

The copyright © of this thesis belongs to its rightful author and/or other copyright owner. Copies can be accessed and downloaded for non-commercial or learning purposes without any charge and permission. The thesis cannot be reproduced or quoted as a whole without the permission from its rightful owner. No alteration or changes in format is allowed without permission from its rightful owner.



**FACTORS INFLUENCING ROAD USERS' SATISFACTION FROM BUKIT
KAYU HITAM TO ALOR SETAR, KEDAH**



**NUR FARIHATUL SOLEHAH BINTI ABDUL MALIK
(830497)**

**A Research Paper Submitted to the
College of Business Universiti Utara Malaysia,
in Partial Fulfillment of The Requirement for The Master of Sciences
(Transportation and Logistics Management)**



Kolej Perniagaan
(College of Business)
Universiti Utara Malaysia

PERAKUAN KERJA TESIS / DISERTASI
(Certification of thesis / dissertation)

Kami, yang bertandatangan, memperakukan bahawa
(We, the undersigned, certify that)

NUR FARIHATUL SOLEHAH BINTI ABDUL MALIK

calon untuk Ijazah **MASTER OF SCIENCE (TRANSPORTATION & LOGISTICS MANAGEMENT)**
(candidate for the degree of)

telah mengemukakan tesis / disertasi yang bertajuk:
(has presented his/her thesis / dissertation of the following title)

**FACTORS INFLUENCING ROAD USER SATISFACTION FROM BUKIT KAYU HITAM TO ALOR
SETAR, KEDAH**

seperti yang tercatat di muka surat tajuk dan kulit tesis / disertasi.
(as it appears on the title page and front cover of the thesis / dissertation).

Bahawa tesis/disertasi tersebut boleh diterima dari segi bentuk serta kandungan dan meliputi bidang ilmu dengan memuaskan, sebagaimana yang ditunjukkan oleh calon dalam ujian lisan yang diadakan pada:

03 April 2024.

(That the said thesis/dissertation is acceptable in form and content and displays a satisfactory knowledge of the field of study as demonstrated by the candidate through an oral examination held on:

03 April 2024

Pengerusi Viva
(Chairman for Viva)

: **Dr. Chuah Lai Fatt**

Tandatangan
(Signature)

Pemeriksa Dalam
(Internal Examiner)

: **Dr. Chuah Lai Fatt**

Tandatangan
(Signature)

Pemeriksa Dalam
(Internal Examiner)

: **En. Zulkufli bin Aziz**

Tandatangan
(Signature)

Tarikh: **03 April 2024**
Date:

Nama Pelajar
(Name of Student)

: **Nur Farihatul Solehah binti Abdul Malik**

Tajuk Tesis / Disertasi
(Title of the Thesis / Dissertation)

: **Factors Influencing Road User Satisfaction from Bukit Kayu Hitam to Alor Setar, Kedah**

Program Pengajian
(Programme of Study)

: **Master of Science (Transportation & Logistics Management)**

Nama Penyelia/Penyelia-penyelia
(Name of Supervisor/Supervisors)

: **Dr. Md. Abdul Kafi**



Tandatangan

Nama Penyelia/Penyelia-penyelia
(Name of Supervisor/Supervisors)

: -

Tandatangan



UUM
Universiti Utara Malaysia

PERMISSION TO USE

In presenting this dissertation/project paper in partial fulfillment of the requirements for a Post Graduate degree from the Universiti Utara Malaysia (UUM), I agree that the Library of this university may make it freely available for inspection. I further agree that permission for copying this dissertation/project paper in any manner, in whole or in part, for scholarly purposes may be granted by my supervisor(s) or in their absence, by the Director of Postgraduate Studies Unit, College of Business where I did my dissertation/project paper. It is understood that any copying or publication or use of this dissertation/project paper parts of it for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the UUM in any scholarly use which may be made of any material in my dissertation/project paper.

Request for permission to copy or to make other use of materials in this dissertation/project paper in whole or in part should be addressed to:

Director of Postgraduate Studies Unit, College of Business



Universiti Utara Malaysia

06010 UUM Sintok

Kedah Darul Aman

Universiti Utara Malaysia

ABSTRACT

In the realm of road transportation, service quality has gained paramount importance due to the heightened awareness and expectations of road users. Organizations involved in road infrastructure have been prompted to prioritize and enhance the quality of their services to meet these evolving demands. Road users now expect efficient, safe, and well-maintained roads, along with effective traffic management and support services, which not only ensure satisfaction but also foster greater loyalty. It is widely acknowledged that service quality plays a critical role in enhancing customer satisfaction. Besides, there are limited studies conducted focus on service quality and customer satisfaction quantitatively. Therefore, this study is set forth to investigate the factors that influence road user satisfaction from Bukit Kayu Hitam to Alor Setar, Kedah. By using non-probability sampling techniques, 363 questionnaires were distributed by face-to-face interview to road users who are situated in the urban areas of selected districts in Kedah. Based on the correlation results, this study reveals that service quality factors (reliability, responsiveness and tangibles) and customer satisfaction factors (road sign and safety) significantly influence road user satisfaction. In addition, a multiple regression analysis has highlighted that safety plays the most critical role in influencing road user satisfaction due to the heightened awareness and expectations of road users. These results underscore the importance of prioritizing improvements in reliability, responsiveness, and safety measures along the route to enhance road users' satisfaction and promote tourism and economic development in the region. Future efforts should focus on addressing these key areas to ensure a positive experience for road users and stimulate growth in the Bukit Kayu Hitam area.

Keywords: Service Quality, Customer Satisfaction, Road User Satisfaction

ABSTRAK

Dalam bidang pengangkutan jalan raya, kualiti perkhidmatan telah menjadi sangat penting berikutan peningkatan kesedaran dan jangkaan pengguna jalan raya. Organisasi yang terlibat dalam infrastruktur jalan raya telah digesa untuk mengutamakan dan meningkatkan kualiti perkhidmatan mereka untuk memenuhi permintaan yang semakin berkembang ini. Pengguna jalan raya kini mengharapkan jalan raya yang cekap, selamat dan diselenggara dengan baik, bersama-sama pengurusan trafik dan perkhidmatan sokongan yang berkesan, yang bukan sahaja memastikan kepuasan tetapi juga memupuk kesetiaan yang lebih tinggi dan diakui secara meluas bahawa kualiti perkhidmatan memainkan peranan penting dalam meningkatkan kepuasan pelanggan. Selain itu, terdapat kajian terhad yang dijalankan difokuskan kepada kualiti perkhidmatan dan kepuasan pelanggan secara kuantitatif. Oleh itu, kajian ini bertujuan untuk mengkaji faktor-faktor yang mempengaruhi kepuasan pengguna jalan raya dari Bukit Kayu Hitam ke Alor Setar, Kedah. Dengan menggunakan teknik persampelan bukan kebarangkalian, 363 soal selidik telah diedarkan secara temu bual secara bersemuka kepada pengguna jalan raya yang terletak di kawasan bandar di daerah terpilih di Kedah. Berdasarkan keputusan korelasi, kajian ini mendedahkan bahawa faktor kualiti perkhidmatan (kebolehpercayaan, responsif dan ketara) dan faktor kepuasan pelanggan (tanda jalan dan keselamatan) secara signifikan mempengaruhi kepuasan pengguna jalan raya. Di samping itu, analisis regresi berganda telah menyerlahkan bahawa keselamatan memainkan peranan paling kritikal dalam mempengaruhi kepuasan pengguna jalan raya disebabkan oleh peningkatan kesedaran dan jangkaan pengguna jalan raya. Keputusan ini menggariskan kepentingan untuk mengutamakan penambahbaikan dalam kebolehpercayaan, tindak balas dan langkah keselamatan di sepanjang laluan untuk meningkatkan kepuasan pengguna jalan raya dan menggalakkan pelancongan dan pembangunan ekonomi di rantau ini. Usaha masa depan harus menumpukan pada menangani bidang utama ini untuk memastikan pengalaman positif bagi pengguna jalan raya dan merangsang pertumbuhan di kawasan Bukit Kayu Hitam.

Kata Kunci: Kualiti Perkhidmatan, Kepuasan Pelanggan, Kepuasan Pengguna Jalan Raya

DECLARATION

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; and any editorial work, paid or unpaid, carried out by a third party is acknowledged.



ACKNOWLEDGEMENTS

In the name of Allah S.W.T, the Most Gracious and the Most Merciful, I thank You for the strength You have given me in order to complete this thesis and my master's degree study.

First and foremost, I would like to express my sincere gratitude and appreciation to my supervisor, Dr. Md. Abdul Kafi, for his constructive ideas, wisdom, guidance, and patience throughout the journey in completing this research paper. His insights and encouragement have been a constant source of inspiration and he has successfully guided me to improve my research skills and academic writings.

Next, I would like to deliver my deepest respect, heartfelt thankfulness, unwavering love, understanding, and patience to my parents and family members especially to Puan Sharmila and Encik Abdul Malik. Thank you for all your prayers and love. Your belief in me has been a source of strength, propelling me forward even in the face of challenges.

I am also grateful to my friends and colleagues for their support and encouragement throughout this process. Your feedback and encouragement have been invaluable in refining my ideas and pushing me to strive for excellence. I also would like to acknowledge the assistance of Nur Amirah and Siti Kamilah for their valuable contributions. Your expertise and dedication have significantly enhanced the quality of this work.

I extend my appreciation to my fellow respondents, I would like to give a special gratitude for your cooperation of time and insights during my data collection process. Your involvement has enriched the research and added depth to its findings.

Lastly, I would like to thank UUM staff and lecturer in STML, whose work has laid the foundation for this project. Your pioneering efforts have paved the way for new discoveries, and I am grateful for the opportunity to build upon your legacy.

To all those mentioned and the many others who have supported me along the way, thank you for being part of this journey. Your contributions have made a meaningful difference, and I am deeply grateful for your generosity and support.

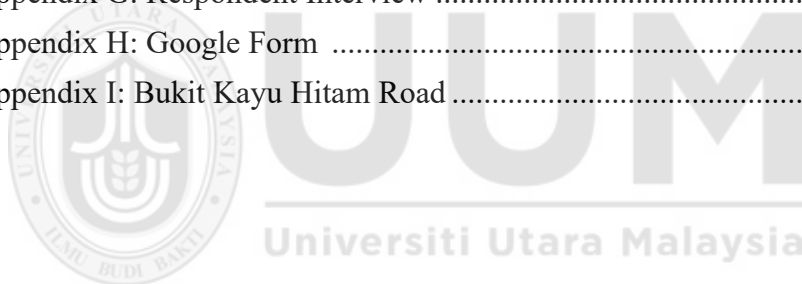
Table of Contents

Certification	i
Permission To Use	iii
Abstract (English Version)	iv
Abstrak (Malay Version)	v
Declaration	vi
Acknowledgements.....	vii
Table of Contents.....	viii
List of Tables.....	xii
List of Figures.....	xiii
List of Abbreviation	xiv
CHAPTER ONE: INTRODUCTION	1
1.0 Introduction.....	1
1.1 Background of Study	3
1.2 Problem Statement	5
1.3 Research Objectives	8
1.4 Research Question.....	8
1.5 Scope of Research	9
1.6 Significance of the Study	9
1.7 Key Definition of Terms	10
CHAPTER TWO: LITERATURE REVIEW	13
2.1 Introduction.....	13
2.2 Definition and Concept of Variables	13
2.2.1 Reliability.....	13
2.2.2 Responsiveness	14
2.2.3 Tangibles	15
2.2.4 Road sign	16
2.2.5 Safety	17

2.2.6 Road user satisfaction	18
2.3 Underpinning theory	18
2.3.1 Service quality (SERVQUAL).....	20
2.3.2 Customer Satisfaction	21
2.4 Research Framework.....	22
2.5 Hypotheses Development.....	24
2.5.1 Reliability and road user satisfaction	24
2.5.2 Responsiveness and road user satisfaction	25
2.5.3 Tangibles and road user satisfaction	25
2.5.4 Road sign and road user satisfaction.....	26
2.5.5 Safety and road user satisfaction	27
2.6 Chapter Summary.....	28
 CHAPTER THREE: METHODOLOGY	29
3.1 Introduction	29
3.2 Research Design.....	29
3.3 DataCollection	31
3.3.1 Sampling Techniques	31
3.3.2 Population	32
3.3.3 Sample Size.....	32
3.4 Research Instrument.....	33
3.4.1 Questionnaire Design.....	33
3.4.2 Measurement of Variable	35
3.5 Data Analysis	36
3.6 Summary	38
 CHAPTER FOUR: DATA ANALYSIS AND FINDINGS	39
4.1 Introduction	39
4.2 Respondents Profile	39
4.3 Descriptive Analysis.....	41

4.4 Reliability Test	43
4.5 Correlation Analysis.....	44
4.5.1 Reliability.....	44
4.5.2 Responsiveness	45
4.5.3 Tangibles	45
4.5.4 Road sign	46
4.5.5 Safety	46
4.6 Multiple Regression Analysis	47
4.7 Summary of the Hypothesis Testing	51
4.8 Summary of Chapter	52
 CHAPTER FIVE: DISCUSSIONS AND CONCLUSION	53
5.1 Introduction	53
5.2 Discussion of Findings.....	53
5.2.1 Demographic Characteristic	54
5.2.2 Identify the relationship Between Service Quality Factors and Customer Satisfaction on Road User Satisfaction.....	56
5.2.2.1 The Relationship Between Service Quality Factors on Road User Satisfaction.....	56
5.2.2.2 The Relationship Between Customer Satisfaction Factors on Road User Satisfaction.....	57
5.2.3 Investigates the Effect of Tangibles, Reliability, Responsiveness, Road sign, Safety on Road user Satisfaction.	58
5.2.3.1 The Relationship Between Reliability on Road User Satisfaction	58
5.2.3.2 The Relationship Between Responsiveness on Road User Satisfaction.....	61
5.2.3.3 The Relationship Between Tangibles on Road User Satisfaction.....	62
5.2.3.4 The Relationship Between Road sign on Road User Satisfaction	63
5.2.3.5 The Relationship Between Safety on Road User Satisfaction	65
5.3 Implications of Study	66
5.3.1 Theoretical Contribution.....	66
5.3.2 Practical Contribution	67
5.4 Limitation of the Study	68
5.5 Recommendations for Future Research	68

5.5.1 Technology Integration	68
5.5.2 Policy Analysis	69
5.6 Conclusion	70
References	71
APPENDICES	78
Appendix A: Questionnaire	78
Appendix B: Descriptive Analysis of Respondents' Demographic Profiles.....	83
Appendix C: Descriptive Statistics of the Variables	86
Appendix D: Reliability Test	88
Appendix E: Correlation Test	90
Appendix F: Multiple Regression Analysis	91
Appendix G: Respondent Interview	93
Appendix H: Google Form	94
Appendix I: Bukit Kayu Hitam Road	95



List of Tables

Table 3.1 Questionnaire Items.....	34
Table 3.2 Five Points Likert Scale	36
Table 4.1 Respondents Profile.....	40
Table 4.2 Descriptive Statistics	42
Table 4.3 Reliability Test	43
Table 4.4 Reliability Correlation Analysis	44
Table 4.5 Responsiveness Correlation Analysis.....	45
Table 4.6 Tangibles Correlation Analysis	45
Table 4.7 Road sign Correlation Analysis.....	46
Table 4.8 Safety Correlation Analysis.....	46
Table 4.9 Model Summary	47
Table 4.10 ANOVA.....	48
Table 4.11 Collinearity Statistics	49
Table 4.12 Coefficients of Multiple Regression Analysis.....	50
Table 4.13 Summary of the Hypothesis Testing	51

List of Figures

Figure 1.1: North-South Expressway Map	3
Figure 1.2: Bukit Kayu Hitam City Landmark	3
Figure 2.1: SERVQUAL Model.....	20
Figure 2.2: Research Framework.....	23
Figure 3.1: Flow Process of Data Collection.....	30



List of Abbreviation

ASEAN	Association of Southeast Asian Nations
BKH	Bukit Kayu Hitam
CS	Customer Satisfaction
DV	Dependent Variables
FHWA	Federal Highway Administration
H	Hypothesis
IV	Independent Variables
M	Mean
MLR	Multiple Linear Regression
N	Neither Satisfied Nor Satisfied
PWD	Public Work Department
REL	Reliability
RES	Responsiveness
RO	Research Objective
RQ	Research Question
RS	Road Sign
RUS	Road User Satisfaction
S	Satisfied
SAF	Safety
SD	Standard Deviation
SERVQUAL	Service Quality
SPSS	Statistical Package for the Social Sciences
STML	School of Technology Management and Logistics
TAN	Tangibles
U	Unsatisfied
UUM	Universiti Utara Malaysia
VIF	Variance Inflation Factor
VS	Very Satisfied
VU	Very Unsatisfied

CHAPTER ONE

INTRODUCTION

1.0 Introduction

The transportation infrastructure, particularly the road network, is the lifeblood of modern societies, connecting people, goods, and services across huge geographical areas. Geographers have long recognized its critical role, analyzing its spatial organization and the dynamics of its linkages. Skorobogatova (2017) highlights the indispensable nature of transportation accessibility in urban settings, where efficient road systems are important for the smooth functioning of daily life. Within this context, various modes of land transportation, from cars to buses to trains, serve as vital conduits for mobility, enabling individuals to navigate both urban centers and remote regions with ease.

