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WILLINGNESS TO PAY EXTRA CHARGE FOR INCREASING SAFETY WHILE USING PUBLIC TRANSPORT POST COVID-19 PANDEMIC

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WILLINGNESS TO PAY EXTRA CHARGE FOR INCREASING SAFETY
WHILE USING PUBLIC TRANSPORT POST COVID-19 PANDEMIC

By

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

PT's	Public Transport
WTP	Willingness To Pay
SPSS	Science Package for the Social Science
UK	United Kingdom
DV's	Dependent Variables
IV's	Independent Variables

WILLINGNESS TO PAY EXTRA CHARGE FOR INCREASING

SAFETY WHILE USING PUBLIC TRANSPORT POST COVID-19

PANDEMIC

LIST OF APPENDICES

xii

ABSTRAK

Kajian ini dijalankan untuk menyiasat kesediaan membayar caj tambahan bagi meningkatkan keselamatan semasa menggunakan pengangkutan awam pasca COVID-19 di kalangan rakyat Pulau Pinang. Dalam kajian ini, beberapa parameter seperti sosio-demografi, kekerapan menggunakan pengangkutan awam, dan niat untuk menggunakan pengangkutan awam telah diteliti untuk menentukan faktor penting yang mempengaruhi kesanggupan membayar ke arah inisiatif pengendali Pengangkutan Awam untuk meningkatkan langkah keselamatan. Dalam tempoh dua bulan, tinjauan soal selidik terhadap 210 responden telah direkodkan untuk kajian ini. Data yang dikumpul dianalisis menggunakan analisis deskriptif dan analisis statistik melalui *Statistical Package for the Social Science* (SPSS). Korelasi Pearson digunakan untuk menyiasat hubungan yang signifikan antara kesanggupan membayar dengan faktor sosio-demografi responden. Seterusnya, analisis Regresi digunakan dalam analisis statistik untuk menentukan faktor yang mempengaruhi kesanggupan membayar secara signifikan mengikut faktor sosiodemografi. Daripada keputusan yang diperolehi melalui analisis regresi, umur, kekerapan menggunakan pengangkutan awam, dan niat untuk menggunakan pengangkutan awam adalah faktor yang menyumbang kepada kesanggupan membayar terhadap inisiatif pengendali Pengangkutan Awam.

ABSTRACT

This study was conducted to investigate the willingness to pay extra charge for increasing safety while using public transport during post COVID-19 pandemic among Penangites. In this study, several parameters such as socio-demographic, frequency of using public transport, and intention to use public transport were examined to determine the significant factors that influence the willingness to pay towards PT's operators initiatives to increase safety measures. Within two months period, the questionnaire surveys of 210 respondents were recorded for this study. The collected data were analyzed using descriptive analysis and statistical analysis through Statistical Package for the Social Science (SPSS). Pearson correlation was used to investigate the significant relationship between willingness to pay and socio-demographic factors of respondents. Next, Regression analysis was used in statistical analysis to determine factors that significantly influenced willingness to pay according to socio-demographic factors. From the results acquired through the regression analysis, the age, frequency of using public transport, and the intention to use public transport were factors that contribute to willingness to pay towards PT's operators initiative.

CHAPTER 1

INTRODUCTION

1.1   Background of study

During the first half of 2020, the lives of a sizable portion of the world's population were dramatically altered. The COVID-19 pandemic, which was caused by the virus SARS-CoV-2, is the first in decades to have almost brought the globe to a halt (Awad Nunez et al., 2021). Covid-19 has spread across the world and is being exported to an increasing number of nations, with some countries experiencing forward transmission (Cucinotta.D et al., 2020). On March 11, 2020, the World Health Organization (WHO) proclaimed the new coronavirus (COVID-19) outbreak a worldwide pandemic (WHO, 2020). Malaysia reported its first incidence of COVID-19 on January 25, 2020, which was traced back to three Chinese citizens who had previously had close contact with an infected individual in Singapore (Elengoe.A, 2020). On March 16, 2020, the number of positive cases surpassed 553 instances, and Malaysia's Prime Minister issued a Movement Control Order (MCO). Social isolation was to last 14 days (18th March to 31st March 2020) to slow the development of COVID-19.

The Movement Control Order (MCO) was implemented to control the spread of COVID-19 nationwide. Since March 18, 2020, the government has prohibited citizens from travelling to neighboring states or places impacted by COVID-19. According to Almlof et al. (2021), the COVID-19 epidemic has altered travel habits and restricted the usage of public transportation worldwide. Due to a combination of government lockdowns and fears of getting and spreading the virus while utilizing mass transportation modes, one of the most significant effects has been a decrease in

passenger transport demand (IEA, 2020). The crisis has affected all forms of transport, from cars and public transport in cities, to buses, trains, and planes, nationally and internationally.

