM POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

Dengan segala hormatnya, perkara di atas adalah dirujuk.

2.   Adalah dimaklumkan bahawa pelajar jabatan ini perlu mengumpulkan maklumat kajian untuk memenuhi keperluan kursus yang sedang diikuti yang merupakan salah satu syarat penganugerahan diploma.

3.   Butiran kajian dan pelajar terlibat adalah seperti di lampiran.

4.   Sehubungan dengan itu, kerjasama dari pihak tuan amatlah diharapkan untuk membenarkan pelajar tersebut mendapatkan maklumat kajian yang berkaitan. Sekiranya terdapat sebarang pertanyaan, tuan bolehlah menghubungi pegawai seperti di lampiran.

5.   Segala kerjasama dari pihak tuan amatlah dihargai dan didahului dengan ucapan ribuan terima kasih.

Sekian.

"BERKHIDMAT UNTUK NEGARA"

Saya yang menjalankan amanah,

(DR. HJ MOHD ZAHARI BIN ISMAIL)
Pengarah,
Politeknik Sultan Salahuddin Abdul Aziz Shah.

Figure 4: Permission Letter For Luas Agency

Pengarah
Lembaga Urus Air Selangor (LUAS)
Tingkat 13, Bangunan Darul Ehsan, No 3, Jalan Indah, Seksyen 14,
40000 Shah Alam,
Selangor Darul Ehsan

Butiran kajian dan pelajar terlibat adalah seperti berikut.

Kursus & Kod Kursus : DCC50194 Final Year Project 2
Tajuk kajian: Case Study of Water Supply Disruption in Taman TTDI Jaya, Shah Alam, Selangor

BIL	NAMA PELAJAR	NO PENDAFTARAN	NO TELEFON
1.	Aina Binti Kamaruddin	08DKA20F1066	012-2043482
2.	Sweta A/P Nagaretnam	08DKA20F1068	011-11108933

Sekiranya terdapat sebarang pertanyaan, tuan bolehlah menghubungi penyelia projek iaitu Puan Jazlina Binti Muhammad di talian 019-3564191

Figure 5: Permission Letter For Luas A

Questionnaire

Soal selidik gangguan bekalan air di Taman TTDI Jaya, Shah Alam

Soal selidik ini khas untuk penduduk Taman TTDI Jaya sahaja

Sila tandakan yang berkenaan

Section A: Profail responden

* Required

1. 1) Jantina responden *

    Mark only one oval.

    ◯ Lelaki

    ◯ Perempuan

2. 2) Nyatakan lingkungan umur responden *

    Mark only one oval.

    ◯ 18-25

    ◯ 26-35

    ◯ 36-45

    ◯ 45 dan keatas

3. 3)Nyatakan pekerjaan responden *

    Mark only one oval.

    ◯ Pelajar

    ◯ Pensyarah

    ◯ Staf Sokongan

    ◯ Bekerja sendiri

    ◯ Other: _____

Section B: Maklumat kediaman responden

4. 1) Berapa lama anda telah tinggal di Taman TTDI Jaya? *

Mark only one oval.

- ( ) 1 bulan - 5 bulan
- ( ) 5 bulan - setahun
- ( ) Setahun - 5 tahun
- ( ) 5 tahun - 10 tahun
- ( ) >10 tahun

5. 2) Nyatakan jenis kediaman responden *

Mark only one oval.

- ( ) Apartment/Kondominium
- ( ) Rumah teres
- ( ) Rumah banglo
- ( ) Other: _____

6. 3) Nyatakan sumber bekalan air di kediaman responden *

Mark only one oval.

- ( ) Bekalan air paip
- ( ) *water vendor*
- ( ) Tangki air
- ( ) Other: _____

7. 4) Sila tandakan kegunaan utama sumber air di kediaman *

Mark only one oval per row.

	Paling kerap	Kerap	Kurang Kerap	Tidak Kerap	Tidak pernah
Kegunaan dapur	◯	◯	◯	◯	◯
Pembersihan rumah (basuh baju, basuh kenderaan)	◯	◯	◯	◯	◯
Kebersihan diri	◯	◯	◯	◯	◯
Aktiviti luar rumah (kebun, kolam renang, kolam ikan)	◯	◯	◯	◯	◯

Section C: Masalah gangguan sumber air & penyelesaian

8. 1) Adakah anda pernah mengalami gangguan bekalan air? *

Mark only one oval.

◯ Ya

◯ Tidak

9. 2) Berapakah kekerapan berlakunya gangguan bekalan air di kawasan kediaman * anda?

Mark only one oval.

◯ Sekali dalam 1 minggu ke 5 minggu

◯ Sekali dalam 1 bulan ke 5 bulan

◯ Sekali dalam 6 bulan ke 12 bulan

◯ Sekali dalam 1 tahun - 2 tahun

◯ Other: _____

10. 3) Apakah persiapan responden dalam menghadapi gangguan bekalan air? *

Mark only one oval.

- ◯ Menggunakan baldi atau bekas besar
- ◯ Mencatu bekalan air yang sedia ada
- ◯ Membeli bekalan air (air botol dan lain-lain)
- ◯ Menggunakan perkakasan dapur pakai buang
- ◯ Other: _____

11. 4) Apakah isu bekalan air yang anda hadapi selain terputus bekalan air *

Mark only one oval.

- ◯ Air tidak bersih
- ◯ Air berbau
- ◯ Air berkarat
- ◯ Other: _____

12. 5)Apakah punca gangguan bekalan air ? *

Mark only one oval.

- ◯ Pencemaran sumber air
- ◯ kerosakan paip induk
- ◯ Gangguan akibat penutupan loji disebabkan oleh penyelenggaraan berjadual
- ◯ Gangguan yang disebabkan oleh ketidakcukupan air mentah
- ◯ Other: _____