Moreover, Rifai (2022) shed light on the basic relationship between well-maintained road infrastructure and user satisfaction, emphasizing the importance of meeting user needs and expectations to enhance overall service quality and satisfaction levels. By understanding the intricate interplay between infrastructure providing and user experience, policymakers and planners can strive towards creating more efficient, accessible, and user-centric transportation systems that underpin socioeconomic development and foster societal integration.

In the realm of road transportation, as emphasized by Jamal (2018) service quality has gained paramount importance due to the heightened awareness and expectations of road users. Organizations involved in road infrastructure have been prompted to prioritize and enhance the quality of their services to meet these

evolving demands. Road users now expect efficient, safe, and well-maintained roads, along with effective traffic management and support services, which not only ensure satisfaction but also foster greater loyalty. Consequently, road authorities and transportation agencies are increasingly focusing on improving service quality to enhance the overall user experience, promote safety, and build enduring relationships with road users.

This emphasis on meeting user expectations is crucial for ensuring satisfaction and loyalty, underscoring the fundamental objective of road infrastructure management and transportation services. As highlighted by Ngo (2016), while the conceptualization of the service quality-satisfaction relationship may vary, it's widely acknowledged that service quality plays a critical role in enhancing customer satisfaction, and is essential for the longevity and success of road infrastructure and transportation services in today's competitive market (Cosmas, 2019).

Therefore, this research will study on service quality in relations towards user satisfaction among road users from Bukit Kayu Hitam to Alor Setar, Kedah will be conducted. This review will focus on several scopes of service quality and user satisfaction such as the reliability, responsiveness, tangibles, safety and road sign to measure and evaluate the satisfaction of the relationship. In addition, this study is expected to be the medium of information to the road authority for the profound understanding on the road users' expectation in order to develop an appropriate guideline or action plan for future development and expects to show the importance of road management.

1.1 Background of Study



Figure 1.1:
North-South Expressway Map
Source: PLUS Malaysia Berhad (2023)

The road system in Malaysia covers approximately 210,658 km, of which 79% is covered and 1,969 km are freeways. The road network covers three separate networks specifically Malaysian Federal Roads System, Malaysian State Roads System and Malaysian Expressways System (PWD, 2024).



Figure 1.2:
Bukit Kayu Hitam City Landmark
Source: Nur Farihatul Solehah (2024)

This study covered the small town of Bukit Kayu Hitam of a 36 square kilometre area, located in Malaysia's Kubang Pasu District, it is 48 kilometres north of Alor Setar, capital city of Kedah state. The biggest border town of Kedah on the Thailand and Malaysia's border is Bukit Kayu Hitam also represents the starting point of the Federal Route 1 and the North-South Expressway are the longest roads in Malaysia covering over 772 km to the Singapore border in Johor Bahru and passes seven states that is Johor, Melaka, Negeri Sembilan, Selangor, Perak, Penang, and Kedah (Anuar, 2018).

Almost 80% of the logistics of freight in the country are made easier by the Malaysian Road system (Jeevan, 2017). This economic development of the western Peninsular Malaysia is based on this expressway, which connects many major cities and towns. This infrastructure service is valuable because it offers faster alternate routes between different locations and cuts down on travel time. As service products, highways play an important and strategic part in the community's transportation of services. Providing the community's roads is a basic requirement for government as a kind of community service that helps in citizens' regular mobilization and transportation needs.

Road transportation is dominated by Bukit Kayu Hitam. According to bilateral trade data between Malaysia and Thailand from 2007 to 2022, RM11 billion worth of goods and services were passed through Bukit Kayu Hitam. This constituted roughly 65% of the entire road transport-based joint trade values between Malaysia and Thailand. Thus, in terms of land transportation, Bukit Kayu Hitam has a comparative benefit. This is further reinforced by the fact that Bukit Kayu Hitam is located on the planned ASEAN Highway

Network, which runs from Singapore to Malaysia and includes the PLUS Highway, which is primarily used for long-distance transportation (Salleh, 2022).

Despite being a developing residential area, Bukit Kayu Hitam remains important due to its border location and infrastructure. As the starting point of the North-South Expressway, it has a unimodal inland port that facilitates the processing and clearance of numerous containers through customs. Bukit Kayu Hitam has been designated as a free commercial zone in accordance with the Free Zone Act 438. Numerous logistic companies and wholesalers have been established within the trade centre area, situated in the northeastern section of the city, as a result of these infrastructures. Trade and commerce activities involving different modes of transportation, particularly private vehicles and truck drivers, will expand in the region as a result of the increase in the bilateral flow of people and vehicles through Bukit Kayu Hitam and Sadao.

1.2 Problem Statement

The journey from Bukit Kayu Hitam to Alor Setar in Kedah, Malaysia, is a vital corridor connecting regions, facilitating trade, commerce, and everyday commuting. However, the satisfaction of road users traversing this route is influenced by various factors that affect users' experience.

The dynamics of road traffic interactions involve a multitude of factors that shape driving behaviours and interactions among road users. As highlighted in research by Elvik (2014) and Sucha (2017), road traffic

interactions encompass elements of coordination, collaboration, competition, and negotiation, akin to human interactions in general.

As observed by Theeuwes (2017), drivers adapt their behaviour in response to the demands of driving tasks and the conditions of road infrastructure. This adaptation involves conscious adjustments in driving speed, lane choice, and following distance to maintain a suitable level of task difficulty. However, challenges such as inadequate road conditions or congestion may prompt drivers to engage in non-normative behaviours like aggressive driving or distracted driving in order to navigate the situation effectively or achieve their goals efficiently. Unfortunately, such behaviours can introduce safety risks and compound the difficulties associated with deficiencies in road infrastructure.

Existing roads may struggle to keep pace with growing traffic demands, leading to congestion, delays, and safety concerns. The national road authority in the Netherlands, is responsible for the design and implementation of road network infrastructure in Netherlands. Some of these measures are design to facilitate, with optimum use of existing cross-section. Example are the use of the hard shoulder in peak hours and dynamic or dual mode marking. Other measures are flexible and adjustable speed limits and ramp metering. The success of traffic management depends on the measure taken and on the reaction of the road users. Unfortunately, the result has shown that the effects of particular measures did not always meet the expectations (Theeuwes, 2017).

The research by Deb (2017) highlights the potential of semi or fully autonomous vehicles to enhance traffic safety and mobility, driven by emerging

automotive technologies. These vehicles are equipped to perceive and analyse their surroundings, including road signs, other vehicles, and traffic conditions, to make informed decisions. However, these judgments relies heavily on the effectiveness of automated vehicle judgments hinges on camera, sensor, and radar functionality, with ongoing development focused on Fully Automated Vehicles (FAVs) to enhance safety and interaction with diverse road users. Research addresses FAV technology improvements, particularly in detecting cyclists, pedestrians, and motorcyclists (Häne, 2015). External interfaces for road user interaction are also under review (Peters, 2017). Vissers (2016) emphasizes that while automation advances, it cannot fully replace human drivers or accommodate all its limitations, highlighting the need to understand vulnerable road users' perspectives and the dynamic impact on safety.

For example, the integration of vehicles with high levels of automation into existing road infrastructure presents a significant challenge, as current infrastructure primarily caters to human drivers. Studies by Lengyel (2020) and Liu (2019) highlight the limitations of existing road systems in accommodating autonomous vehicles effectively. Unlike autonomous systems, human drivers possess an innate adaptability to navigate situations where traditional road markings and traffic signs are absent. Moreover, they demonstrate the ability to make complex real-time inferences and maintain acceptable driving behavior even when visibility is compromised, such as when obscured by large vehicles (Farah, 2018). Therefore, the research problem lies in devising strategies and modifications to current road infrastructure that enable seamless integration of highly automated vehicles while ensuring safety and efficiency akin to human-driven scenarios.

Improving road user satisfaction necessitates bridging the gap between existing infrastructure and user expectations. Evaluating and upgrading roads to meet user needs ensures efficient, safe, and convenient travel. However, current infrastructure often falls short, resulting in congestion, delays, and safety issues due to inadequate capacity to handle increasing traffic demands.

1.3 Research Objectives

The specific objectives of this study are;

- I. To explore the frequency of respondent characteristic and key variables
- II. To identify the relationship between service quality (tangibles, reliability, and responsiveness) and customer satisfaction (road sign and safety) in influencing road user satisfaction levels at Bukit Kayu Hitam.
- III. To investigate the effect of tangibles, reliability, responsiveness, road sign, safety on road user satisfaction.

1.4 Research Question

- I. What are the most common respondent characteristics and key variables?
- II. How do road user perceptions of service quality dimensions (tangibles, reliability, and responsiveness) regarding road signs and safety influence overall road user satisfaction levels in Bukit Kayu Hitam?
- III. Do tangibles, reliability, responsiveness, road sign and safety and road user satisfaction have a significant impact on each other?

1.5 Scope of Research

This study is to investigate and assess the satisfaction level of road users from Bukit Kayu Hitam to Alor Setar, Kedah with certain factors that influencing the road user satisfaction. The target respondents for this research are among road user from Bukit Kayu Hitam to Alor Setar, Kedah. This study will employ quantitative approach to gather the data from the respondent through questionnaires.

On top of that, this study will only survey the influence in term of service quality factors and customer satisfaction factors in Bukit Kayu Hitam. Service quality factors are factors that are related to the both customers and service providers. On the other hand, customer satisfaction factors are factors which are customer's requirements must be fulfilled. There are only three service quality factors selected in this study, which is tangibles, reliability and responsiveness. However, there are only two customer satisfaction factors employed, which are road sign and safety.

1.6 Significance of the Study

The contribution of these studies will increase road users' satisfaction level from the factors arise that resulting a better quality of service in the study area. The factors in this study important in advancing the literature on transportation planning, infrastructure development, quality of life, safety and policymaking. The findings of the research can guide in the development of policies and the selection of decisions concerning infrastructure management and transportation planning. Employing this data, policymakers can efficiently

allocate resources and put policies forward that resolve the most pressing issues that road users have pointed out. Moreover, many researchers can evaluate those factors in influencing road users' satisfaction include elements related to safety, convenience, and efficiency. Identifying these factors can help prioritize improvements that enhance safety and streamline traffic flow, leading to fewer accidents, reduced travel times, and overall improved user experiences.

In addition, the Bukit Kayu Hitam to Alor Setar route serves as a gateway to various tourist destinations and economic centres in Kedah. Improving road users' satisfaction along this route can encourage more people to visit the region, leading to increased tourism revenue and economic development. By understanding road users' satisfaction along the route can help identify areas where infrastructure improvements are needed. This could include widening roads, improving signage, adding rest areas, or addressing safety concerns. In identifying and addressing infrastructure needs and safety concerns, the industry can attract more travellers, promote economic growth, and ensure a positive experience for all road users.

1.7 Key Definition of Terms

In identifying the key definition of terms of:

- I. Reliability - Ability to provide service dependably and accurately.

The abilities of the service provider to regularly deliver accurate and dependable services and complete the task as required (Philip, 2018). According to Churchill

(1998) customers want dependable and consistent performance.

II. Responsiveness – Willingness to serve and provide prompt support.

The capacity of an organization to help its customers by offering prompt and effective service (Philip, 2018). Customers are also expecting that service and product providers will be willing and ready to take action (Churchill, 1998).

III. Tangibles – Physical facility appearance.

The definition of "tangibles," also known as "physical quality," relates to the appearances, with a focus on the physical spaces, personnel, tools and equipment, communication materials, or physical characteristics that are utilized in providing the service. Churchill (1998) cite the need for customers to consider the quality of the equipment, facilities, and communications utilized in the provision of the service or good.

IV. Road Sign – An iconic legal article written locally in a specific context.

A given road sign is an application of the legislator's message in a specific context and must be understood within the meaning of the exact driving goal that is being chosen. (Bazire, 2009).

V. Safety - Consists of feeling safe

Safety refers to the condition of being protected from harm, danger, or risk. It involves measures, precautions, and practices aimed at preventing accidents, injuries, or any form of harm to individuals, property, or the environment (Suanmali S. C., 2015).



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter explains a review of literature that is connected to the research topic. The hypotheses and the framework for understanding the relationship between reliability, responsiveness, tangibles, road sign, safety and road user satisfaction.

2.2 Definition and Concept of Variables

2.2.1 Reliability

The Oxford Advanced Learner's Dictionary (2016) defines "reliability" as "the quality of being likely to be correct or true". Put differently, it could refer to the degree of repeatability of results. This suggests that the study's results would be comparable if it were conducted again from start to finish. If the data is trustworthy, it can be relied upon to function correctly and demonstrate appropriate behaviour.

Other definitions of reliability that have been used in the past come from Condra (1993), who defined it as an element of a product that reveals whether or not it fulfils user expectations at the appropriate time. Another definition of reliability given by Stracener (1997) is a product's capacity to fulfil customer expectations for performance over an extended period of time.

According to the book Reliability Engineering, a product's or system's reliability is its capacity to operate as intended—that is, without failure and

within predetermined performance parameters for a predetermined amount of time, under the conditions of its life cycle. Product reliability is impacted by factors such as product quality. Defects in a product's material strength can lead to lower-than-expected life-cycle conditions, which can lead to failures and decrease product reliability. However, even if a product meets workmanship specifications, it may not be dependable despite its high quality. For instance, even though the materials match workmanship specifications, a product may eventually become unsuitable for operating or environmental conditions as a result of poor material selection. Additionally, it's possible that the workmanship specifications weren't chosen appropriately for the requirements of usage (Kapur, 2014).

Nonetheless, the factors that have been found to determine service quality are being dependable and consistent in one's performance, accurately billing, maintaining accurate records, and completing tasks on schedule are all examples of reliability.

2.2.2 Responsiveness

Responsiveness refers to their readiness or willingness to provide assistance and their promptness in doing so. The only paper that defines responsiveness clearly and establishes a model for it is Barclay (1996). According to the definition, responsiveness is the capacity to react forcefully and promptly to noteworthy occurrences, opportunities, or threats, particularly those originating from the external environment, in order to establish or preserve a competitive advantage.

This idea is equivalent to the definition of responsiveness found in another body of literature: customer responsiveness is defined by the marketing literature as the action performed in response to intelligence that is generated and distributed (Narver, 1994).

For example, Zaheer (1997) suggest that responsiveness is a critical capability in fast-paced environments and tie their concept of responsiveness to the speed of strategic decision making. Stalk (1988) agrees, arguing that responsiveness is an effect of using a time-based strategy. According to Das (1995), responsiveness is an organization's ability to quickly identify external opportunities while lessening the impact of threats.

Barclay (1996), Stalk (1988), Stalk G. a., (1990), and Bozarth (1996) concentrate on methods for achieving or facilitating responsiveness. These articles offer varying strategies for enhancing responsiveness to specific inputs. These problems can be summed up as follows: the requirement for capabilities that indicate more than just the presence of useful abilities and the requirement for distinct abilities to react to various drivers.

2.2.3 Tangibles

The term "tangibles" refers to a service quality measurement that takes into account the physical characteristics of a service, such as its appearance, presence, or comfort of its workforce, equipment, or communication system. Similar to that, Setiono (2022) demonstrate that tangibles pertain to the physical attributes of establishments, equipment, and personnel of service providers. Modern equipment, clean staff, visually appealing facilities, and

materials related to visually appealing services are some of the attributes of this dimension. But tangible products are different, according to Schönsleben (2019), "in that they can typically, or to some extent, be directly experienced - seen, touched, smelled, or tasted, as well as tested."

2.2.4 Road sign

Road signs serve to control traffic, alert motorists, and offer helpful information to make driving more convenient and safer. The signs employ a variety of basic styles to make it obvious which of these types of information each particular sign is providing. The unique colors and forms that underlie these variations (Feng, 2018).

Road signs contain tons of helpful information that is necessary for piloting, including how to control the vehicle in the proper lane and at the appropriate speed, avoid hazards and obstacles, notice other vehicles' positions and movements on the roadway, as well as pedestrians' movements, road lanes, and status. They also offer information on the flow of traffic, the condition of the road, the right-of-way, and blocked maneuvers (Jayaprakash, 2019).

Road signs are usually positioned above lanes or next to roadways. In order to guide, warn, or regulate traffic and make driving safer and easier, they are made to catch drivers' attention and convey important details (Vinoth, 2023).

2.2.5 Safety

Being safe is the state of not being in danger from random human error or natural forces. Human error or natural forces combine to form the source of the hazard (Nas, 2015).

In order to protect people's health and well-being as well as the community, safety is defined as "a state in which hazards and conditions leading to physical, psychological, or material harm are controlled." This condition has more to do with the absence of accidents, whether purposeful or not. It must also produce the impression that one is safe from harm.

For that reason, it has two scopes. One is objective and quantified by tallying the number of injuries or behavioural and environmental factual parameters, like the quantity of collisions at a hazardous intersection, the proportion of drivers suspected of driving under the influence, and the number of traffic-related fatalities reported in a community. The other is based on subjective evaluation and how safe one feels, for example parents may feel unsafe letting their children walk to school (Smartphone, 2022).

Moreover, risk is commonly defined in safety settings as the combination of consequences and related probabilities or associated uncertainties, where safety settings are understood to be situations involving the possibility of unwanted events (Amundrud, 2017).