Public transportation has been impacted as well. For example, in March 2020, the UK implemented a rigorous lockdown, which resulted in a 95% reduction in subway journeys in London. Figure 1.1 shows data from one popular transportation planning smartphone app on changes in the mobility index. The chart shows that the number of trips has decreased by over 90% in many of the world's largest cities since the crisis began.
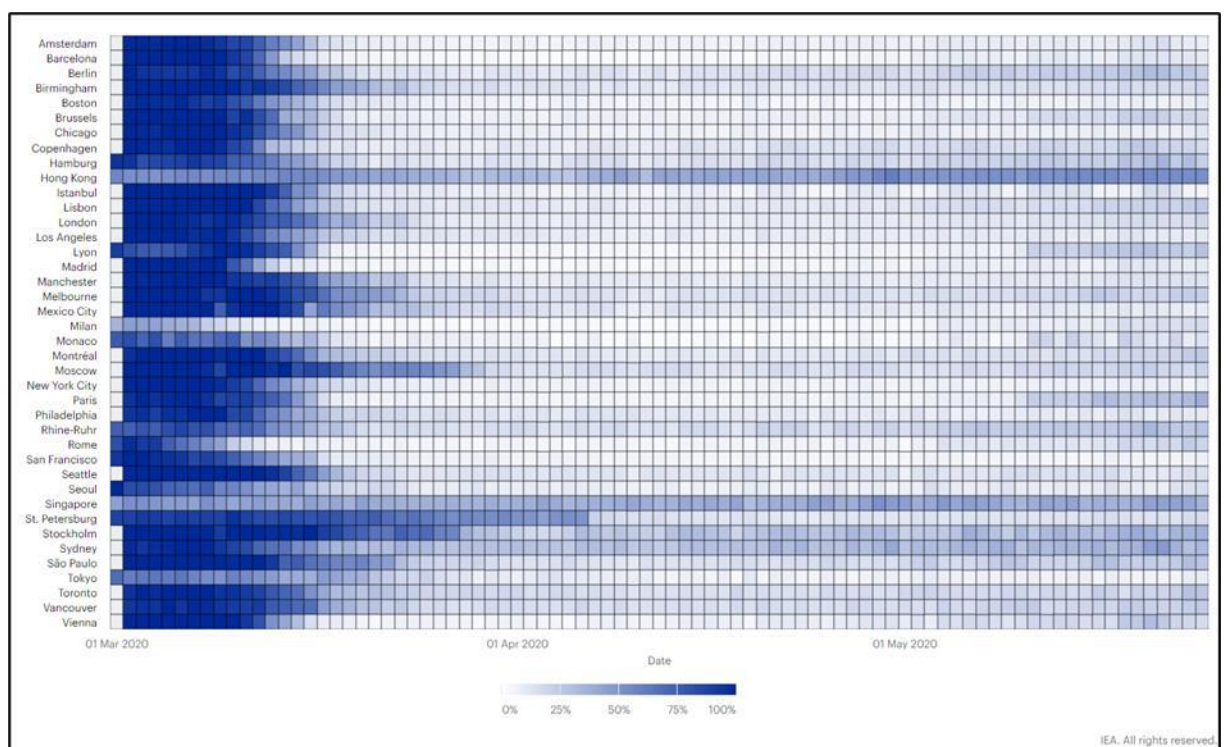
Figure 1.1: Changes in the Citymapper Mobility Index for selected cities since 1st

March 2020

(Source: Citymapper Mobility Index Apps, 2021)

1.2   Problem Statement

Many strategic policies have been adopted to foster sustainable transportation in a gradually increasing role of public transportation by reducing people's dependence on private vehicle transportation (O'Sullivan, 2003). The importance of public transportation was also stated by (Susniene, 2015), who stated that the benefits of public transportation will be able to increase people's mobility, reduce their reliance on automobiles, and mitigate the negative effects of pollution on health, all while minimizing the consequences of road widening.

However, the increasing perceived risk of getting infected has reduced the usage of public transport. During the lockdown, there was a decrease in the use of PT, which corresponds to the reality reported by studies, which found a 95% decrease in the use of PT during the pandemic (Aloi et al., 2020).The pandemic instils anxiety in the population, which may result in changes in travel behavior, more precisely in the activities people engage in and the modes of transportation they use to get to their activity areas. One of the key determinants of people's behavior during a health crisis (e.g., the COVID-19 pandemic) is their perceived risk associated with certain activities (Hotle et al., 2020).

Users' perceptions of the virus-resistance of modes of transport influence their decisions. Thus, in order to secure the successful recovery of the public transport sector, it is vital to implement suitable hygienic measures to ensure users' virus-resistance (Echaniz et al., 2021). According to an Australian survey, approximately 58 percent of respondents expressed hygiene concerns when using public transportation during the epidemic, compared to only 5% on regular days (Beck and Hensher, 2020).

This emphasizes the critical nature of maintaining cleanliness and hygiene when resuming services.

Public transportation and shared mobility service providers will need to invest resources in biosecurity measures in order to retain their customers (Faass et al., 2013). Previous studies conducted to explore individuals' willingness to use and to pay for using public transport and shared mobility services on COVID-19 safety measures after the lockdown showed 89.7 percent would use public transport services in the post-COVID-19 era and 64.3 percent of total respondents stated that they would pay more if operators took sanitizing measures, 70.6 percent increased supply to minimizecrowding; and increased cleanliness and sanitizing by 52.1 percent (Nunez, et al., 2021). These findings may indicate that individuals do not consider public transportation a harmful means of transit in terms of sanitary conditions.

Rapid Penang buses are also experiencing a decrease in passengers, with fewer people boarding the buses on all routes during COVID-19. This trend can be seen across the board (Sekaran, 2020). In order to increase the ridership in Penang state, several initiatives have been implemented, such as providing free unlimited rides on all Rapid Penang buses. This initiative aimed to ease people's burdens during the COVID-19 pandemic as well as encourage more people to continue using public transport (Audrey, 2021). However, the findings show the willingness to pay for extra safety measures against COVID-19 has yet to be investigated.

Therefore, to overcome this problem, the willingness to pay for extra safety measures needs to be understood. Hence, this study is aimed at determining the willingness to pay for extra safety measures while using public transport services during the COVID-19 pandemic by focusing on potential bus users in Penang.

1.3   Objectives of Study

This study aimed to determine the willingness to pay for extra safety measures while using public transport services during the post COVID-19 pandemic by focusing on the following objectives:

i.   To identify willingness to pay an extra charge when using public transport during the post COVID-19 pandemic among Penangites.

ii.   To investigate relationships between willingness to pay and sociodemographic, frequency of using public transport, and intention of using public transport.

iii.   To investigate factors affecting willingness to pay an extra charge for public transport operators' initiative on safety among the Penangites.