2.2.6 Road user satisfaction

In order to assess the real state of the roads and the handling required to improve road users' comfort, road user satisfaction can also be used as a benchmark. Vinayaka (2017) elucidate how the dimension of road user satisfaction is a means of evaluating the achievement of service quality within the parameters of trip satisfaction and the operation of road infrastructure components. The mode of transportation that is chosen has a major effect on just how satisfied road users are with the performance of road services. The impact of travel mode selection on trip satisfaction is influenced by factors such as travel duration, vehicle speediness, vehicle operational costs (BOK), and travel safety.

As long as road users are satisfied, using the appropriate instruments for the road sector's needs can greatly contribute to its improvement and result in an improved system for the delivery of services and products (Akakpo, 2017).

2.3 Underpinning theory

According to Gregor (2002), underpinning theories are theories for comprehending the social context of IS studies. The explanation of "how" and "why" particular events occur is the aim of the theories. The study's conclusions are determined and shaped by the data analysis. For this reason, the analysis's underlying theory is considered important. The framework of the theory that supports the study regulates the collection and analysis of data.

In this study considering Service Quality and Customer Satisfaction as the underpinning theory. Service Quality will consider three variables (reliability, responsiveness and tangibles) and Customer Satisfaction covered two factors (road sign and safety) for this study.

Service quality is a critical idea in the field of service management and marketing, serving as an underpinning theory for considerate and evaluating the effectiveness of services providing by organizations. Parasuraman A. Z. (1990) labels the problem as the “extent of discrepancy between customers’ expectancy or needs, and their perceptions of the quality of service”. The underpinning theory of service quality revolves around the idea that customers evaluate the value of a service based on their observations of the service delivered compared to their expectations. Customer satisfaction is a fundamental concept in marketing and business theory that underpins many aspects of organizational success. Gustafsson et al. (2005), expresses customer satisfaction as a customer’s general estimation of the act of a contribution to date. At its core, customer satisfaction mentions to the degree to which a product or service meets or surpasses customer expectations.

Applying service quality and customer satisfaction theories to understand factors influencing road users' satisfaction from Bukit Kayu Hitam to Alor Setar, Kedah, can help transportation authority’s prioritize investments, allocate resources effectively, and implement targeted interventions to enhance the overall road user experience.

2.3.1 Service quality (SERVQUAL)



Figure 2.1
SERVQUAL Model

Source: Parasuraman A. B. (1988)

Parasuraman et al. (1988) presented a list of ten aspects that determine the value of services: access, communication, competence, courtesy, credibility, reliability, responsiveness, security, understanding, and tangibles. These factors were determined through focus groups with both customers and service providers. They then developed SERVQUAL, an instrument for measuring service quality, based on the five dimensions: tangibles, reliability, responsiveness, assurance, and empathy. They also stated that, regardless of the service under study, responsiveness, assurance, and empathy were among the important scopes, after reliability.

It was five dimensional of service quality and explains itself is reliability defined as "the extent to which a promised service is performed accurately and dependably." The second is responsiveness, which is defined as "the extent to which service providers are willing to assist clients and offer prompt service." "The degree to which service providers are informed, polite, and able to inspire trust and confidence" is the third assurance. Fourth are empathy explained "the extent to which the clients receive considerate and customized service." The fifth category is tangibles, or "the extent to which personnel appearance, equipment, and physical facilities are adequate."

2.3.2 Customer Satisfaction

Road users are customers and Customer Satisfaction is the customer's observation of the degree to which the customer's wants have been fulfilled (Sakai, 2011). Cardozo (1965) assign the term "customer satisfaction" to marketing; however, academics have differing opinions about what constitutes "customer satisfaction." Hempel (1977) acknowledges that the degree to which a customer receives the benefits they believe from a product determines "customer satisfaction." Churchill Jr (1982) acknowledge that "customer satisfaction" is a purpose of a product's purchase and use, and that it can be identified by analysing the benefits of expected outcomes against the cost of the investment. Kotler P. (1996) recognizes that the term "satisfaction" refers to the consumer's emotional perception that arises from comparison the product's apparent functionality or results with the expectations the customer has for it. Solomon (2018) understands that "customer satisfaction" refers to an individual's general attitude toward the brought-in product. Cina (1989) notes

that "customer satisfaction" raises to the alignment of the customer's expectations with the experience received from the service; when the service fails to match up to the expectations, disappointment results. When service goes above and beyond expectations, it creates a positive impression and increases the likelihood that the customer will return for more goods or services from the business.

According to the common perception, satisfaction is defined as a person's feelings of satisfaction or dissatisfaction following an evaluation of a product's perceived performance or outcome in comparison to the buyer's expectations (Kotler P. &, 2016).

2.4 Research Framework

In this study, road user satisfaction has been chosen as the dependent variable, and road sign, safety, responsiveness, tangibles, and reliability have been chosen as the independent variables. The figure below displays a theoretical framework schematic diagram:

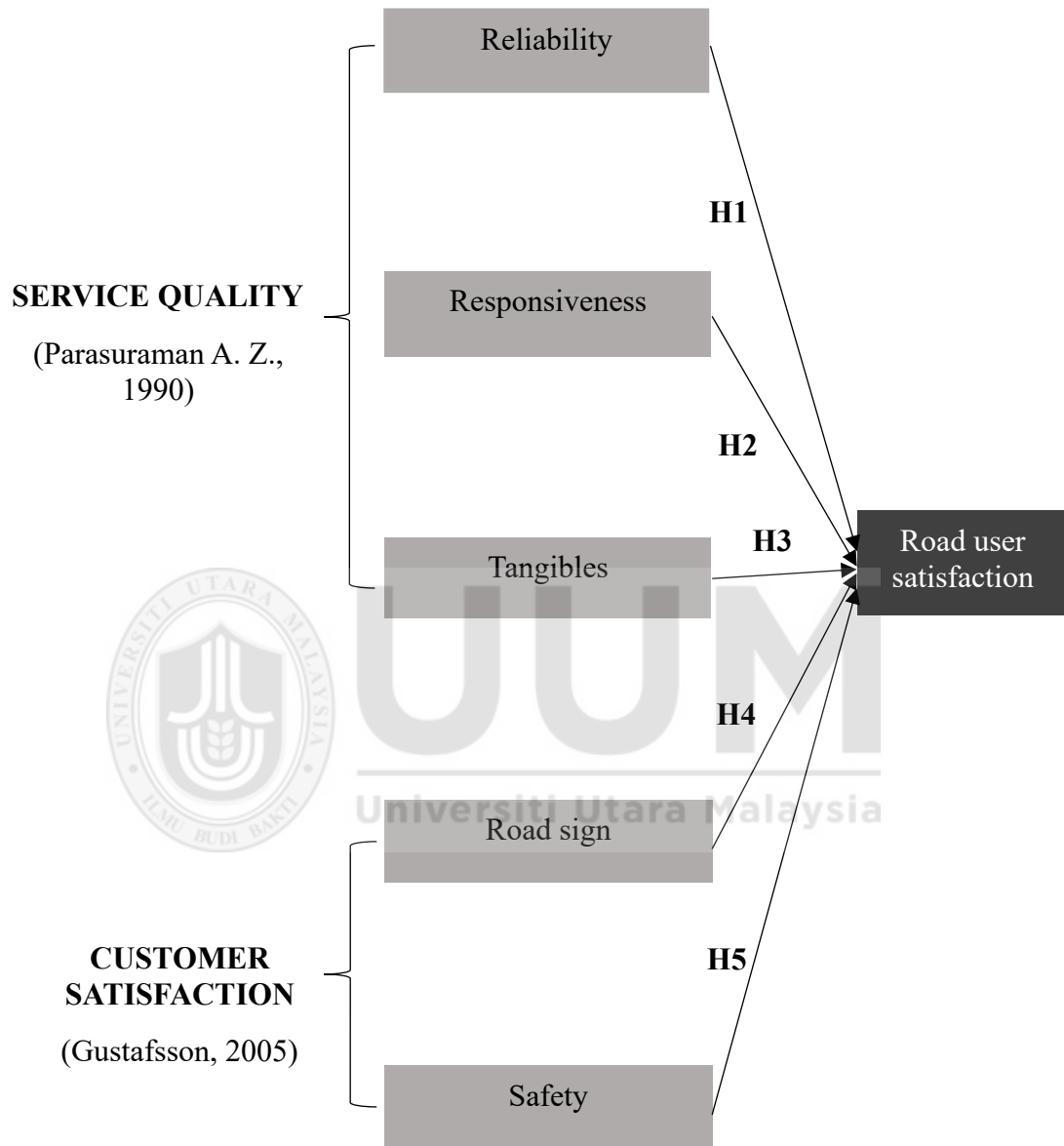


Figure 2.2:
Research Framework

2.5 Hypotheses Development

2.5.1 Reliability and road user satisfaction

Suanmali S. K., (2015) demonstrates that the main factor influencing the level of satisfaction drivers are about the roads is the state of the highways. When it comes to increased convenience, better road surface condition is also important because it reduces the time that users have to spend on traveling. Participants in a study by the Karnataka State Highway Improvement Project (2004) were asked to use a 5-point Likert scale to rate their degree of satisfaction. The results demonstrated that there is a high level of satisfaction with the road surface's quality. Road users rank the lighting condition of the Rajshahi City Bypass Road (RCBR) as having the highest level of satisfaction, following the ranking of the factors influencing customer satisfaction. Due to the fact that there are plenty of lighting posts on both sides of the street and the second-highest satisfied state was the state of the road surface (Hasan, 2020). In addition, Motorway Route 7's main variables where the state of the road had the biggest effects on road users' satisfaction and other drivers' legal status (Suanmali S. K., 2015).

The statement above highlights a strong relationship between the reliability of road infrastructure, particularly focusing on the state of highways and road surfaces, and road user satisfaction by ensuring convenience and reducing travel time.

H1: Reliability has positive relationship towards road user satisfaction.

2.5.2 Responsiveness and road user satisfaction

One of the keys to building a long-term customer relationship for service providers is the ability to successfully address customer needs. According to Roch (2006) study, stakeholder management may be influenced by expectations and satisfaction with road maintenance. Emergency telephone services and accident management attributes rank third and fourth among the most important factors for road users in the study of Hasan (2020). This is because the majority of users have access to these services. In addition, road surface maintenance is necessary to improve user convenience and shorten travel times. (Suanmali S. K., 2015).

This underscores the need for service providers to be responsive to emergency situations, as it directly influences user satisfaction. Moreover, the recognition of the significance of road surface repairs in enhancing convenience and reducing travel time emphasizes the broader impact of responsiveness on overall user satisfaction, creating a foundation for long-term customership in the realm of road services.

H2: Responsiveness has positive relationship towards road user satisfaction.

2.5.3 Tangibles and road user satisfaction

The National Road User Satisfaction Survey in the UK underscores a crucial connection between tangible aspects of road services and overall user satisfaction. The findings suggest that the majority of road users' express satisfaction with the quality of road services, emphasizing the pivotal role that

excellent road services play in retaining and potentially elevating user satisfaction levels (Hasan, 2020).

Since road services are inherently intangible and inseparable from their providers, the tangible components become crucial touchpoints for user evaluation (Jones, 2000). Despite the inherent challenges in evaluating intangible services, the tangible aspects become key evaluative criteria, showcasing the significance of maintaining and improving observable elements to enhance overall road user satisfaction.

H3: Tangibles has positive relationship towards road user satisfaction.

2.5.4 Road sign and road user satisfaction

The significant impact of road marking, signage, traffic, and warnings on road users' satisfaction, as identified by Suanmali (2015) and supported by findings from the Karnataka State Highway Improvement Project (2004). Specifically, roadside signage emerges as a crucial factor, contributing to high satisfaction levels among road users. The presence of clear and effective road signage, as emphasized in the Karnataka State Highway Improvement Project, is associated with elevated satisfaction. Hasan (2020) further reinforces the importance of additional amenities such as road signage and roadside furniture in enhancing overall satisfaction. This underscores the interconnected relationship between the quality of road signage and the contentment of road users, suggesting that well-designed and strategically placed signage plays a pivotal role in shaping a positive and satisfactory road user experience.

H4: Road sign has positive relationship towards road user satisfaction.

2.5.5 Safety and road user satisfaction

As highlighted by Kadiyali (2013) and Abaza (2023), the connection between safety and road user satisfaction is finely stitched into substance of transportation services. According to Kadiyali (2013), safety is a significant factor of the quality of services provided by a transport facility. Although characteristically challenging to quantify, its significance is highlighted by the fact that countless road users are willing to choose for lengthier routes if it ensures a safer journey. Abaza (2023) further emphasizes the key role of the road itself in introducing a sense of safety and comfort for riders, particularly at the design speed. This underscores the full landscape of road user satisfaction, where safety considerations cover outside mere avoidance of accidents to encompass the overall experience of the journey. Moreover, previous studies, such as those by Cantisani (2010), and Corriere (2012), have investigated into aspects of ride comfort, using metrics like the intensity of vibrations during driving to explain user satisfaction. In essence, the interplay between safety measures and the quality of road infrastructure collectively shapes road user satisfaction, influencing perceptions of both security and comfort throughout the transportation experience.

H5: Safety has positive relationship towards road user satisfaction.

2.6 Chapter Summary

The relationship between road signs, safety, road user satisfaction, responsiveness, and tangibles were demonstrated in this chapter by illustrating on previous studies. The research framework made evident a possible relationship between those variables based on the underpinning theory.



CHAPTER THREE

METHODOLOGY

3.1 Introduction

The chosen research methodology used in this study is explained in detail in this chapter. This chapter's goal is to establish a link between the research's theoretical framework and the empirical findings presented in the following chapters. The three primary methodology topics covered in this chapter are data analysis techniques, data collection methods, and research design.

3.2 Research Design

The research design refers to the overall strategy for tying the theoretical research problem to relevant and achievable empirical research. It is basically the study's framework, which directs data gathering and analysis. Additionally, the research design must outline a strategy that enables the researcher to address the research problem in as detailed as possible given the time and respondent constraints.

This study uses cross-sectional quantitative analysis and is based on descriptive, unqualified data (Sekaran, 2010). The primary focus of this research methodology is to establish a general relationship between the independent and dependent variables within a specific population (Zikmund W.G., 2003). Additionally, Zikmund W. G. (2003) notes that the choice is based on the nature of the research and that both approaches are equally important. This study also utilizes deductive research design approach follows the path of logic most closely. The responses collected are analyzed using several statistical analyses. The analysis includes descriptive analysis

and reliability test is run to ensure all the measures are free from random error and yield consistent results.

Next, a Pearson correlation analysis is performed to examine the strongest independent variable influencing road user satisfaction. Finally, a multiple regression analysis is run to see if the variables and observations have a linear relationship that would support or reject the hypothesis (Snieder, 2009).

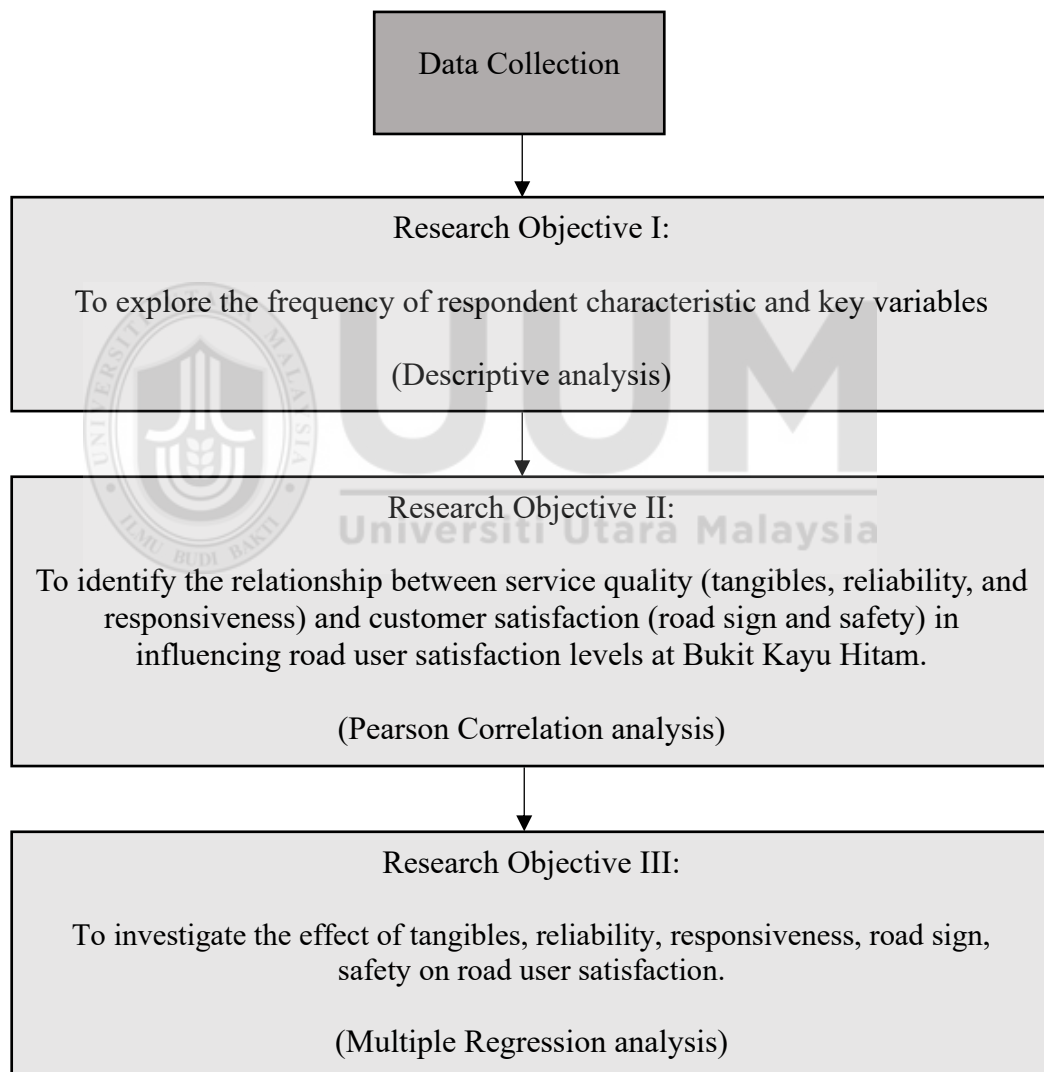


Figure 3.1:
Flow Process of Data Collection

3.3 Data Collection

The basic sources for guiding the research study are secondary data. According to Zikmund W. G. (2003), primary data is defined as “data assembled for the research purpose of the existing situation whereby the events are happening.” The primary data can be gathered in a few different ways. A questionnaire is one of the techniques, and most researchers use it widely to assist in data collection. As a result, the administered questionnaire was chosen for the study as the primary data collection method because it can improve the information's simplicity and reliability.

The researcher distributed the questionnaires to the respondents physically by approaching respondent to fill in a questionnaire distributed at Bukit Kayu Hitam are took about five minutes to complete. In case of questionnaire, all the question that prepared in open format questions for the respondents to give their answer. The questionnaire conducted hard copy via printed paper and through smartphones. For concluding data collection part for this research, quantitative data method which is questionnaire is being conducted through google form. The respondents who given the hardcopy question will answer directly on the printed paper, meanwhile respondents who using smartphones will be given a gadget containing a survey question to complete the questionnaire survey in order to accomplish this research's objectives.

3.3.1 Sampling Techniques

The sampling techniques in this study is convenience sampling (Sekaran, 2010). The term "convenience sample" refers to a sample wherein study participants have been chosen from the target population based on their

accessibility or convenience. While convenience sampling may not be entirely representative, it can be a simple and cost-effective method of gathering data because the respondents in this study happened to be located, either administratively or spatially, close to the study's data collection site.

3.3.2 Population

The population of this study consists of respondents who lived in Kedah's urban areas. According to the Department of Statistics Malaysia (2023), 2.2 million people are projected to live in Kedah in 2021. There are twelve districts in Kedah, Bukit Kayu Hitam which is city in Kubang Pasu district are selected to be included in this study. This is because the only main road of highway starting point to Alor Setar and the people who live in these areas are common with the road. Besides, it is also convenient for the researcher to collect data from these areas. Based on estimates from the most recent census reached in 2020, 4,983 thousand people reside in Bukit Kayu Hitam's urban areas (Federal Department of Town and Country Planning Peninsular Malaysia, 2011).

3.3.3 Sample Size

According to Roscoe (1975), for major research a sample size of 30 to 500 participants is considered to be the most suitable. Furthermore, it has been proposed by Comrey (2013) that a sample size of 1000 is acceptable and a sample size of 50 should be regarded as poor. The formula proposed by Krejcie (1970) is used to determine the appropriate sample size based on the total

population for this study. Based on the formula, 357 samples are the most suitable sample size for this study.

3.4 Research Instrument

A survey questionnaire was used as the research tool in this study. At the beginning of the survey's first page is a brief explanation of the questionnaire. The questionnaire is divided into two parts which are section 1 and section 2, Section 1 consists of questions for respondent's demographic information. Meanwhile, questions of section 2 have been adopted from relevant past studies with some minor modifications to suit this study.

3.4.1 Questionnaire Design

This study's questionnaire has two sections and is available in both Malay and English. The respondent's details, including gender, age, occupation, driver's license, kind of vehicle, and purpose of travel, are included in the first section. Second section consist six factors of independent and dependent variables which is reliability evaluate three items, responsiveness evaluates three items, tangibles evaluate four items, road sign evaluate four items, safety evaluate three items and road user satisfaction evaluate three items. The respondents were requested to assign five points to each of the independent and dependent variables from very satisfied to very unsatisfied on a Likert scale. All items for Section 2 which are obtained from previous studies as stated in Table 3.1 below:

Table 3.1
Questionnaire Items

RELIABILITY	SOURCES
Smoothness of road surface	(Zuna, H. T., Hadiwardoyo, S. P., & Rahadian, H. , 2016)
Road lighting sufficiency	(Zuna, H. T., Hadiwardoyo, S. P., & Rahadian, H. , 2016)
The safety of junctions on expressways	(Tangkitsiri, W., 2016)
RESPONSIVENESS	SOURCES
Road maintenance effectiveness	(Zuna, H. T., Hadiwardoyo, S. P., & Rahadian, H. , 2016)
Accident handling efficiency	(Zuna, H. T., Hadiwardoyo, S. P., & Rahadian, H. , 2016)
Fast response of emergency units	(Zuna, H. T., Hadiwardoyo, S. P., & Rahadian, H. , 2016)
TANGIBLES	SOURCES
The sufficiency of traffic signs to display traffic signals	(Tangkitsiri, W., 2016)
The clarity of traffic signs to display traffic signals	(Tangkitsiri, W., 2016)
The convenience of using the expressway	(Tangkitsiri, W., 2016)
Sufficient networking of expressways	(Tangkitsiri, W., 2016)
ROAD SIGN	SOURCES
The adequacy of the number of traffic signs placed when using the road.	(Shaaban, K., Shakeel, K., Rashidi, T. H., & Kim, I., 2022)
The accuracy and clarity of traffic signs that is placed when using this road such as guideposts and road sign.	(Shaaban, K., Shakeel, K., Rashidi, T. H., & Kim, I., 2022)

The warning signs when the lanes are closed like diversion signs.	(Shaaban, K., Shakeel, K., Rashidi, T. H., & Kim, I., 2022)
The visibility of road mark.	(Shaaban, K., Shakeel, K., Rashidi, T. H., & Kim, I., 2022)

SAFETY	SOURCES
The load limit control for the freight transport of goods by cargo truck	(Suanmali S. K., 2015)
The functionality of road safety equipment such as guard rails, road stud and road delineator	(Suanmali S. K., 2015)
Functionality of road lights that help the driver at night	(Suanmali S. C., 2015)

ROAD USER SATISFACTION	SOURCES
Has the condition of roads improved?	(Shaaban, K., Shakeel, K., Rashidi, T. H., & Kim, I., 2022)
Did the travel time of your frequent trips decrease or increase?	(Shaaban, K., Shakeel, K., Rashidi, T. H., & Kim, I., 2022)
How satisfied are you with the roads in general?	(Shaaban, K., Shakeel, K., Rashidi, T. H., & Kim, I., 2022)

3.4.2 Measurement of Variable

To investigate the connection between variables and road user satisfaction from Bukit Kayu Hitam to Alor Setar, Kedah, twenty items were chosen. One typical scale found in questionnaires is the Likert scale. Survey research employs this methodology to examine a variety of responses. The scale is as follows: 1 = very satisfied, 2 = satisfied, 3 = neither satisfied nor satisfied 4 = unsatisfied, 5 = very unsatisfied.

In order to determine a respondent's preferences or level of agreement with a statement or collection of statements, psychometric response scales such

as Likert scales are frequently employed in questionnaires. Using an ordinal scale, participants were asked to rate their degree of agreement with a given statement. This non-comparative scaling method is known as a Likert scale. Furthermore, the most common representation of a Likert scale is a five-point scale with "very satisfied" at one end and "very unsatisfied" at the other, with "neither satisfied nor satisfied" in the middle. The measures are listed in Table 3.2 below:

Table 3.2
Five Points Likert Scale

1 Very Satisfied <i>Sangat Berpuashati</i> (VS)	2 Satisfied <i>Berpuashati</i> (S)	3 Neither Satisfied nor Satisfied <i>Berkecuali</i> (N)	4 Unsatisfied <i>Tidak Berpuashati</i> (U)	5 Very Unsatisfied <i>Sangat Tidak Berpuashati</i> (VU)
--	---	--	---	--

Source: Likert (1932)

3.5 Data Analysis

This study will conduct all the data using SPSS (Statistical Package for the Social Sciences) to follow the analysis, regression and correlation.

According to Yellapu (2018), the essential first step in conducting research is by generating descriptive statistics. Descriptive analysis will be applied to provide an explanation of the phenomenon of the study (Sekaran, 2010), where the average score, or central tendency (mean), the degree of variability (standard deviation), and the frequency of phenomenon occurrence (frequency) were used to statistically analyze the descriptive data. This analysis is pertaining to demographic item such of gender, age, occupation, driving license, vehicle type and purpose of travel.

Next, Reliability was measured using Cronbach's Alpha coefficient. This Cronbach's Alpha serves as measurement of the internal consistency of a test or scale

such as a questionnaire by showing which item is related to each other. Different item testing may result in different acceptable value of Cronbach's Alpha which ranging from 0.70 to 0.95 (Tavakol, 2011). In order to gain acceptable value range, the researcher may discard or revise item that has low value of alpha. Usually, the low value of alpha is due to the poor inter-relation between the items while the redundant item may result in high value of alpha.

To determine whether there is a linear relationship between the variables, Pearson correlation analysis is used. Continuous variables are the primary focus of Pearson correlation analysis when it comes to analysis objects. The application is limited in scope. In this context, the linear relationship between the system's variables is analyzed using Pearson correlation. The Pearson correlation coefficient, whose value ranges from -1 to 1, is a statistical tool used to assess the linear correlation between two variables. When two variables have a numerical value of 1, it indicates that there is a positive correlation and can be represented by a straight-line equation. The two variables are negatively correlated, but they can also be expressed by a linear equation, according to the coefficient value of -1. A lower linear correlation between the two variables is indicated by a coefficient's absolute value near zero, and a higher linear correlation between the two variables is indicated by a coefficient's absolute value near one (Yang, 2021).

In this study, multiple linear regression (MLR) is still a fundamental analysis method. However, the interpretation of MLR weights in terms of predictor contributions to the criterion is compromised by intercorrelations between predictors, or multicollinearity. Other indices that can be used are dominance weights, commonality coefficients, all-possible-subsets regression, relative weights, validity

coefficients, structure coefficients, and product measures. This study reviews these indices and, in a unique manner, provides accessible software that: (a) computes and compares each of these indices with itself; (b) calculates bootstrapped confidence intervals associated with these indices; and (c) does so for a random number of predictors, provided that the correlation matrix is positive definite.

3.6 Summary

The research design, which uses a structured questionnaire and is based on a quantitative approach, is covered in this chapter. The minimum sample size requirements are covered along with the population, sample size, and survey procedures.

In addition, the present chapter also discussed the sample techniques used in the study are convenience sampling as sample analysis. Moreover, the analysis used Likert analysis for measurement of questionnaire and the result of data will be analyze by descriptive analysis, Pearson correlation analysis and Multiple linear regression (MLR).

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1 Introduction

The results of the data analyses for this study are presented in this chapter. The profile of the respondents is given in the first section of the chapter according to the demographics. Next, highlights include the results of multiple regressions, reliability tests, correlation tests, and descriptive analyses. The statistical package for the social sciences (SPSS) version 23 is used to analyze all of the data.

4.2 Respondents Profile

By looking at the demographic data about the respondents, the descriptive analysis evaluates the general data gathered from respondents using structured questionnaires (Refer Appendix A). This is performed by providing a descriptive analysis of the measurement items for each variable. In this study, six questions have been used for collecting demographic information from the respondents which are gender, age, occupation, driving license, vehicle type and purpose of travel. Each item in the obtained demographic data was displayed in a frequency and percentage table using descriptive analysis (Refer Appendix B). There were 363 respondents who participated in this study. Based on Table 4.1 below shows the profile of respondents, and the following is a discussion of the respondents' profile:

Table 4.1
Respondents Profile

Demographic Variable		Frequency	Percentages (%)
Gender	Male	168	46.3
	Female	195	53.7
Age	18-27	93	25.6
	28-37	129	35.5
	38-47	105	28.9
	48 and above	36	9.9
Occupation	Student	11	3.0
	Government sector	125	34.4
	Private sector	111	30.6
	Self-employed	116	32.0
Driving license	Yes	358	98.2
	No	5	1.4
Vehicle type	Private vehicle	347	95.6
	Public transport	11	3.0
	Trucks	5	1.4
	Others	0	0
Purpose of travel	Hometown	111	30.6
	Vacation	63	17.4
	Transit	154	42.4
	Study	15	4.1
	Work	20	5.5
	Others	0	0

Based on the analysis, the respondent of this study majority is female consisted 195 respondent (53.7%) out of 363 respondents, the remaining is 168 (46.3%) are male.

The displayed data shows that most of the respondents is 28-37 years old which is represent 129 respondents (35.5%), followed by age 38-47 years old was 105 of respondents (28.9%), and the ages of 18-27 years old was 93 respondents (25.6%). Meanwhile, there is only 36 respondents for the 48 years old and above.

For the occupation status, the respondents who work in the government sector are the highest which is 34.4%, 30.6% are in the private sector, 32.0% are self-employed, and 3.0% fall in others category which may consist of students.

Meanwhile, 358 respondents have a driving license which influence to the vehicle type category which 347 respondents are using private vehicle. Other 5 respondents have no driving license and shows 11 respondent using public transport at this road. Out of 363 respondents, there are 5 respondent is truck drivers.

Regarding the purpose of travel category, majority are used the road for transit is 154 respondents, following by 111 respondents are hometown. The others 63 respondents are on vacation and 20 respondents are to work. However, only 15 respondents are used the road for study.

4.3 Descriptive Analysis

This study uses SPSS to examine the means and standard deviation of each indicator (Refer Appendix C). As indicated in Table 4, the mean score of all latent variable ranges from, with standard deviations ranging from on a five- point Likert scale. The five-point Likert scale remained used to assess all variables, including

reliability, responsiveness, tangibles, road sign, and safety to satisfied road users. According to Yassin (2014), a mean score of less than 2 is measured low, a mean score of 2 to 4 is considered average, and a mean score of 4 or higher is considered high.

Table 4.2
Descriptive Statistics

Descriptive Statistics (N=363)	Mean (M)	Standard Deviation (SD)
Reliability	3.09	.699
Responsiveness	3.08	.702
Tangibles	2.74	.688
Road sign	3.20	.688
Safety	3.52	.915
Road user satisfaction	3.02	.758

Based on the table above, descriptive analysis has been measured for all twenty-question based on five independent variables and one dependent variable which is consist factors of reliability, responsiveness, tangibles, road sign, safety and road user satisfaction. However, all the items mean score range from 2.74 to 3.52 and the standard deviation range from 0.688 to 0.915. The respondent gave a score more than 3.0 for five items except tangibles nearly to the average score (M=2.74, SD=0.688). The highest score mean fall for safety (M=3.52, SD=0.915), followed by road sign (M=3.20, SD=0.688) and responsiveness (M=3.08, SD=0.702). Meanwhile, reliability falls to third lowest score mean (M=3.09, SD=0.699) and the second lowest mean is road user satisfaction (M=3.02, SD=0.758).

4.4 Reliability Test

An approach to determine scale consistency is the reliability test. Indicators are used to gauge consistency, such as Cronbach's alpha coefficient (Cronbach, 1951). Several reports state that an acceptable range for alpha is between 0.70 and 0.95. Insufficient item interrelationships, a small number of questions, or heterogeneous constructions can all contribute to a low alpha value. For example, some of the items should be changed or removed if the poor association leads to a low alpha. If an item's alpha score is excessively high, it could mean that different questions are being evaluated for the same item. The highest recommended alpha value is 0.90 (Tavakol, 2011).

Table 4.3
Reliability Test

Variables	Cronbach's Alpha	No. of Items
Reliability	0.699	3
Responsiveness	0.717	3
Tangibles	0.745	4
Road Sign	0.816	4
Safety	0.948	3
Road user satisfaction	0.806	3

Table shows the Cronbach's Alpha for all the variables used in this study (Refer Appendix D). The Cronbach's Alpha for Safety is 0.948 which is determine the reliability safety is high. Secondly, the value of Cronbach's Alpha for road sign is 0.816 are the second highest followed by Road user satisfaction is 0.806.

Next for tangibles also has high reliability test value which is 0.745, meanwhile responsiveness is 0.717. Lastly, reliability also nearly reached acceptable reliability test value which is 0.699 and it shows that independent variable has high level of reliability. To conclude, all variables have high reliability value.

4.5 Correlation Analysis

Correlation analysis was done to identify the variables that have a strong relationship with each other and influence road user satisfaction. The correlation coefficient shows how the independent variables are related to each other (reliability, responsiveness, tangibles, road sign, and safety), and dependent variable (road user satisfaction) (Refer Appendix E).