1.4   Scope of Study

The main interest of this research is to study the willingness to pay an extra charge for increasing safety while using public transport during the post COVID-19 pandemic among Penangites. This study was conducted via an online survey. The respondents are people who stayed in Penang and aged 18 and above.

CHAPTER 2

LITERATURE REVIEW

2.1 Impact of COVID-19 to Public Transport

Public transportation is a form of travel offered locally that enables more people to travel together along designated routes. Buses, trains, and trams are common examples of this type of public transportation. Rail, airlines, and coaches dominate public transportation between cities. Most public transport services operate on stipulated timelines. Some transportation systems operate on a full capacity basis, which means the vehicle will not start until it's full. However, many cities across the world provide shared taxis when the essence of time is a factor. According to the Institute for Transportation and Development Policy, public transport has the power to connect cities or to push them apart. Quality, well-designed transport systems are reliable, comfortable, affordable, and most importantly, accessible. (Public Transportation,2018)

Public transport represents a suitable alternative to travelling by private car and has become a hugely important part of sustainable transport policies. Because the perceived quality of public transportation users is widely recognized as a determining factor in their behavior, the quality of public transportation service delivery has become one of the main priorities within sustainable transport politics, as it motivates and encourages travelers to choose modes of transportation that use less space and energy (Luigi et al., 2018).

Good transportation is a public service that must meet three basic criteria, namely comfort, safety, and reliable. Additionally, public transportation is viewed as

critical in achieving other aims and public value, particularly those pertaining to economic and environmental concerns and the social dimension, which are not as prioritized (Stjernborg and Mattisson, 2016). Furthermore, user satisfaction is critical in increasing public interest in public transportation. As a result, it is critical to enhance service quality. If service quality does not improve, the number of passengers will decline.

The world is currently suffering from coronavirus disease 2019, which is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (COVID-19). World Health Organization's (WHO) COVID-19 media briefing on April 10, 2020, reported that the COVID-19 outbreak has touched 213 nations, with 1,524,162 confirmed positive cases and 92,941 deaths.

COVID-19's epidemic, which began in December 2019 and expanded fast around the world, has had a significant impact on public transportation, since the virus transmits via close contact, particularly in confined spaces (Abdullah et al.,2021). Governments throughout the globe have taken steps to prevent the spread of the fatal virus, including the closing of educational institutions, non-essential enterprises, restaurants, and bars, as well as the prohibition of social gatherings (Gutierrez et al.,2020). Several governments around the world have imposed lockdowns to restrict the movement of people. On March 16, 2020, the number of positive cases surpassed 553 instances, and Malaysia's Prime Minister issued a Movement Control Order (MCO) to be implemented to control the spread of COVID-19 nationwide.

According to studies examining risk perceptions, COVID-19, and travel outcomes, perceived risk of infection is inversely linked with involvement in out-of-

home activities and trip frequency (Parady et al., 2020; Wise et al.,2020). Given that COVID-19 is significantly more fatal than seasonal flu or pneumonia, we should assume that people's attitudes regarding infection are a significant factor influencing travel behavior (Basu, 2020). Survey-based research also shows that the pandemic hada big impact on changes in how people moved around, such as a drop in shared mobility or a rise in the use of private mobility (Matiza et al., 2020).

2.2   Perceived Risk towards COVID-19 infection in Public Transport

A study based on mobility behavior in view of the impact of the COVID-19 pandemic and a questionnaire survey conducted in the city of Gdansk, Poland with special regard to public transport users before and after the COVID-19 pandemic reported that 91 percent of respondents stopped or limited their usage with less than 10 percent remaining that used public transport due to one third of the participants involved a switch from a job or learning in a stationary mode to working online. This shows the scale of changes in mobility behavior due to the epidemic. Furthermore, 42 percent of respondents stated that they had switched from public transportation to a private vehicle. (Przybylowski et al., 2021).

Previous studies on the factors affecting both the feeling of comfort and safety in public transport show three additional factors were identified by the users, which include the number of passengers, the behavior of other passengers, and fear of other passengers not following the hygienic regime (Rahimi et al., 2021). This shows people feel less safe using public transport than before the pandemic, which significantly affects attitudes towards using this kind of transport in everyday life. However, 74 percent of respondents declared openness and willingness to return to using public