4.5.1 Reliability

Table 4.4
Reliability Correlation Analysis

	Correlations	Reliability	Road user satisfaction
Reliability	Pearson	1	.934**
	Correlation		.000
	Sig. (2-tailed)	363	363
	N		
Road user satisfaction	Pearson	.934**	1
	Correlation	.000	
	Sig. (2-tailed)	363	363
	N		

** Correlation is significant at the 0.01 level (2-tailed).

Table 4.4 above show the correlation analysis revealed a significant and positive relationship between road user satisfaction and reliability. The findings indicate that road user satisfaction ($p<.000$) appears to have a significant positive relationship with reliability ($r=0.934$).

4.5.2 Responsiveness

Table 4.5
Responsiveness Correlation Analysis

	Correlations	Responsiveness	Road user satisfaction
Responsiveness	Pearson Correlation	1	.926**
	Sig. (2-tailed)		.000
	N	363	363
Road user satisfaction	Pearson Correlation	.926**	1
	Sig. (2-tailed)	.000	
	N	363	363

** Correlation is significant at the 0.01 level (2-tailed).

The results of the correlation study between responsiveness and road user satisfaction are shown in Table 4.5. The findings indicate that there is a significant positive correlation ($p < .000$) between responsiveness ($r = 0.926$) and road user satisfaction.

4.5.3 Tangibles

Table 4.6
Tangibles Correlation Analysis

	Correlations	Tangibles	Road user satisfaction
Tangibles	Pearson Correlation	1	.020
	Sig. (2-tailed)		.708
	N	363	363
Road user satisfaction	Pearson Correlation	.020	1
	Sig. (2-tailed)	.708	
	N	363	363

Constructed on the Table 4.6, it shows the outcome of correlation analysis between tangibles and road user satisfaction. The result shows there was not significant and no correlation between tangibles ($r = 0.020$) and Road user satisfaction ($p > .708$).

4.5.4 Road sign

Table 4.7
Road sign Correlation Analysis

Correlations		Road sign	Road user satisfaction
Road sign	Pearson Correlation	1	.062
	Sig. (2-tailed)		.241
	N	363	363
Road user satisfaction	Pearson Correlation	.062	1
	Sig. (2-tailed)	.241	
	N	363	363

The result of the investigation is as in Table 4.7 has generated from the correlation analysis between road sign and road user satisfaction uncovers that road sign ($r=0.62$), not significant and no correlation with road user satisfaction ($p>.241$).

4.5.5 Safety

Table 4.8
Safety Correlation Analysis

Correlations		Safety	Road user satisfaction
Safety	Pearson Correlation	1	.931**
	Sig. (2-tailed)		.000
	N	363	363
Road user satisfaction	Pearson Correlation	.931**	1
	Sig. (2-tailed)	.000	
	N	363	363

** Correlation is significant at the 0.01 level (2-tailed).

According to the results of the correlation study, road user satisfaction and safety have a significant positive relationship ($p<.000$) with safety ($r=0.931$).

In summary, these findings suggest that factors (reliability, responsiveness and safety) indicated the positive relationship among variables

while tangibles and road sign showed a no relationship in influencing road user satisfaction from Bukit Kayu Hitam to Alor Setar, Kedah.

4.6 Multiple Regression Analysis

Road user satisfaction was the dependent variable that was regressed against five independent variables: reliability, responsiveness, tangibles road signs and safety. According to Kumari (2022), regression analysis is a statistical technique for determining the relationship between variables that have a cause-and-effect relationship. To put it another way, the purpose of this analysis is to identify the direction and strength of the linear relationship between the variables under study. Using multiple regression analysis, the direction and strength of the linear association between the research variables were discovered (Nanda, 2013).

Table 4.9

Model Summary

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.964 ^a	.930	.929	.201

a. Predictors: (Constant), SAF=safety, RS=road sign, REL=reliability, RES=responsiveness, TAN=tangibles

b. Dependent Variable: RUS=road user satisfaction

The information regarding the relationships between the five variables is shown in Table 4.9. The correlation coefficient (R) indicates the degree of connection between the independent variable (DV) and all of the predictor variables (IVs) put together. This study's strong relationship, $R=0.964$, suggests that the model is a reasonably good predictor of the result. Additionally, R square shows how much of the variance in the outcome variable that affects road user satisfaction can be accounted

for by the safety, road sign, tangibles, responsiveness, and reliability factors. According to the model summary, 8% of the variance in the data may be attributed to variables not included in the study, while the predictor variables account for 92% of the variance in the data. Refer to Appendix F for the SPSS output related to the detailed multiple linear regression analysis.

Table 4.10
ANOVA

ANOVA ^a			
Model		F	Sig.
1	Regression		
	Residual	951.899	.000b
	Total		

a. Dependent Variable: RUS=road user satisfaction

b. Predictors: (Constant), SAF=safety, RS=road sign, REL=reliability, RES=responsiveness, TAN=tangibles

The results were dependent on the coefficients table to review the relationship between the variables, while the assumption regarding the overall framework is either significant or not significant examined based on the ANOVA table.

Based on table 4.10 above, the result output tells whether or not the model (reliability, responsiveness, tangibles, road sign and safety) is a significant predictor of the result variable. The regression model in this study significantly predicts the satisfaction of road user as the significance value is less than $p < 0.05$.

Table 4.11
Collinearity Statistics

Collinearity Statistics

Variables	VIF	TOLERANCE
Reliability	12.703	.079
Responsiveness	6.145	.163
Tangibles	1.013	.987
Road Sign	1.005	.995
Safety	7.762	.129

In order to regulate collinearity, the value of VIF was examined. The critical value for VIF is 5.0, and the VIF value should never be higher than the value to showed that there was no multi-collinearity among the exogenous latent construct. Multi-collinearity was therefore absent from the investigation (Hair, 2016).

Table 4.11 results for the collinearity statistics indicate that the tolerance value ranges from 0.079 to 0.995, while the variance inflation factor (VIF) ranges from 1.005 to 12.703. There is no evidence of multicollinearity among the four out of the five variables (responsiveness, tangibles, road sign, and safety) because the tolerance value range is greater than 0.1 and the VIF range is less than 10. This study also found that Reliability VIF value is slightly higher (12.703) due to the data collection go the different perception and not clearly to declare with others variables. As defined by O'brien (2007), high VIF values don't always lead to negative effects on statistical analysis, as factors like sample size and random disturbance variance can also contribute. However, some researcher stated that there's no theoretical upper limit maximum to VIF value of the sample.

Table 4.12
Coefficients of Multiple Regression Analysis

Coefficients ^a					
Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
Constant	-.208	.079		-2.640	.009
Reliability	.130	.054	.119	2.397	.017
Responsiveness	.464	.037	.430	12.415	.000
Tangibles	.007	.015	.006	.452	.651
Road Sign	.022	.015	.020	1.431	.153
Safety	.372	.032	.450	11.556	.000

a. Dependent Variable: RUS=road user satisfaction

A value for Standard Coefficient Beta (β) can be used to determine the contribution of the independent variables used in this study to the explanation of variables. The result in Table 4.12 indicated that, three variables (reliability, responsiveness and safety) have had significant impacts in influencing road user satisfaction. There was reliability ($\beta=0.119$, $p<0.017$), with regards to the first hypothesis (H1), which expects that reliability will influence road user satisfaction, the hypothesis is well supported. The second strongest variable that plays a role in explanation road user satisfaction is safety ($\beta=0.450$, $p<0.000$), This result automatically verifies and supports H5, which proposes that safety will influence road user satisfaction, followed by the responsiveness ($\beta=0.430$, $p<0.000$), With regards to the second hypothesis (H2) which predicts that responsiveness will influence road user satisfaction, the hypothesis is supported.

On the contrary, tangibles ($\beta=0.006$, $p>0.651$) and road sign ($\beta=0.020$, $p>0.153$) failed to affected road user satisfaction from Bukit Kayu Hitam to Alor Setar, Kedah. With regards to the third hypothesis (H3) and fourth hypothesis (H4) predicts that tangibles and road sign not influence road user satisfaction, the hypothesis is not supported.

4.7 Summary of the Hypothesis Testing

Table 4.13
Summary of the Hypothesis Testing

Hypothesis	Result
H1: Reliability has positive relationship towards road user satisfaction.	Supported
H2: Responsiveness has positive relationship towards road user satisfaction.	Supported
H3: Tangibles has positive relationship towards road user satisfaction.	Not Supported
H4: Road sign has positive relationship towards road user satisfaction.	Not Supported
H5: Safety has positive relationship towards road user satisfaction.	Supported

Based on the previously described regression analyses, the results of the hypothesis testing are summarized in Table 4.13 and show that only three of the study's predicted hypotheses (reliability, responsiveness, and safety) are supported. However, the road sign and tangibles hypotheses are unsupported.

4.8 Summary of Chapter

This chapter has presented the empirical results of this research, which contained five sections. All five sections fulfilled these roles: (1) first section reported the response rate and respondents' profile (2) second section displayed the descriptive analysis, (3) the third section presented the reliability of the variables (4) the fourth section analysed the correlation between variables (5) the fifth is multiple regression analysis and last section is the result of hypothesis.

Based on the correlation analysis the data has been analysed according research objective II (to identify the relationship between service quality (tangibles, reliability, and responsiveness) and customer satisfaction (road sign and safety) in influencing road user satisfaction levels at Bukit Kayu Hitam.) showed reliability appeared to have the highest significant value, followed by safety factors are second and responsiveness are fell in the third place in influencing road user satisfaction. However, road sign and tangibles showed no significant correlation with road user satisfaction.

Followed by regression analysis from research objective III (to investigate the effect of tangibles, reliability, responsiveness, road sign, safety on road user satisfaction) the results of the hypothesis testing showed that only three of the study's predicted hypotheses (reliability, responsiveness, and safety) are has impact on road user satisfaction. However, the road sign and tangibles hypotheses are unsupported based on value of Standard Coefficient Beta (β) in table 4.12. The discussion and conclusion are then discussed in the next chapter.

CHAPTER FIVE

DISCUSSIONS AND CONCLUSION

5.1 Introduction

The study results that were presented in Chapter Four are covered in this last chapter. There are several sections in this chapter. The discussion of the results, study limitations, implications, and future research directions for the factors influencing road user satisfaction from Bukit Kayu Hitam to Alor Setar, Kedah, come after this introduction. The final part of this chapter also includes the study's conclusion.

5.2 Discussion of Findings

This chapter examines five variables which is reliability, responsiveness, tangibles, road sign, safety in influencing road user satisfaction from Bukit Kayu Hitam to Alor Setar, Kedah. Hence, in order to reach the purpose of this study, there are three research questions that had been developed as follows and the in-depth discussion and analytical evaluation of the findings are further discussed in the next sections.

- What are the most common respondent characteristics and key variables?
- How do road user perceptions of service quality dimensions (tangibles, reliability, and responsiveness) regarding road signs and safety influence overall road user satisfaction levels in Bukit Kayu Hitam?
- Do tangibles, reliability, responsiveness, road sign and safety and road user satisfaction have a significant impact on each other?

5.2.1 Demographic Characteristic

As discussed earlier, in Chapter 1 (Introduction) and Chapter 3 (Research Methodology), the respondents for this study are the road user are using the road from Bukit Kayu Hitam to Alor Setar, Kedah are satisfied with the road. The relevant data were collected through online survey (Google Form) and administered questionnaires using convenience sampling approach and final data secured 363 respondents for the statistical analysis. The independent variables (IV) in this study are reliability, responsiveness, tangibles, road sign and safety. Meanwhile, road user satisfaction is the dependent variable in this study.

The study examined the factors influencing road user satisfaction from Bukit Kayu Hitam, focusing on respondents primarily identified as female aged between 28 to 37 years old. Occupationally, the majority belonged to the government sector. Particularly, the frequency of respondents possessing a driving license was high, indicating a strong correlation with the vehicle type variable, predominantly private vehicles. However, truck drivers and users of public transport, such as buses and vans, were also included in this study.

The purpose of travel variable encompassed several categories including hometown visits, vacations, transit, study and work-related trips. Interestingly, the data revealed that the majority of respondents utilized the road from Bukit Kayu Hitam to Alor Setar for various purposes, whether traveling directly to Alor Setar or continuing further to other destinations. This suggests a significant pattern in travel behaviour along this route.

The findings suggest a nuanced understanding of road user satisfaction influenced by gender, age, occupation, vehicle type, and purpose of travel. The

predominance of female respondents within a specific age range and from the government sector highlights potential demographic trends impacting road usage and satisfaction levels. Additionally, the high frequency of driving license holders underscores the importance of vehicle type in shaping road user experiences, with private vehicles being the preferred mode of transport. The study highlights gender disparities in perceptions of private vehicles, with males generally exhibiting a more positive attitude and lower perception of risk compared to females. This aligns with the argument that individuals, particularly males prioritizing hierarchies or individualism, may downplay risks to defend their cultural identity (Hulse, 2018). Conversely, those leaning towards egalitarianism or communitarianism may perceive higher risks from private vehicles, potentially seeing them as promoting social inequalities. These disparities suggest females might be more receptive to private vehicle adoption due to lower risk perception and more positive attitudes. However, it's crucial to address these disparities for equitable and inclusive transportation technology implementation, especially considering broader societal values and concerns regarding safety and social equity. Additionally, understanding how age and gender intersect with perceptions of risk and acceptance of private vehicles is essential for shaping policies and technologies that cater to diverse road user needs and preferences, ultimately enhancing overall satisfaction with transportation systems (Schoettle, 2014).

Moreover, the inclusion of truck drivers and users of public transport broadens the study's scope, providing insights into the diverse needs and experiences of road users beyond private vehicle owners. Understanding the various purposes of travel further enriches the analysis, shedding light on the specific contexts in which road user satisfaction is evaluated and influenced.

Overall, the study offers valuable insights into the complex interplay of factors shaping road user satisfaction in Bukit Kayu Hitam, providing a foundation for targeted interventions and improvements in transportation infrastructure and services to enhance overall user experiences.

5.2.2 Identify the relationship Between Service Quality Factors and Customer Satisfaction on Road User Satisfaction

To identify the factor that influences road user satisfaction, a correlation analysis was run. The result reveals that reliability, responsiveness and safety factor have significant relationship with road user satisfaction, meanwhile tangibles and road sign have no relationship towards the satisfaction of road user.

5.2.2.1 The Relationship Between Service Quality Factors on Road User Satisfaction

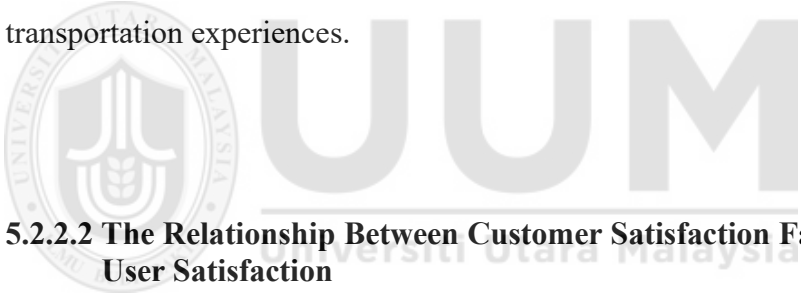
Service quality factors refer to the reliability, responsiveness and tangibles variable which are employed to examine how these characters and attitudes of the respondents influence road user satisfaction.

Road users prioritize reliability and responsiveness as key factors influencing their satisfaction due to the direct impact on the overall quality of their experience. Reliability relates to the consistency and dependability of road infrastructure and services, such as timely maintenance, accurate traffic information, and consistent travel times. When road systems consistently function as expected, users experience fewer disruptions and delays, leading to heightened satisfaction (Assen, 2019). Similarly, responsiveness reflects the efficiency and effectiveness of responses to road users' needs and concerns,

encompassing aspects like quick emergency services, effective communication during incidents, and prompt resolution of issues (Leonard, 2017). These factors directly contribute to users feeling valued, supported, and cared for, enhancing their satisfaction with the overall road experience

Conversely, tangibles such as physical road features or amenities, might not significantly influence satisfaction because they represent only one aspect of the user experience, which can be outweighed by the more impactful aspects of reliability and responsiveness in shaping overall satisfaction levels.

Hence, road users prioritize reliability and responsiveness in assessing service quality, aligning with their core concerns for efficient and safe transportation experiences.



5.2.2.2 The Relationship Between Customer Satisfaction Factors on Road User Satisfaction

The significant relationship between safety factors and road user satisfaction can be attributed to the fundamental human need for security and well-being while navigating roadways. Road users prioritize safety above other factors because it directly impacts users' physical integrity and peace of mind. Perceived safety encompasses various aspects such as the presence of traffic regulations, enforcement of speed limits, road infrastructure maintenance, and effective accident prevention measures (Rahman, 2022). When road users feel that these safety measures are robust and reliable, road users experience a sense of reassurance and confidence in their journeys, thus leading to higher satisfaction levels.

On the other hand, the lack of influence of road signs on satisfaction may stem from their perceived importance relative to other factors. While road signs serve as essential navigational aids, their impact on satisfaction might be overshadowed by more crucial factors such as road reliability and responsiveness. Additionally, if road signs are already perceived as adequate or standardized, their influence on satisfaction may be minimal compared to factors that directly impact safety and reliability.

In summary, road signs perceived as secondary in comparison to safety of customer satisfaction on the roads. Clear, accurate, and well-maintained signage contributes to smoother traffic flow, reduces accidents, enhances trust in the infrastructure, and improves the overall travel experience for road users.

5.2.3 Investigates the Effect of Tangibles, Reliability, Responsiveness, Road sign, Safety on Road user Satisfaction.

To answer the third research questions, five hypotheses are proposed. The results from the multiple regression analysis and presented in the previous chapter (Chapter Four) demonstrated only three independent variables has impact in influencing satisfaction of road user (reliability, responsiveness and safety) and two independent variables (tangibles and road sign) has insignificant relationship, however the hypotheses proposed are not all supported.

5.2.3.1 The Relationship Between Reliability on Road User Satisfaction

The data analysis from Chapter Four suggests that there is a significant impact of reliability on road user satisfaction along the route from Bukit Kayu

Hitam to Alor Setar in Kedah. Specifically, the analysis reveals a positive relationship between reliability and road user satisfaction (H1). This indicates that higher levels of reliability, such as better road conditions or traffic management, lead to increased satisfaction among road users traveling along this route. Therefore, it can be concluded that reliability positively influences road user satisfaction in this context.

The reliability of indicators is another concern which is mainly related to the method of conflict measurement. Many of these indicators have not been validated for conditions in developing countries where, very often, complex and unique road and geometric characteristics and traffic behavior applies. Local peculiarities include some special types of single vehicle crashes, such as overturn induced by pothole; shoulder drops and bridge approach drops, tyre burst induced by over loading and over use of tyres. In addition, numbers of crashes in developing countries are triggered by road hazards, including road side encroachment, road side activities by local users. Addressing these issues in traffic conflict techniques remain a challenge (Mahmud S. S., 2017).

Most of the indicators have been used to study safety problems in urban roads and intersections in developed countries. There are very few studies where these techniques have been applied in rural road environments, such as Mahmud S. S., (2020) and Sevenster (2023). Most of indicators have focused on read-end or right-angle collisions. Some studies has been considered merging and diverging collisions, particularly in motorway or freeway of developed countries such as Bartin (2023), Vanderesse (2018), Jucker (2017) and Singh (2024).

Integrating advanced machine vision techniques with microsimulation modeling offers a promising approach to enhance road user satisfaction by addressing critical traffic safety issues. The Surrogate Safety Assessment Model developed by the FHWA serves as a valuable tool for analyzing conflict severity and frequency from simulation data, improving the reliability of safety evaluations. This approach not only enhances theoretical understanding but also provides practical benefits by enabling targeted interventions to mitigate risks and improve overall road safety. By incorporating machine vision technology, such as automated video analysis, researchers can refine their understanding of traffic dynamics and identify potential safety improvements (FHWA, 2008). Overall, integrating these advanced techniques and models establishes a robust foundation for addressing traffic safety concerns, leading to enhanced road user satisfaction and improved transportation experiences.

In summary, ensuring well-maintained highways and road surfaces, along with adequate lighting, are crucial for enhancing driver satisfaction and safety. Therefore, policymakers and transportation authorities should prioritize investments in road maintenance and infrastructure improvements to meet user expectations and improve overall road quality. Additionally, regular monitoring and timely repairs should be implemented to sustain high levels of satisfaction among road users.

Thus, this research can be concluded that reliability can affected the satisfaction of road user from Bukit Kayu Hitam to Alor Setar, Kedah.

5.2.3.2 The Relationship Between Responsiveness on Road User Satisfaction

Based on the data analysis, it is evident that the hypothesis H2, which affects to responsiveness, is supported. There is a significant and positive relationship between responsiveness and road user satisfaction from Bukit Kayu Hitam to Alor Setar, Kedah. This implies that higher levels of responsiveness, such as timely assistance and communication from relevant authorities or service providers, lead to increased satisfaction among road users traveling along this route. Therefore, the data suggests that responsiveness positively influences road user satisfaction in this particular context.

Traffic safety issues have long been a primary concern for freeway management agencies and researchers Wen (2018) and Zeng Q. S. (2017). Most studies in this realm have focused on analyzing freeway crash frequencies. Compared with other types of roadways such as urban roads, crash rate in freeways may be lower due to the high-standard design, construction and maintenance of freeway infrastructures, and the simpler traffic environment for example, no junction is present in freeway systems (Zeng Q. W., 2018).

On the other hand, freeway crashes tend to have more severe outcomes, probably because of the higher vehicle speeds and the greater proportion of heavy vehicles. Freeway usually ranks the first among all roadway types in terms of the fatality rate. According to the statistics from the Traffic Management Bureau of Public Security Ministry in China, freeway crashes account for only 5% of roadway crashes, while the fatalities resulting from freeway crashes account for about 10% of the total deaths in roadway crashes.

In 2017, about one-third of the major roadway crashes involving ten or more fatalities in China have occurred on freeways. Therefore, a crash severity analysis is fully merited, which may suggest proper countermeasures for reducing the number of fatalities, degree of injuries, and amount of property loss in freeway crashes. China Police Administration, categorizes roadway crashes into four severity levels, namely the light crashes, medium crashes, severe crashes, and very severe crashes. These levels are defined by taking into account not only the injury severity, but also the amount of property damage and the number of people injured or killed (Zeng Q. G., 2019).

The significance of responsiveness to emergency situations and routine maintenance needs, such as road surface repairs, cannot be overstated. It directly influences user satisfaction and lays the foundation for long-term customership in the road service industry. This highlights the importance of proactive and attentive service provision to meet user needs effectively.

5.2.3.3 The Relationship Between Tangibles on Road User Satisfaction

Based on the data analysis conducted for H3, it is evident that there is no significant impact of tangibles on road user satisfaction along the route from Bukit Kayu Hitam to Alor Setar, Kedah. This implies that factors related to tangible aspects of service quality, such as physical infrastructure and amenities, do not significantly influence road user satisfaction on this particular route. Therefore, it can be concluded that the presence or quality of tangible elements does not significantly affect road user satisfaction in this context.

Road user dissatisfaction can stem from various factors such as damaged roads, inadequate signage, potholes, and poor construction quality. This study Awara (2022) was conducted to verify the veracity of the foregoing position by investigating the statistical relationship between service tangibles and customer satisfaction of car rental companies in Calabar Metropolis. In an age of heightened consumer sophistication and selectiveness, coupled with intense competition, consistently delivering high-quality service becomes a difficult task because consumers tend to be more difficult to please. The availability of large numbers of alternative service providers increases the selectiveness and sophistication of consumers as they could easily switch to other providers if they are unsatisfied by their current providers (Walia, 2021). This is an important factor which makes the service industry very competitive and dynamic (Pakurár, 2019).

Additionally, enhancing the quality of road construction through better materials and techniques can lead to longer-lasting and more resilient roads. These measures collectively contribute to an improved road infrastructure and a safer, more satisfactory experience for road users.

5.2.3.4 The Relationship Between Road sign on Road User Satisfaction

The analysis conducted using regression techniques indicates that road signs do not have a significant impact on road user satisfaction along the route from Bukit Kayu Hitam to Alor Setar. Consequently, hypothesis H4, which hypothesizes a relationship between road signs and road user satisfaction, is

not supported. This suggests that road signs do not play a significant role in influencing the satisfaction levels of road users traveling along this route.

Saputra (2023) identified drivers' sensitivity to factors impacting their satisfaction and safety on roads, particularly disliking surprises like abrupt geometry changes or poorly coordinated signals that induce erratic maneuvers and diminish service quality perception. Therefore, quality and clarity of signs and markings were emphasized as crucial for safety and satisfaction. Other than that, Bazilinskyy (2019) has reported that the effectiveness of icons depends on prior exposure and that, for first-time users, the interpretation of icons takes longer and is more error-prone than textual information. For example, the effectiveness of an icon further depends on its concreteness, semantic distance, and familiarity as well as its representational strategy, that is, whether the icon depicts a literal representation for a gas pump, an abstract representation for a knife and a fork to indicate a restaurant, or an arbitrary representation for a red cross for first aid. By adding a textual explanation to an icon can help to understand the meaning of the icon but may also lead to confusion and delayed responses (Farmer, 2024). According to Löcken (2019), vehicles would benefit from types of communication derived from established concepts like traffic signs or traffic indicators.

Effective road signage significantly enhances road user satisfaction by providing clear information, promoting safety, and improving navigation experiences. Well-designed signs instill confidence and trust in the road network, fostering a sense of control among users. Conversely, poorly maintained or confusing signage can lead to frustration and anxiety.

Prioritizing clear communication, consistent maintenance, and user-centered design principles is essential for promoting satisfaction, safety, and a positive experience for all road users.

5.2.3.5 The Relationship Between Safety on Road User Satisfaction

Based on the data analysis, it is evident that hypothesis H5, which concerns the relationship between safety and road user satisfaction, is supported. The analysis reveals a significant and positive relationship between safety and road user satisfaction along the route from Bukit Kayu Hitam to Alor Setar in Kedah. This suggests that higher levels of safety, such as well-maintained roads, effective traffic management, and reduced accident rates, lead to increased satisfaction among road users traveling along this route. Therefore, the data suggests that safety positively influences road user satisfaction in this particular context.

Comfort and safety are fundamental aspects of transportation facility quality, highly valued by road users even if it means opting for longer routes. However, quantifying these elements poses challenges. High traffic volumes and the presence of heavy vehicles notably affect traffic flow, maneuverability, and driver perceptions of safety. The increased congestion resulting from high traffic volumes not only leads to longer travel times but also elevates stress levels for drivers, impacting their overall comfort. Moreover, heavy vehicles can exacerbate road wear and tear, potentially leading to uneven surfaces and potholes, compromising both comfort and safety. Maneuverability is compromised as drivers navigate through congested roads, often contending

with limited space and aggressive driving behaviors. Additionally, the presence of heavy vehicles can create visibility challenges, particularly during adverse weather conditions or at night, further impacting safety perceptions (Malone, 2017).

By enhancing road infrastructure to accommodate increased traffic volumes and heavy vehicle movement, implementing measures to improve traffic flow efficiency such as intelligent transportation systems and traffic management strategies, ensuring clear and visible signage and markings to enhance safety perceptions, and promoting awareness among drivers about safe driving practices in high-volume traffic scenarios.

5.3 Implications of Study

This study was conducted to understand why road user in Bukit Kayu Hitam do not and satisfied with road situation. The contribution of the study is discussed in the following sub-sections.

5.3.1 Theoretical Contribution

The studies presented offer a comprehensive exploration of factors crucial for enhancing road users' satisfaction, thereby significantly impacting transportation planning, infrastructure development, quality of life, safety, and policymaking. The findings have theoretical implications by advancing existing literature in these domains. This study recommends a strategic approach towards prioritizing improvements that not only address safety, convenience, and efficiency but also streamline traffic flow, reduce accidents,

and enhance overall user experiences. This contributes theoretically by providing a framework for policymakers to allocate resources effectively, informed by empirical evidence, thereby optimizing transportation planning and infrastructure management. Moreover, it facilitates ongoing research endeavors by offering a deeper understanding of the factors influencing road users' satisfaction and their implications for policy and decision-making processes.

5.3.2 Practical Contribution

To enhance road users' satisfaction along the Bukit Kayu Hitam to Alor Setar route and consequently stimulate tourism and economic growth in Kedah, it's imperative to conduct a comprehensive assessment of infrastructure and safety concerns. This entails identifying areas for improvement such as widening roads, enhancing signage, adding rest areas, and addressing safety issues. Collaborating with relevant stakeholders including government bodies, local communities, and businesses is essential for implementing practical solutions. Additionally, leveraging technological advancements for real-time traffic updates and establishing effective communication channels to gather feedback from road users can aid in continuously monitoring and improving the route. By prioritizing infrastructure enhancements and safety measures, the region can attract more travelers, boost tourism revenue, and foster economic development while ensuring a positive experience for all road users.

5.4 Limitation of the Study

A few limitations were encountered over the course of this research. Firstly, it is because of the limited time available. The questionnaires could not be given to a large number of respondents as for this study, researcher need to identify first which respondent are live and using the road before distribute the questionnaire. In addition, since this study involve to convince respondent around to answering the questionnaire, it has taken a long time to get a suitable place and respond from a few of the respondent.

The study faced limitations due to its reliance on only five independent variables to assess factors influencing road user satisfaction. Additionally, the use of a non-probability sampling method restricts the generalizability of the findings to the broader population. Furthermore, the results cannot fully represent the entire Bukit Kayu Hitam area, as the study focused solely on urban residents within the districts of Kedah. These limitations suggest that the findings may not be applicable to rural areas or other demographic groups within the region.

5.5 Recommendations for Future Research

5.5.1 Technology Integration

Integrating connected vehicles and real-time traffic monitoring systems along the Bukit Kayu Hitam to Alor Setar route in Kedah, Malaysia, revolutionizes road user satisfaction. Through advanced sensors and communication capabilities, connected vehicles relay crucial data to users regarding road conditions, congestion, and hazards. This empowers drivers to make informed decisions, optimizing routes and avoiding delays. Safety is greatly enhanced as connected vehicles receive real-time alerts about potential

dangers, while traffic monitoring systems deploy interventions to mitigate risks (Paranjothi, 2020) . By providing timely information and alternative routes, these technologies offer a more pleasant and stress-free driving experience, reducing frustration and promoting overall well-being. Ultimately, this integration promises smoother, safer, and more efficient journeys, significantly elevating road user satisfaction and contributing to a sustainable transportation ecosystem.

5.5.2 Policy Analysis

In evaluating policies influencing road user satisfaction from Bukit Kayu Hitam to Alor Setar, several key factors emerge. First, the quality and maintenance of roads are crucial, suggesting opportunities for improvements to ensure smoother journeys and reduce accidents. Efficiency in traffic management systems, including signage and toll booths, is vital for reducing congestion and frustration. Safety measures such as speed limits and enforcement of traffic laws are essential for traveler confidence, and enhancements in these areas can improve the overall experience (Tee, 2019). Furthermore, considering environmental concerns, such as emissions and noise pollution, is vital. Implementing eco-friendly practices, such as promoting public transportation or encouraging the use of electric vehicles, can mitigate these issues and contribute to a more pleasant journey (Abdel Wahed Ahmed, 2020). Lastly, communication and feedback mechanisms between road authorities and users should be established or enhanced to address concerns promptly and effectively (Kang, 2019). By evaluating these aspects comprehensively and making necessary policy changes, authorities can foster

a safer, more efficient, and ultimately more satisfying road experience for travelers along the Bukit Kayu Hitam to Alor Setar route in Kedah.

5.6 Conclusion

The current study is being conducted to gain an insight into the relationships between perceived reliability, responsiveness, tangibles, road sign and safety. The specific research objectives of this study are as follows: a) What are the demographic characteristics of respondents at Bukit Kayu Hitam?; b) How do tangibles, reliability, responsiveness, road sign and safety influencing road user satisfaction levels at Bukit Kayu Hitam? and c) Do tangibles, reliability, responsiveness, road sign and safety and road user satisfaction have a significant impact on each other?.

From the result, the study has identified all answer for RO, RQ and hypotheses development. There is a significant relationship between reliability, responsiveness and safety towards satisfaction levels at Bukit Kayu Hitam. Therefore, these three variables are the most significant factor that influence satisfaction levels at Bukit Kayu Hitam. Meanwhile, the tangibles and road sign has no significant relationship toward satisfaction levels at Bukit Kayu Hitam.

This study has provided valuable insights into the factors influencing satisfaction level of road user from Bukit Kayu Hitam to Alor Setar, Kedah. These results underscore the importance of prioritizing improvements in reliability, responsiveness, and safety measures along the route to enhance road users' satisfaction and promote tourism and economic development in the region. Future efforts should focus on addressing these key areas to ensure a positive experience for road users and stimulate growth in the Bukit Kayu Hitam area.

References

- Abaza, K. A. (2023). The use of IRI data in developing optimal pavement rehabilitation plan for developing countries: Palestine as a case study. *Journal of Transportation Engineering*.
- Abdel Wahed Ahmed, M. M. (2020). Sustainable and green transportation for better quality of life case study greater Cairo–Egypt. *HBRC Journal*, 16(1), 17-37.
- Akakpo, S. A. (2017). A CONCEPTUAL FRAMEWORK TO EVALUATE ROAD USERS'SATISFACTION OF GEORGE WALKER BUSH HIGHWAY, GHANA.
- Amundrud, Ø. A. (2017). How the definition of security risk can be made compatible with safety definitions.
- Anuar, A. R. (2018). Malaysia-Thailand Cross Border Trade and Cross Border Special Economic Zone Potential: A Case Study of Rantau Panjang ÂSungai Kolok Cross Border Town. *Journal of International Studies*, 14, 119-139.
- Assen, S. M. (2019). Model-based urban road network performance measurement using travel time reliability: A Case Study of Addis Ababa City, Ethiopia. *American Journal of Civil Engineering and Architecture*, 7(5), 202-207.
- Awara, N. F. (2022). Service tangibles and customer satisfaction of car rental companies. *Nigerian Academy of Management Journal*, 17(2), 187-196.
- Barclay, I. P. (1996). Improving competitive responsiveness via the virtual.
- Bartin, B. J. (2023). Estimating roadway horizontal alignment from geographic information systems data: An artificial neural network-based approach. *Journal of Surveying Engineering*, 149(4), 04023015.
- Bazilinskyy, P. D. (2019). Survey on eHMI concepts: The effect of text, color, and perspective. *Transportation research part F: traffic psychology and behaviour*, 67, 175-194.
- Bazire, M. &. (2009). Understanding road signs. *Safety science*, 47(9), 1232-1240.
- Bozarth, C. &. (1996). A contingency view of time-based competition for manufacturers. *International Journal of Operations & Production Management*, 16(6), 56-67.
- Cantisani, G. &. (2010). Road roughness and whole body vibration: Evaluation tools and comfort limits. *Journal of Transportation Engineering*, 136(9), 818-826.
- Cardozo, R. N. (1965). "An Experimental Study of Consumer Effort, Expectation and Satisfaction.". *Journal of Marketing Research*, 244-249.
- Churchill Jr, G. A. (1982). An investigation into the determinants of customer satisfaction. *Journal of marketing research*, 19(4), 491-504.
- Churchill, G. &. (1998). Marketing Creating Value for Customers.