transport after the epidemic situation stabilizes. Returning to public transportation is affected by the sense of security among passengers. As a result, the future of public transportation and passengers' desire to use it once the epidemic is over is largely determined by the perceived comfort and safety during the outbreak. (Rahimi et al., 2021).
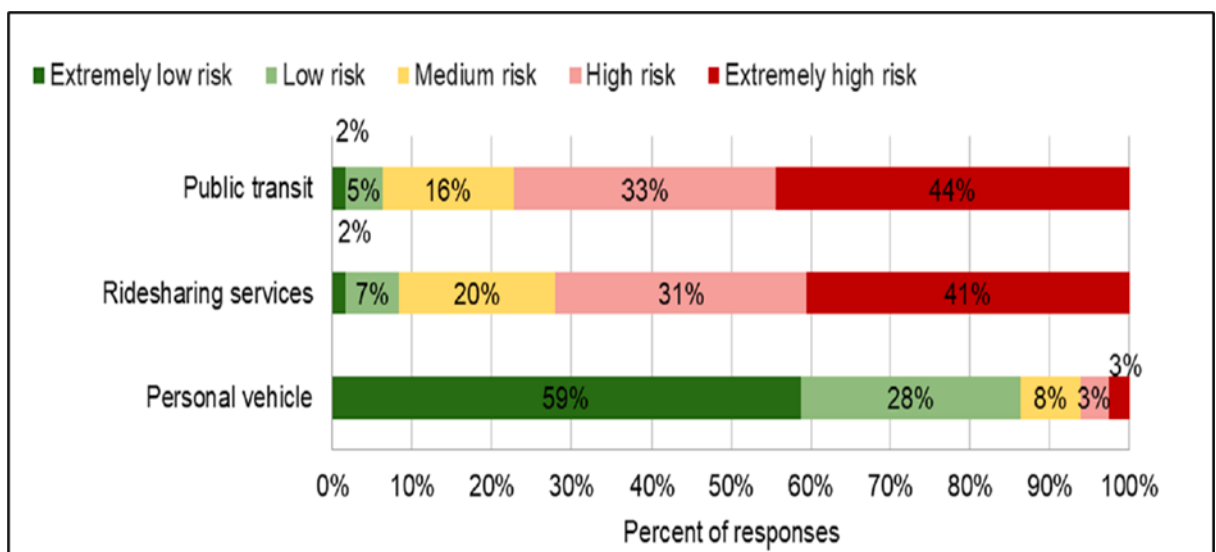
Figure 2.1: Perceived risk of traveling with public transport and ridesharing services ascompared with a personal vehicle during the COVID-19 pandemic.

(Source: Rahimi et al., 2021)

To inquire about individuals' risk perception toward using public transport and ridesharing services during the COVID-19 pandemic, a recent study conducted in Chicago shows the percentage of perceived risk of travelling with public transport and ridesharing services compared with personal vehicles during the COVID-19 pandemic. Figure 2.1 shows 44 percent choosing public transport as an extremely high risk and 41 percent declaring ridesharing services as extremely high risk. However, 59 percent agreed that personal vehicles are extremely low risk. According to Hotle et al. (2020), the pandemic

9

instils anxiety in the population, which may result in changes in travel behavior, more precisely in the activities people engage in and the modes of transportation they use to get to their activity areas. One of the key determinants of people's behavior during a health crisis (e.g., the COVID-19 pandemic) is their perceived risk associated with certain activities.
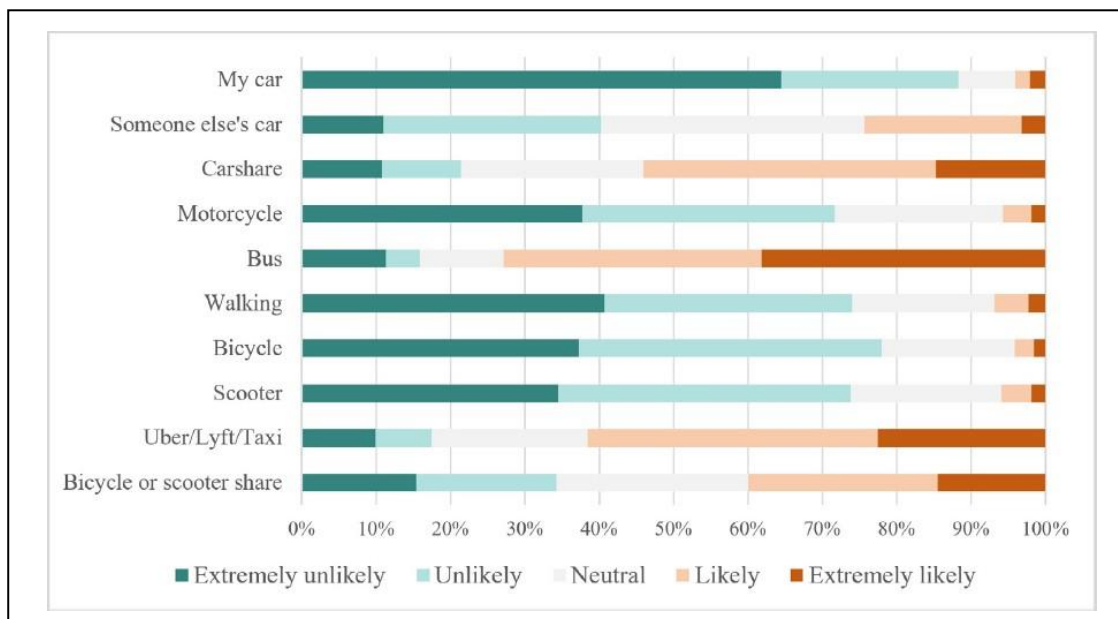
Figure 2.2: Risk of becoming infected with COVID-19 while using different

transportation modes

(Source: Ozbilen et al., 2021)

Another study on the perceived risk of infection while travelling during the COVID-19 pandemic, carried out in Columbus, has analyzed the changes in individuals' travel outcomes and the risk perceptions related to exposure and specific travel modes during the COVID-19 pandemic. Figure 2.2 shows that, on average, individuals are more likely to find shared modes (i.e., transit, ride-hailing, carsharing) riskier as compared to individual ones (i.e., walking, autos) when it comes to COVID-