- Cina, C. (1989). Creating an effective customer satisfaction program. *Journal of Business & Industrial Marketing*, 4(2), 33-42.
- Comrey, A. L. (2013). A first course in factor analysis. *Psychology press*.
- Condra, L. W. (1993). Reliability Improvement with Design of Experiments.
- Corriere, F. &. (2012). The rail quality index as an indicator of the “global comfort” in optimizing safety, quality and efficiency in railway rails. *Procedia-Social and Behavioral Sciences*, 53, 1088-1097.
- Cosmas, C. (2019). “Service quality and customer satisfaction in the public sector: the case of the national social security authority in Zimbabwe”. *International Journal of Scientific and Research Publications*, Vol. 9 No. 4, pp. 282-295.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297–334.
- Das, T. a. (1995). “Managing strategic flexibility”.
- Deb, S. S. (2017). Development and validation of a questionnaire to assess pedestrian receptivity toward fully autonomous vehicles. *Transportation research part C: emerging technologies*, 84, 178-195.
- Department of Statistics Malaysia. (2023). *Official Portal*. Retrieved from Dosh.gov.my: <https://www.dosh.gov.my>
- Dictionary, T. O. (2016). *Reliability*. Retrieved from <http://www.oxfordlearners.com/>
- Elvik, R. (2014). “A Review of Game-Theoretic Models of Road User Behaviour.”. *Elsevier*, 62: 388–396.
- Farah, H. E. (2018). Infrastructure for Automated and Connected Driving: State of the Art and Future Research Directions. *Road Vehicle Automation 4*, 187–197.
- Farmer, D. S. (2024). School Bus Lighting Effectiveness and Improvements: Results from a Driving Experiment. *Sustainability*, 16(2), 501.
- Federal Department of Town and Country Planning Peninsular Malaysia. (2011). *Rancangan Struktur Negeri (RSN) Kedah 2002 – 2020*. Retrieved from Jabatan Perancangan Bandar Dan Desa Semenanjung Malaysia: <http://www.townplan.gov.my>
- Feng, J. K. (2018). Forward vehicle deceleration detection system for motorcycle at nighttime. *IEEE 4th International Conference on Computer and Communications (ICCC)*, 515-521.
- FHWA. (2008). *Surrogate Safety Assessment Model and Validation*. FHWA-HRT-08-051.
- Gregor, S. (2002). A theory of theories in Information Systems. *Information Systems Foundations: Building the Theoretical Base*, 1-20.
- Gustafsson, A. J. (2005). ‘The Effects of Customer Satisfaction, Relationship Commitment Dimension, and Triggers on Customer Relation’.
- Hair, J. F. (2016). A primer on partial least squares structural equation modeling (PLS-SEM). *CA: Sage Publications*.

- Häne, C. S. (2015). Obstacle detection for self-driving cars using only monocular cameras and wheel odometry. In: Intelligent Robots. *IEEE/RSJ International Conference on. IEEE*, 5101–5108.
- Hasan, M. M. (2020). Identifying User Satisfaction Level of Road services: A Focus on Rajshahi City Bypass Road, Bangladesh.
- Hempel, D. J. (1977). Consumer satisfaction with the home buying process: Conceptualization and measurement. *The conceptualization of consumer satisfaction and dissatisfaction*, 7.
- Hulse, L. M. (2018). Perceptions of autonomous vehicles: Relationships with road users, risk, gender and age. *Safety science*, 102, 1-13.
- Jamal, M. J. (2018). Service quality, customer satisfaction and loyalty in an internet service providers”. *International Journal of Business and Management*, Vol. 13 No. 8, pp. 108-120.
- Jayaprakash, A. &. (2019). Feature selection using ant colony optimization (ACO) and road sign detection and recognition (RSDR) system. *Cognitive Systems Research*, 123-133.
- Jeevan, J. (2017). The role of Malaysian dry ports in the container seaport system. *Doctoral dissertation, University of Tasmania*.
- Jones, M. a. (2000). Transaction-specific satisfaction and overall satisfaction: an empirical analysis.
- Jucker, T. C. (2017). Allometric equations for integrating remote sensing imagery into forest monitoring programmes. *Global change biology*, 23(1), 177-190.
- Kadiyali, L. R. (2013). Traffic engineering and transport planning. *Khanna publishers*.
- Kang, S. M. (2019). Public-private partnerships in developing countries: Factors for successful adoption and implementation. *International Journal of Public Sector Management*, 32(4), 334-351.
- Kapur, K. C. (2014). *Reliability engineering (Vol. 86)*. John Wiley & Sons.
- Kotler, P. &. (2016). Marketing Management, 15thn Edition.
- Kotler, P. (1996). Marketing Management . 9th ed .
- Krejcie, R. &. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*.
- Kumari, B. T. (2022). Non linear regression analysis and response surface modeling for Cr (VI) removal from aqueous solution using poly-aniline coated sugarcane bagasse (PANI@ SB) composites as an adsorbent. *Surfaces and Interfaces*, 29, 101729.
- Lengyel, H. T. (2020). Conflicts of Automated Driving With Conventional Traffic Infrastructure. *IEEE Access* 8, 163280–163297.
- Leonard, D. L. (2017). Incident Traffic Management Response. *Doctoral dissertation, Walden University*.

- Likert, R. (1932). A technique for the measurement of attitudes. *Archives of psychology*.
- Liu, Y. T. (2019). A systematic review: Road infrastructure requirement for Connected and Autonomous Vehicles (CAVs). *J. Phys. Conf. Ser.*, 1187, 042073.
- Löcken, A. W.-K. (2019). Investigating user requirements for communication between automated vehicles and vulnerable road users. *Proceedings of the 2019 IEEE Intelligent Vehicles Symposium*.
- Mahmud, S. S. (2017). Application of proximal surrogate indicators for safety evaluation: A review of recent developments and research needs. *IATSS research*, 41(4), 153-163.
- Mahmud, S. S. (2020). Using a surrogate safety approach to prioritize hazardous segments in a rural highway in a developing country. *IATSS research*, 44(2), 132-141.
- Malone, K. S. (2017). Safety, mobility and comfort assessment methodologies of intelligent transport systems for vulnerable road users. *European transport research review*, 9, 1-16.
- Nanda, T. G. (2013). Diagnostics for pretesting questionnaires: A comparative analysis. *International Journal of Technology, Policy and Management*, 13(1), 67-79.
- Narver, S. a. (1994). . A theoretical review of flexibility, agility and responsiveness in the operations management literature.
- Nas, S. (2015). The definitions of safety and security. *Journal of ETA Maritime Science*, 3(2), 53-54.
- Ngo, V. a. (2016). "The relationship between service quality, customer satisfaction and customer loyalty: an investigation in Vietnamese retail banking sector". *Journal of Competitiveness*, Vol. 8 No. 2, pp. 103-116.
- Nur Farihatul Solehah (2024) *Bukit Kayu Hitam City Landmark*, 28 January 2024.
- Nur Farihatul Solehah (2024) *Bukit Kayu Hitam Road*, 15 February 2024.
- O'brien, R. M. (2007). "A caution regarding rules of thumb for variance inflation factors." . *Quality & quantity* 41, 673-690.
- Pakurár, M. H. (2019). The service quality dimensions that affect customer satisfaction in the Jordanian banking sector. *Sustainability*, 11(1113), 1-24.
- Paranjothi, A. K. (2020). A survey on congestion detection and control in connected vehicles. *Ad Hoc Networks*, 108, 102277.
- Parasuraman, A. B. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality.
- Parasuraman, A. Z. (1990). Five imperatives for improving service quality. *MIT Sloan Management Review*, 31(4), 29.
- Peters, A. (16 February, 2017). *Fast Company*. Retrieved from What if Driverless Cars Let You Cross the Street When You Wave at Them:

<https://www.fastcompany.com/3068166/what-if-driverless-cars-let-you-cross-the-street-when-you-wave-at-them>

- Philip, K. A. (2018). Principles of marketing. *Pearson Education*.
- PLUS Malaysia Berhad. (2023). *Nourth-Sourth Expressway Map*. Retrieved from klia2 info: <https://www.klia2.info/trips/highways/plus-expressway-north-south-expressway/>
- Project, K. S. (2004). *Karnataka State Highway Improvement Project* . Retrieved from <https://kship.in/en/Default.aspx>
- PWD. (2024). *Public Work Department; Malaysian Highway Authority*. Retrieved from <http://www.kkr.gov.my/ms/node/118>
- Rahman, M. M.-S. (2022). Towards sustainable road safety in Saudi Arabia: Exploring traffic accident causes associated with driving behavior using a Bayesian belief network. *Sustainability*, 14(10), 6315.
- Rifai, A. I. (2022). Customer Satisfaction and Road Performance in Long Segment Maintenance Contract: Application of an Urban Road Network. *UIJRT United International Journal of Research & Technology*, 3(09), 10-19.
- Roch, C. H. (2006). Citizens, accountability, and service satisfaction: The influence of expectations. *Urban Affairs Review*, 41(3), 292-308.
- Roscoe, J. T. (1975). Fundamental Research Statistics For The Behavioral Sciences.
- Sakai, T. Y.-K. (2011). New measure of the level of service for basic expressway segments incorporating customer satisfaction.
- Salleh, D. &. (2022). The Establishment of Malaysia-Thailand Special Border Economic Zone (SBEZ): The Potential of Bukit Kayu Hitam as Northern Economic Hub. *Journal of Governance and Development (JGD)*, 18(1), 89-110.
- Saputra, D. B. (2023). Accident Investigation in the Automated Traffic System. *Doctoral dissertation, Westsächsische Hochschule Zwickau*.
- Schoettle, B. &. (2014). A survey of public opinion about autonomous and self-driving vehicles in the US, the UK, and Australia. *Transportation Research Institute*.
- Schönsleben, P. (2019). Tangible services and intangible products in industrial product service systems. *Procedia CIRP*, 83, 28-31.
- Sekaran, U. &. (2010). Research methods for business. *A sill building approach (5th Ed.) John Willey: UK*.
- Setiono, B. A. (2022). Influence of Service Quality with the Dimensions of Reliability, Responsiveness, Assurance, Empathy and Tangibles on Customer Satisfaction. *International Journal of Economics, Business and Management Research*, 6(9), 330-341.
- Sevenster, A. F. (2023). Response times in drivers' gap acceptance decisions during overtaking. *Transportation research part F: traffic psychology and behaviour*, 94, 329-340.

- Shaaban, K., Shakeel, K., Rashidi, T. H., & Kim, I. (2022). Measuring users' satisfaction of the road network using structural equation modeling. *International Journal of Sustainable Transportation*, 16(9), 792-803.
- Singh, D. D. (2024). Bridging conventional and proactive approaches for road safety analytic modeling and future perspectives. *Innovative Infrastructure Solutions*, 9(5), 1-21.
- Skorobogatova, O. &.-M. (2017). Transport infrastructure development performance.
- Smartphone, O. (2022). AN OVERVIEW OF THE DATA AND USER REQUIREMENT OF RESIDENT'S SECURITY AND SAFETY APPLICATION. *Journal of Theoretical and Applied Information Technology*, 100(12).
- Snieder, R. &. (2009). "The Art of Being a Scientist: A Guide for Graduate Students and their Mentors". *Cambridge University Press*, p.16.
- Solomon, M. R. (2018). Consumer behavior: buying having and being. *Pearson*.
- Stalk, G. (1988). "Time: the next source of competitive advantage".
- Stalk, G. a. (1990). Competing Against Time: How Time Based Competition is Reshaping Global Markets.
- Stracener, J. T. (1997). Mathematical basis of reliability.
- Suanmali, S. C. (2015). Factors affecting road users' satisfaction: the case of Motorway Route 7.
- Suanmali, S. K. (2015). Factors affecting road users' satisfaction: the road users' satisfaction: the ase of Motorway Route 7.
- Sucha, M. D. (2017). "Pedestrian-Driver Communication and Decision Strategies at Marked Crossings.". *Accident Analysis & Prevention*, 41–50.
- Tangkitsiri, W. (2016). Modelling user satisfaction with transportation public-private partnership projects. *Doctoral dissertation, Heriot-Watt University*.
- Tavakol, M. &. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53–55.
- Tee, K. F. (2019). Reliability-based preventive maintenance strategies of road junction systems. *International Journal of Quality & Reliability Management*, 36(5), 752-781.
- Theeuwes, J. &. (2017). Designing safe road systems: A human factors perspective. *CRC Press*.
- Vanderesse, N. R. (2018). Measurement of deformation heterogeneities in additive manufactured lattice materials by Digital Image Correlation: Strain maps analysis and reliability assessment. *Journal of the mechanical behavior of biomedical materials*, 86, 397-408.
- Vinayaka, B. &. (2017). Analysis and Survey of Road User Satisfactory of Gadag District. *International Journal of Innovative Research in Science, Engineering and Technology*, 6(6), 12037-12042.

- Vinoth, S. (2023). IDENTIFICATION AND CLASSIFICATION OF MOVING VEHICLE DETECTION IN TRAFFIC SURVEILLANCE USING IMAGE PROCESSING AND MACHINE LEARNING TECHNIQUES. *Journal of Advances in Management*, 1(01).
- Vissers, L. V. (2016). Safe Interaction Between Cyclists, Pedestrians and Autonomous Vehicles. What do We Know and What Do We Need to Know? *SWOV Institute for Road Safety Research, The Hague*.
- Walia, S. S. (2021). The impact of service quality on passenger satisfaction and loyalty in the Indian aviation industry. *International Journal of Hospitality & Tourism Systems*, 14(2), 137-143.
- Wen, H. S. (2018). The effects of traffic composition on freeway crash frequency by injury severity: a bayesian multivariate spatial modeling approach. *J. Adv. Transp.*
- Yang, Q. K. (2021). Linear correlation analysis of ammunition storage environment based on Pearson correlation analysis. *Journal of physics: Conference series* , Vol. 1948, No. 1, p. 012064.
- Yassin, W. U. (2014). Packet header anomaly detection using statistical analysis. *Springer International Publishing*, 473-482.
- Yellapu, S. K. (2018). Recent developments of downstream processing for microbial lipids and conversion to biodiesel.
- Zaheer, A. a. (1997). "Catching the wave: alertness, responsiveness, and market.
- Zeng, Q. G. (2019). Analyzing freeway crash severity using a Bayesian spatial generalized ordered logit model with conditional autoregressive priors. *Accident Analysis & Prevention*, 127, 87–95.
- Zeng, Q. S. (2017). Bayesian hierarchical modeling monthly crash counts on freeway segments with temporal correlation. *J. Adv. Transp.*
- Zeng, Q. W. (2018). Incorporating temporal correlation into a multivariate random parameters tobit model for modeling crash rate by injury severity. *Transportmetrica A*, 14 (3), 177–191.
- Zuna, H. T., Hadiwardoyo, S. P., & Rahadian, H. . (2016). Developing a model of toll road service quality using an artificial neural network approach. *International Journal of Technology*, 7(4), 562-570.
- Zikmund W.G. (2003). Business Research Method, 7th Edition. *South Western, US*.

APPENDICES

Appendix A

Questionnaire



BMPZ69912 RESEARCH PAPER

QUESTIONNAIRE:

Factors Influencing Road Users' Satisfaction from Bukit Kayu Hitam to Alor Setar Kedah

By

Nur Farihatul Solehah Binti Abdul Malik (830497)
Master of Sciences (Transportation and Logistics Management)
College of Business
Universiti Utara Malaysia, Kedah

Short survey information:

This survey is conducted to examine the factors that influence satisfaction level of road user from Bukit Kayu Hitam to Alor Setar, Kedah. As well-known Bukit Kayu Hitam is the biggest border town of Kedah on the Malaysia-Thailand border also represents the starting point of the North-South Expressway and Federal Route 1, the longest road in Malaysia. As service products, highways play an important and strategic part in the community's transportation of services. Many various types of transportation mode have also been involved in this, especially private vehicles and truck drivers. By identify these factors it's important for the overall development and safety between transportation systems, society and economy. All responses given will be used for academic purposes only.