19 exposures. The findings indicate that auto owners are more likely to consider shared transportation choices such as carsharing, Uber, Lyft, taxis, and buses to be riskier in terms of infection than their own cars. This is quite reasonable for two reasons. To begin, auto users are less likely to employ shared modes of transportation such as ride hailing or public transportation due to their negative attitudes towards strangers (Azimiet al., 2020).
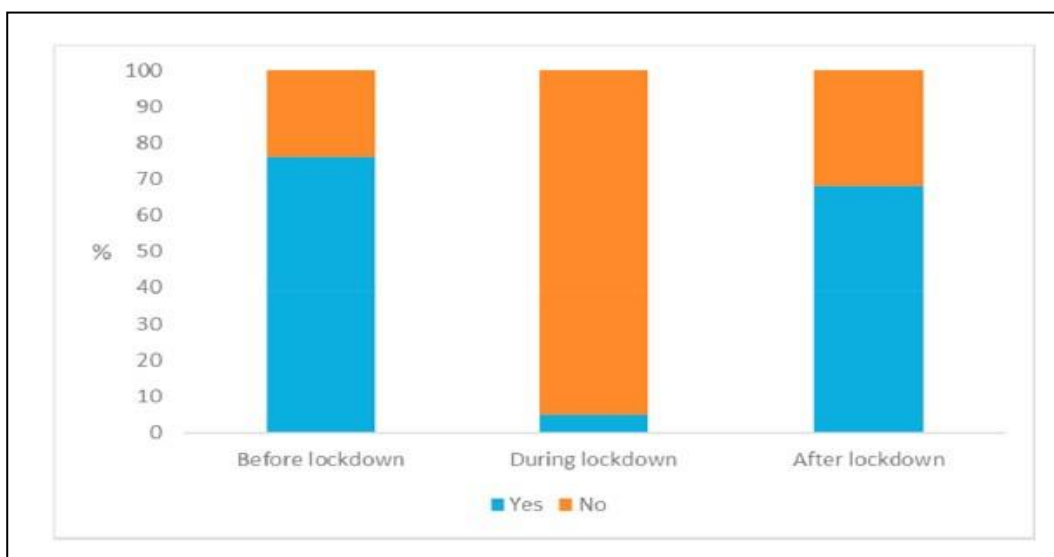
Figure 2.3: Evolution of PT used before, during and after the lockdown

(Source: Echaniz et al., 2021)

Recent research based on mobility data and passenger counts reveals that public transportation utilization has decreased dramatically in many nations. In Spain, for example, a 93 percent drop in the use of PT was detected during the lockdown, which corresponds to the reality reported by studies carried out, which found a 95 percent decrease in the use of PT during the pandemic (Aloi et al. 2020). Another aspect contributing to the decline in public transportation use was the user's sense of virus protection when utilizing those services. Figure 2.3 shows over 30% of

respondents deemed its use to be harmful or extremely dangerous. Also, nearly 30% of respondents believed that using PT services was secure. To conclude, users' perceptions of the virus-resistance of modes of transport influence their decisions. Thus, in order to secure the successful recovery of the public transport sector, it is vital to implement suitable hygienic measures to ensure users' virus-resistance (Echaniz et al., 2021).

Considering public transport may increase the rate of COVID-19 infection among its users, increasing frequent use of public transport may require some special attention in the post-COVID-19 era, as well as responsible behavior on the part of its users. According to an Australian survey, approximately 58 percent of respondents expressed hygiene concerns when using public transport during the epidemic, compared to only 5% on regular days (Beck and Hensher, 2020). This comment emphasizes the critical nature of maintaining cleanliness and hygiene when resuming services. According to Faass et al. (2013), public transport and shared mobility service providers will need to invest resources in biosecurity measures in order to retain their customers. To meet government regulations and give users a better sense of security, which makes them more likely to use them, there are a lot of questions about how willing and acceptable people are to take these steps and who should motivate them.

Reviewing the literature, concrete evidence could be found on the impacts of perceived risk of infection in public transport or shared mobility during COVID-19 pandemic (eg, Przybylowski et al., 2021; Rahimi et al., 2021; Ozbilen et al., 2021; Echaniz et al., 2021). Although these studies are informative and provide invaluable insights into the changes in performing various activities and use of different modes, characterized by individuals' risk perception due to the COVID-19 pandemic,

investigating the risk that individuals perceive while using public transit and ridesharing services as the widespread types of shared mobility solutions during the COVID-19 pandemic, the willingness to use and to pay for comfort in PT, accessibility has yet to be investigated.

2.3   Willingness to pay for better public transport

The willingness to pay, abbreviated WTP, refers to the highest price a client is willing to pay for a product or service. It is frequently expressed in terms of a financial amount or, in some situations, a price range. While potential clients are likely prepared to spend less than this barrier, it is critical to understand that they will not pay a greater price in the majority of circumstances (Stobierski, 2020). In other words, according to Harvard Business School (2020), the concept of willingness to pay states that no matter what your desire to pay for an item is or where it originates from, you will not pay more than that price for it.

Additionally, habits, convenience, value, personal health concerns, and individual responses to social and institutional norms influence consumers' product and brand preferences (Barber et al., 2021). Willingness to pay can vary significantly from customer to customer. A study conducted on crowding and public transport to review the willingness to pay evidence and its relevance in project appraisal shows the impact of crowding on travel time has been investigated in almost all studies, and the common finding is that travelling in crowded conditions leads to increased values of travel time savings. In economic evaluations of public transportation, treating the WTP for crowding reductions in all of its many definitional phases has become as important as valuing journey time savings and trip time variability or reliability.

The willingness to pay among users depends on two main factors. According to Stobierski (2020), this variance is often caused by differences in the customer population, typically classified as either extrinsic or intrinsic. Extrinsic distinctions are discernible. They are factors about a person that can generally be determined without having to speak with them directly. Age, gender, income, education, and location can all be extrinsic factors affecting a customer's willingness to pay. Whereas, intrinsic differences, on the other hand, are traits about a person that can't be learned about without personally asking them. They are difficult to observe and are frequently referred to as "unobserved disparities." The risk tolerance of an individual, their need to fit in with others, and their level of passion for a certain subject are all instances of innate variations that might affect their readiness to pay.

In addition to extrinsic and intrinsic differences, numerous factors can cause a customer's willingness to pay to rise or fall. Economics for Managers (2020) states that customers worry about more than just price. When it comes to legality, packaging, and brand recognition, they may also be significant. In addition, when a consumer has an urgent need that our product or service can fulfil, they may be willing to pay a higher price. Likewise, when there is a shortage of supplies, whether real or perceived, people may be willing to pay a higher price than when there is an abundance.

	0%	5%	10%	15%	20%	25%	30%	35%	40%	45%	>50%	Unanswered
Ride hailing	493	113	130	37	53	21	14	2	2	1	27	92
Moped scooter sharing	598	77	82	21	31	12	16	0	1	0	18	128
Carsharing	551	98	115	25	50	16	16	1	3	1	38	71
Bikesharing/ kick scooter sharing	467	115	131	28	46	28	15	3	6	22	12	110
Public transport	303	142	197	56	85	29	31	4	1	1	88	47
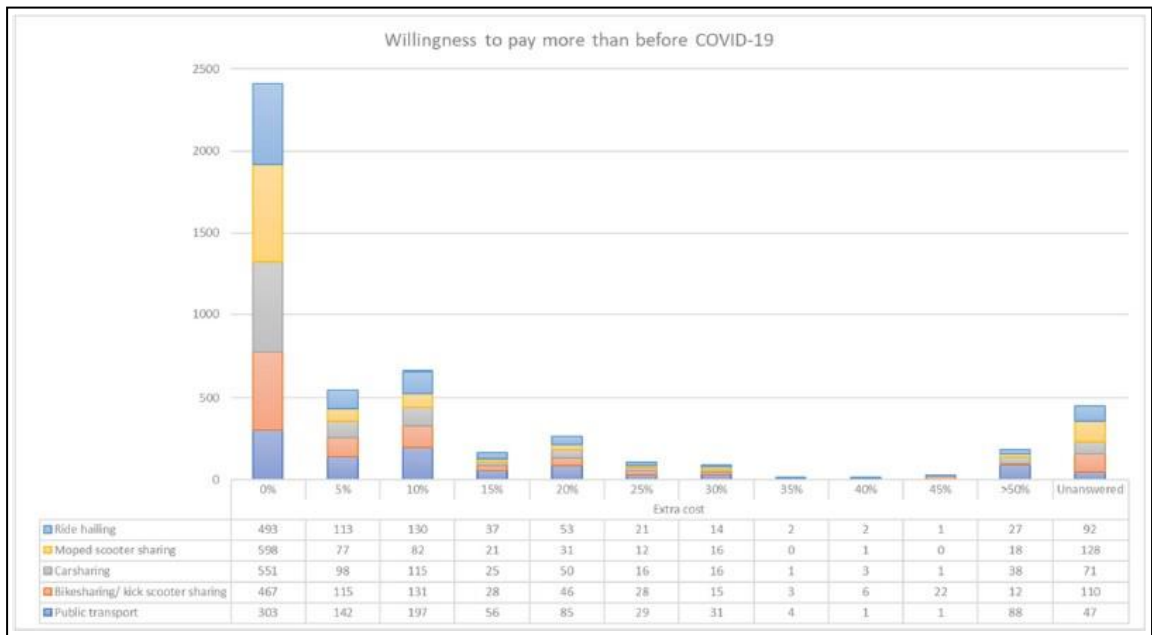
Figure 2.4   Willingness to pay more for special sanitizing measures during

COVID-19 pandemic

(Source: Nunez, 2021)

Research in Spain was conducted to explore individuals' willingness to use and pay for using public transport and shared mobility services given a set of COVID-19 safety measures to be implemented after the lockdown. Figure 2.4 shows that public transport is the alternative that people are most willing to use. 89.7 percent of respondents indicated that they would use these services in the post-COVID-19 era. Around 64.3 percent of total respondents stated that they would pay more for public transportation services in the post-COVID-19 era if operators took sanitizing measures (Nunez, 2021). Furthermore, increasing supply to reduce crowding (70.6 percent) and increasing cleanliness and sanitization (52.1 percent) are the primary actions demanded by public transport users to use this mode.52.9 percent and 40.0 percent of these

people would pay more if the operators increased supply and cleaned up their operations, respectively.

These findings may indicate that individuals do not consider public transportation a harmful means of transit in terms of sanitary conditions, or that they are captives of this mode of transport and would use it anyhow. However, the findings show the willingness to pay for a particular measure against COVID-19 is low. Only 36.4 percent and 27.5 percent of potential users, respectively, would pay more for requested measures such as masks, gloves, and sanitizer gels.

According to Safitri (2016), who evaluated public transportation rates, increasing public interest in public transportation can be accomplished by modifying the degree of service. Furthermore, the findings from Cirillo, Eboli, and Mazulla (2011) show that evaluations from bus users showed a high willingness to pay for timely bus services. Additionally, the care for user views is emphasized by Vilakazi and Govender (2014). The findings have consequences for service providers, relevant government agencies, and others who need to understand commuter attitudes and develop suitable initiatives to improve the situation.

Another study was conducted in Thailand to explore the perceived usefulness of enhanced disinfection technology, specifically aerosol hydrogen peroxide disinfection, on intentions to use public transportation and willingness to pay (WTP) for the technology. According to surveys regarding the WTP, a premium for the fare to enhance disinfection of public buses, a majority of respondents (67.2 percent) were willing to pay the premium. Sanitation on public buses is a major issue, with 99 percent of respondents expressing a strong desire for cleanliness (Jangtawee et al., 2021).

According to Roman (2020), there has been an increase in the usage of enhanced disinfection technology in public transport, for example, the automatic aerosolization of hydrogen peroxide to disinfect the bus. While a previous study indicates that cleanliness influences the quality of service, it is not the primary criterion considered by passengers. The pandemic has heightened public awareness of the critical nature of hygiene. However, this study discovered that just 83% of respondents planned to use public transportation. This could be because the majority of respondents in this study are employed and may have to travel to work from their homes. As expected, passengers impose a strong weight on the benefits of enhanced disinfection, which is critical for public transportation operators to consider when implementing disinfection. Only half of the respondents expressed confidence in their ability to board a clean and disinfected bus. This could be because a majority of modern public buses have not been extensively disinfected.

2.4   Strategies and Safety Measures for COVID-19

From recent studies, it was noticed that users were relatively hesitant to use shared modes of transport, particularly public transportation, owing to the risk of contagion associated with their use. Users' perceptions of the virus-resistance of modes of transport influence their decisions. Thus, in order to secure the successful recovery of the public transport sector, it is vital to implement suitable hygienic measures to ensure users' virus-resistance. Additionally, users' perceptions of safety must be favorable, which necessitates effective communication initiatives informing travelers that suitable hygiene measures are being implemented.

A research paper was carried out by China to introduce experience of the prevention and control measures for public transportation in China to promote a global response to COVID-19 (Shen et al., 2020). To combat the rapid spread of infections, several steps have been implemented to prevent viral spread in public transportation and passenger terminals, including ventilation and sanitation of public transportation vehicles and passenger terminals; routine disinfection; mask use; hand hygiene; and maintaining social distance.

According to Shen et al. (2020), daily cleaning and disinfection of passenger terminals, waiting areas, and public facilities is recommended. Following each journey, the inside surface of public transportation must be cleaned and disinfected. The interior surface of the container can be disinfected by spraying or wiping with a disinfectant containing 250–500 mg/L chlorine or wiping with an efficient disinfecting wipe. In addition, the frequency of cleaning and disinfecting surfaces with a high frequency of contact should be increased. Seat covers and other textiles should be kept clean, washed, and disinfected regularly.

Personal protection measures, including those for workers and passengers in public facilities, should be developed in accordance with SARS-CoV-2 transmission routes and disinfection standards. Given that SARS-CoV-2 is mostly transmitted by respiratory droplets and close contact, three primary techniques for personal protection are mask use, hand cleanliness, and maintaining a safe social distance (more than 1 m) when using public transportation (Leung et al., 2020). In addition, hands should be cleansed thoroughly under running water or with a hand sanitizer. On the other hand, a minimum of a one-meter social distance must be maintained at all times. Thus, the usefulness of these methods has been demonstrated by Chu et al. (2020), and there is

no doubt that they will aid in the battle to prevent the spread of COVID-19. The prevention and control of disease on public transportation is critical when the world's economies resume output.

2.5 Summary

Overall, this study aims to identify the willingness to pay for extra safety measures while using public transport services during the COVID-19 pandemic. This research is focusing more on factors affecting willingness to pay for safety and comfort for public transport services in order to develop a better policy for mobility and to rebuild the public transport system in Malaysia after the COVID-19 pandemic. By knowing the public's response to service quality, the government will be able to evaluate and determine the right policies, Pujiati et al. (2019).

CHAPTER 3

METHODOLOGY

3.1   Introduction

This proposed research project is to identify the willingness to pay for extra safety measures while using public transport services during the COVID-19 pandemic. This chapter presented the design procedure, data collection, tool and equipment utilization, and analysis methods applied throughout the project. In a study, the methodology is essential because it defines the important methods and processes used to conduct the research and enables it to be implemented and adapted by others in the future.

3.1.1   Flow Chart of Methodology

Figure 3.1 shows the first step in the research was identifying the research gap. Next was performing the literature review. A set of questionnaires was prepared and distributed to gather the information for these studies. The results obtainedare analyzed by using the software which is Software Package Statistical Product and Service Solution (SPSS). The result was analyzed based on descriptive analysis, Pearson correlation, and regression analysis. The final stage of the methodology flow chart is the conclusion, which is to conclude the obtained discussion and findings and include several recommendations for further study.
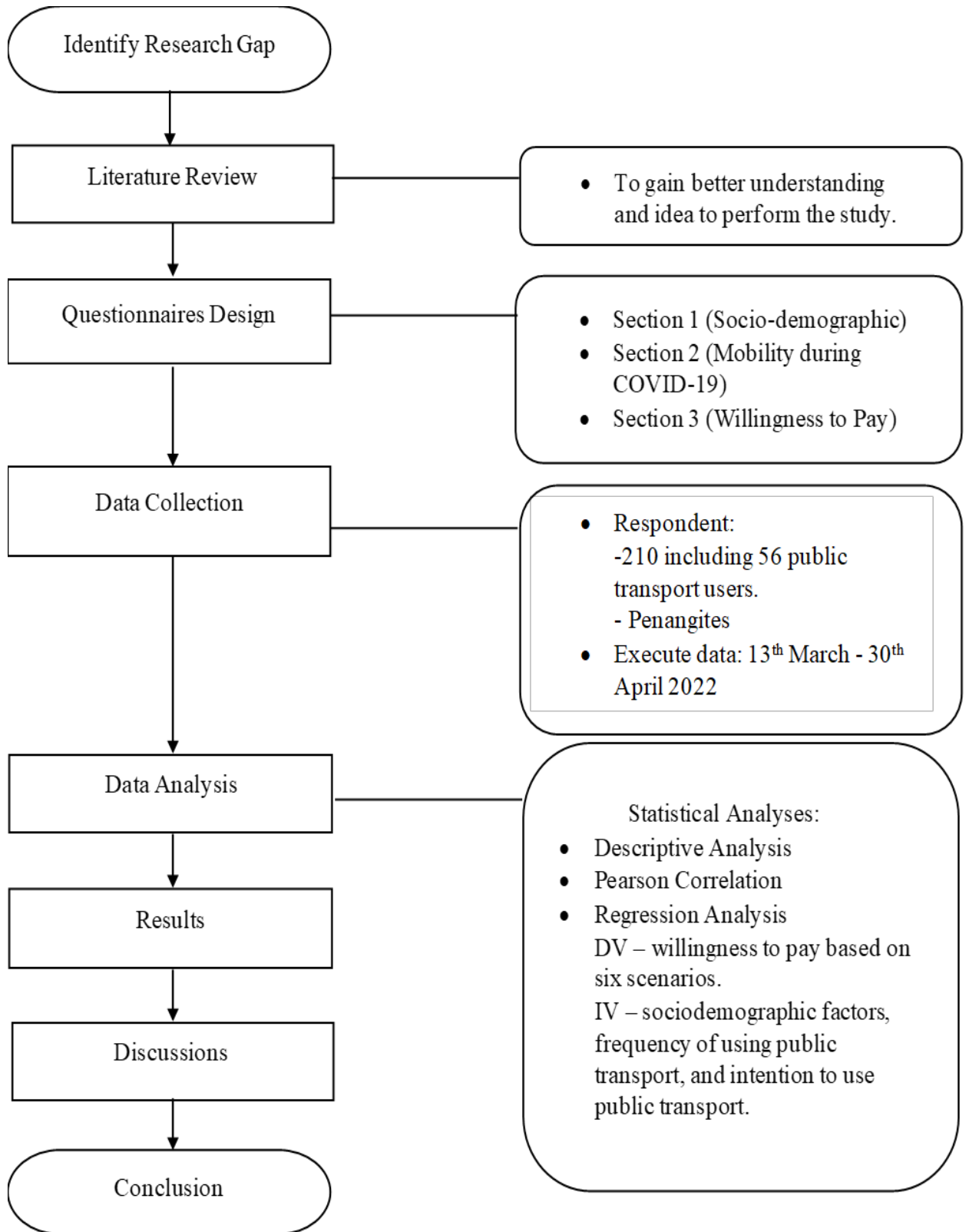
Figure 3.1: The flow chart of the methodology of this study.

3.2 Area of Study and Public Transport Characteristics

This study examines a geographical region that encompasses the entires state of Penang, which is divided into five primary districts. Because the Rapid Penang bus is the most popular mode of public transportation in Penang, this city has been selected as the focus of the investigation. According to Rapid Penang (2021), the company has been operating as a provider of public transportation in the city of Penang since 2007. Within the city of Penang, Rapid Penang offers 49 routes and 1,909 bus stops. The island of Penang is home to 30 of these routes, while the mainland portion of Penang, known as Seberang Perai, is home to 19 of them. Rapid Penang also operates three cross-strait lines, which are typically referred to as BEST (Bridge Express Shuttle Transit) routes, between Bayan Lepas on Penang Island and Seberang Perai. These routes are primarily intended to cater to industrial workers who travel to the Bayan Lepas Free Industrial Zone on a daily basis.

3.3 Questionnaire Design

The questionnaire survey is an important instrument used to obtain a variety of information on the properties of any aspect, behavior, beliefs, and reasons for any action (Bulmer, 2004). A set of questionnaires had been developed with adaptation and adoption from a previous study to ensure the objective of conducting the survey could be achieved. Some of the items were adopted from Awad-Nunez et al., (2021). The items consist of multiple-choice answers to ease the respondent when answering the questionnaire.

The survey was structured into three main sections: (1) socio-demographic information, (2) mobility behavior during the COVID-19 pandemic, and (3)

22

willingness to pay an extra charge for increasing safety while using public transport post COVID-19 pandemic. The survey consists of questions which characterize individuals' socio-demographic and mobility behavior, including travel frequency based on the intention to use public transport. In section 2, the Likert scale is being used to explore the intention of using public transport in the future. The Likert scale for the answer is from no intention (1) to high intention (5).

Next, the questions in section (3) imposed some potentially implemented measures. These measures are related to possible post-COVID-19 adaptations of public transport services by the PT operators. Therefore, these questions foresee individuals' acceptance of each measure and their willingness to pay if they involve an extra cost that the transport operator transfers to the user. A pilot study was conducted to ensure the suitability of the questionnaire.

3.4 Pilot Study

Pilot studies were conducted to identify potential practical problems in the research procedure as well as the suitability of the questionnaire to the respondents. Firstly, the questionnaire was distributed to 15 respondents who were picked randomly from the age, gender, and residential location. The respondents were asked to answer the survey and give their feedback on their understanding of the research conducted to ensure the objectives of the study could be achieved.

The items included in the questionnaire were selected in accordance with the objective of the project. Once the pilot study has been carried out, some adjustment to the questionnaire is needed with regard to the feedback given by the respondents. The

final questionnaire was improvised by removing the unnecessary item. Refer to the final questionnaire in Appendix A.

3.5   Questionnaire Survey

A survey based on willingness to pay has been carried out. Due to circumstances during lockdown conditions, neither face-to-face nor interviews were feasible for this research. Therefore, the questionnaire was created via online surveys. Hence, it is a self-reported survey. However, after new SOP's were introduced by the government, effective on 1st April 2022, the data collection was carried out concurrently via online and on-site interviews. Several places like public transport hubs in Penang have been chosen to conduct the on-site survey, such as KOMTAR, ferry terminal, and Sungai Nibong. The required information was collected from 13th March to 30th April 2022. This study managed to collect data from 210 respondents.