(Maklumat tinjauan ringkas:

Tinjauan ini dijalankan untuk mengkaji faktor-faktor yang mempengaruhi tahap kepuasan pengguna jalan raya dari Bukit Kayu Hitam ke Alor Setar, Kedah. Seperti yang diketahui Bukit Kayu Hitam adalah bandar sempadan terbesar Kedah di sempadan Malaysia-Thailand juga mewakili titik permulaan Lebuhraya Utara-Selatan dan Laluan Persekutuan 1, jalan terpanjang di Malaysia. Sebagai produk perkhidmatan, lebuhraya memainkan peranan penting dan strategik dalam pengangkutan perkhidmatan masyarakat. Pelbagai jenis mod pengangkutan turut terlibat dalam hal ini terutamanya kenderaan persendirian dan pemandu lori. Dengan mengenal pasti faktor-faktor ini adalah penting untuk pembangunan dan keselamatan keseluruhan antara sistem pengangkutan, masyarakat dan ekonomi. Semua jawapan yang diberikan akan digunakan untuk tujuan akademik sahaja.)

Instructions:

There are TWO (2) sections in this questionnaire. Please answer ALL questions in ALL sections. Completion of this survey will take you less than 5 minutes. Please tick in the appropriate box based on your real opinion.

(Arahan:

Terdapat DUA (2) bahagian dalam soal selidik ini. Sila jawab SEMUA soalan dalam SEMUA bahagian. Penyelesaian tinjauan ini akan mengambil masa kurang daripada 5 minit. Sila tandakan pada petak yang berkenaan berdasarkan pendapat sebenar anda.)

Section1:
(Bahagian 1):

Please fill in your information below
(Sila isi maklumat anda di bawah)

Gender (*Jantina*):

☐ Male (*Lelaki*)

☐ Female (*Perempuan*)

Age (*Umur*):

☐ 18 – 27

☐ 28 – 37

☐ 38- 47

☐ 48 and above (*48 dan ke atas*)

Occupation (*Pekerjaan*):

☐ Student (*Pelajar*)

☐ Government Sector (*Sektor Kerajaan*)

☐ Private Sector (*Sektor Swasta*)

☐ Self-employed (*Bekerja sendiri*)

Driving license (*Lesen memandu*):

☐ Yes (*Ya*)

☐ No (*Tidak*)

Vehicle Type (*Jenis kenderaan*):

☐ Private Vehicle (*Kenderaan Persendirian*)

☐ Trucks (*Trak*)

☐ Public Transport (*Pengangkutan Awam*)

☐ Others (*Lain-lain*)

Purpose of Travel (*Tujuan perjalanan*):

☐ Hometown (*Kampung Halaman*)

☐ Vacation (*Bercuti*)

☐ Work (*Kerja*)

☐ Transit (*Persinggahan*)

☐ Study (*Belajar*)

☐ Others

Section 2:
(Bahagian 2):

Please circle (O) the number in the box to indicate how far you satisfied or unsatisfied with each statement by using the following scale:

(Sila bulatkan (O) nombor dalam kotak untuk menunjukkan sejauh mana anda berpuas hati atau tidak berpuas hati dengan setiap pernyataan dengan menggunakan skala berikut)

1 Very Satisfied <i>Sangat Berpuashati</i> (VS)	2 Satisfied <i>Berpuashati</i> (S)	3 Neither Satisfied nor Satisfied <i>Berkecuali</i> (N)	4 Unsatisfied <i>Tidak Berpuashati</i> (U)	5 Very Unsatisfied <i>Sangat Tidak Berpuashati</i> (VU)
--	---	--	---	--

Identify the level of satisfaction of the following items:

Kenal pasti tahap kepuasan item berikut:

	RELIABILITY (REL) <i>KEBOLEHPERCAYAAN</i>	VS	S	N	U	VU
1	REL1: Smoothness of road surface (<i>Kelancaran permukaan jalan</i>)	1	2	3	4	5
2	REL2: Road lighting sufficiency (<i>Kecukupan lampu jalan</i>)	1	2	3	4	5
3	REL3: The safety of junctions on expressways (<i>Keselamatan persimpangan di lebuhraya</i>)	1	2	3	4	5

	RESPONSIVENESS (RES) <i>TANGGUNGJAWAB</i>	VS	S	N	U	VU
1	RES1: Road maintenance effectiveness (<i>Keberkesanan penyelenggaraan jalan</i>)	1	2	3	4	5
2	RES2: Accident handling efficiency (<i>Kecekapan pengendalian kemalangan</i>)	1	2	3	4	5

3	RES3: Fast response of emergency units (Tindakan pantas unit kecemasan)	1	2	3	4	5
---	--	---	---	---	---	---

	TANGIBLES (TAN) <i>KETARA</i>	VS	S	N	U	VU
1	TAN1: The sufficiency of traffic signs to display traffic signals (Kecukupan tanda lalu lintas untuk memaparkan lampu isyarat lalu lintas)	1	2	3	4	5
2	TAN2: The clarity of traffic signs to display traffic signals (Kejelasan papan tanda lalu lintas untuk memaparkan isyarat lalu lintas)	1	2	3	4	5
3	TAN3: The convenience of using the expressway (Keselesaan menggunakan lebuh raya)	1	2	3	4	5
4	TAN4: Sufficient networking of expressways (Rangkaian lebuh raya yang mencukupi)	1	2	3	4	5

	ROAD SIGN (RS) <i>TANDA JALAN</i>	VS	S	N	U	VU
1	RS1: The adequacy of the number of traffic signs placed when using the road (Kecukupan jumlah papan tanda lalu lintas yang diletakkan apabila menggunakan jalan ini)	1	2	3	4	5
2	RS2: The accuracy and clarity of traffic signs that is placed when using this road such as guideposts and road sign (Ketepatan dan kejelasan papan tanda lalu lintas yang diletakkan semasa menggunakan jalan ini seperti tiang panduan dan papan tanda jalan)	1	2	3	4	5
3	RS3: The warning signs when the lanes are closed like diversion signs (Tanda amaran apabila lorong ditutup seperti tanda lencongan)	1	2	3	4	5
4	RS4: The visibility of road mark (Keterlihatan tanda jalan)	1	2	3	4	5

	SAFETY (SAF) <i>KESELAMATAN</i>	VS	S	N	U	VU
1	SAF1: The load limit control for the freight transport of goods by cargo truck <i>(Kawalan had beban untuk pengangkutan barang dengan trak kargo)</i>	1	2	3	4	5
2	SAF2: The functionality of road safety equipment such as guard rails, road stud and road delineator <i>(Kefungsian peralatan keselamatan jalan raya seperti rel pengawal, stud jalan dan pembatas jalan)</i>	1	2	3	4	5
3	SAF3: Functionality of road lights that help the driver at night <i>(Kefungsian lampu jalan yang membantu pemandu pada waktu malam)</i>	1	2	3	4	5

	ROAD USER SATISFACTION (RUS) <i>KEPUASAN PENGGUNA JALAN RAYA</i>	VS	S	N	U	VU
1	RUS1: Has the condition of roads improved? <i>(Adakah keadaan jalan raya bertambah baik?)</i>	1	2	3	4	5
2	RUS2: Did the travel time of your frequent trips decrease or increase? <i>(Adakah masa perjalanan perjalanan kerap anda berkurangan atau meningkat?)</i>	1	2	3	4	5
3	RUS3: How satisfied are you with the roads in general? <i>(Sejauh manakah anda berpuas hati dengan jalan raya secara umum?)</i>	1	2	3	4	5

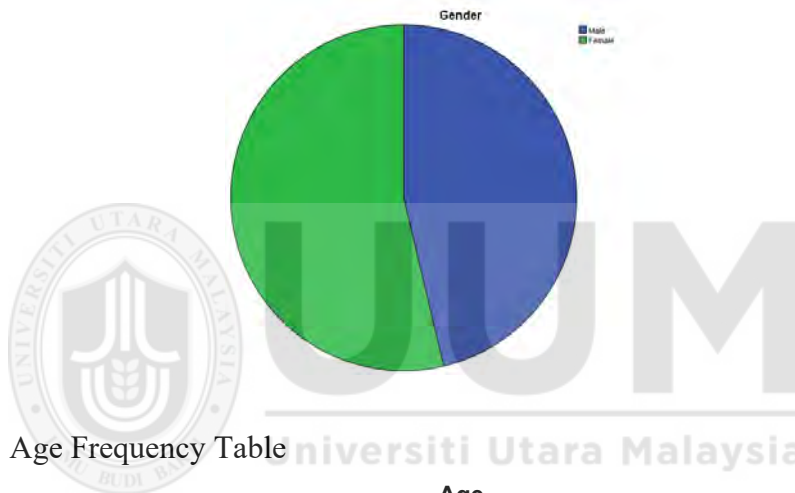
-End of questionnaire. Thank you for your cooperation-
(-Kaji selidik tamat. Terima kasih atas kerjasama anda-)

Appendix B

Descriptive Analysis of Respondents' Demographic Profiles

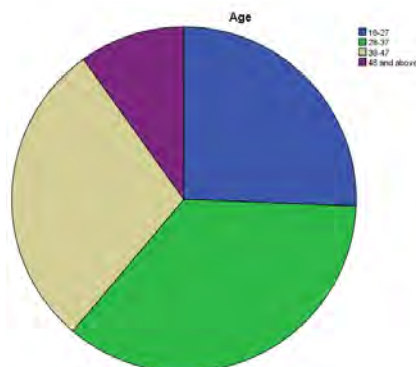
1. Gender Frequency Table

		Gender			Cumulative Percent
		Frequency	Percent	Valid Percent	
Valid	Male	168	46.3	46.3	46.3
	Female	195	53.7	53.7	100.0
	Total	363	100.0	100.0	



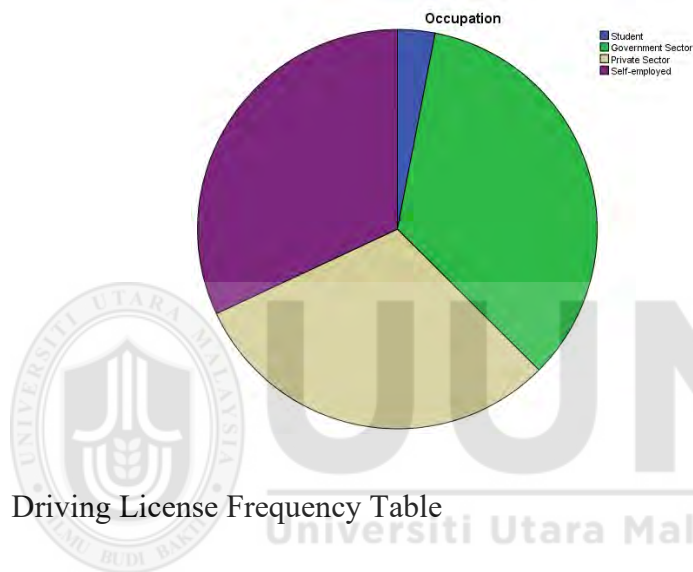
2. Age Frequency Table

		Age			Cumulative Percent
		Frequency	Percent	Valid Percent	
Valid	18-27	93	25.6	25.6	25.6
	28-37	129	35.5	35.5	61.2
	38-47	105	28.9	28.9	90.1
	48 and above	36	9.9	9.9	100.0
	Total	363	100.0	100.0	



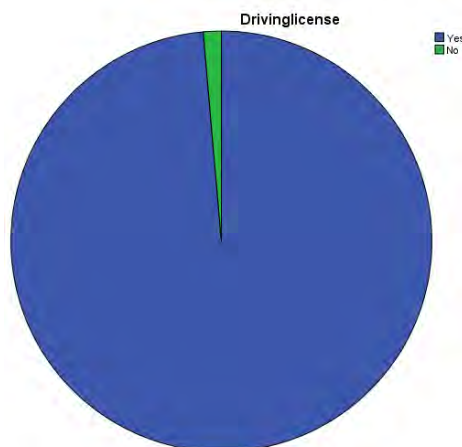
3. Occupation Frequency Table

		Occupation			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Student	11	3.0	3.0	3.0
	Government Sector	125	34.4	34.4	37.5
	Private Sector	111	30.6	30.6	68.0
	Self-employed	116	32.0	32.0	100.0
	Total	363	100.0	100.0	



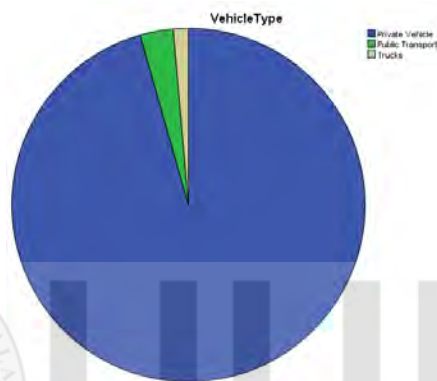
4. Driving License Frequency Table

		Drivinglicense			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	358	98.6	98.6	98.6
	No	5	1.4	1.4	100.0
	Total	363	100.0	100.0	



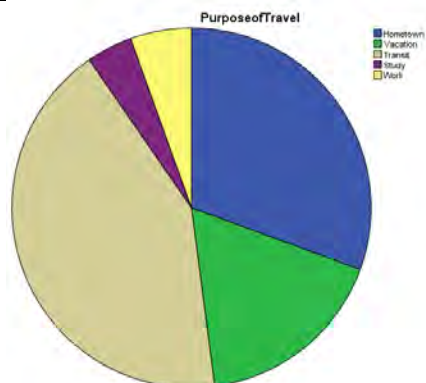
5. Vehicle Type Frequency Table

		VehicleType			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Private Vehicle	347	95.6	95.6	95.6
	Public Transport	11	3.0	3.0	98.6
	Trucks	5	1.4	1.4	100.0
	Total	363	100.0	100.0	



6. Purpose of Travel Frequency Table

		PurposeofTravel			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Hometown	111	30.6	30.6	30.6
	Vacation	63	17.4	17.4	47.9
	Transit	154	42.4	42.4	90.4
	Study	15	4.1	4.1	94.5
	Work	20	5.5	5.5	100.0
	Total	363	100.0	100.0	



Appendix C

Descriptive Statistics of the Variables

1. Reliability

Descriptive Statistics			
	N	Mean	Std. Deviation
REL1	363	3.54	.943
REL2	363	2.22	.720
REL3	363	3.50	.967
Valid N (listwise)	363		

2. Responsiveness

Descriptive Statistics			
	N	Mean	Std. Deviation
RES1	363	3.52	.929
RES2	363	2.22	.748
RES3	363	3.49	.944
Valid N (listwise)	363		

3. Tangibles

Descriptive Statistics			
	N	Mean	Std. Deviation
TAN1	363	2.44	.873
TAN2	363	3.38	.963
TAN3	363	2.40	.826
TAN4	363	2.75	.984
Valid N (listwise)	363		

4. Road sign

Descriptive Statistics			
	N	Mean	Std. Deviation
RS1	363	3.50	.908
RS2	363	3.50	.908
RS3	363	3.50	.908
RS4	363	2.31	.680
Valid N (listwise)	363		

5. Safety

Descriptive Statistics

	N	Mean	Std. Deviation
SAF1	363	3.59	.925
SAF2	363	3.47	.992
SAF3	363	3.50	.967
Valid N (listwise)	363		

6. Road user satisfaction

Descriptive Statistics

	N	Mean	Std. Deviation
RUS1	363	3.44	.977
RUS2	363	3.47	.992
RUS3	363	2.15	.672
Valid N (listwise)	363		



UUM
Universiti Utara Malaysia

Appendix D

Reliability Test

1. Reliability

Reliability Statistics

Cronbach's Alpha	N of Items
.699	3

Item Statistics

	Mean	Std. Deviation	N
REL1	3.54	.943	363
REL2	2.22	.720	363
REL3	3.50	.967	363

2. Responsiveness

Reliability Statistics

Cronbach's Alpha	N of Items
.717	3

Item Statistics

	Mean	Std. Deviation	N
RES1	3.52	.929	363
RES2	2.22	.748	363
RES3	3.49	.944	363

3. Tangibles

Reliability Statistics

Cronbach's Alpha	N of Items
.745	4

Item Statistics

	Mean	Std. Deviation	N
TAN1	2.44	.873	363
TAN2	3.38	.963	363
TAN3	2.40	.826	363
TAN4	2.75	.984	363

4. Road sign

Reliability Statistics

Cronbach's Alpha	N of Items
.816	4

Item Statistics

	Mean	Std. Deviation	N
RS1	3.50	.908	363
RS2	3.50	.908	363
RS3	3.50	.908	363
RS4	2.31	.680	363

5. Safety

Reliability Statistics

Cronbach's Alpha	N of Items
.948	3

Item Statistics

	Mean	Std. Deviation	N
SAF1	3.59	.925	363
SAF2	3.47	.992	363
SAF3	3.50	.967	363

6. Road user satisfaction

Reliability Statistics

Cronbach's Alpha	N of Items
.806	3

Item Statistics

	Mean	Std. Deviation	N
RUS1	3.44	.977	363
RUS2	3.47	.992	363
RUS3	2.15	.672	363

Appendix E

Correlation Test

Correlations		CMREL	CMRES	CMTAN	CMRS	CMSAF	CMSRUS
CMREL	Pearson Correlation	1	.915**	.040	.046	.933**	.934**
	Sig. (2-tailed)		.000	.452	.386	.000	.000
	N	363	363	363	363	363	363
CMRES	Pearson Correlation	.915**	1	.013	.053	.856**	.926**
	Sig. (2-tailed)	.000		.798	.315	.000	.000
	N	363	363	363	363	363	363
CMTAN	Pearson Correlation	.040	.013	1	.022	.005	.020
	Sig. (2-tailed)	.452	.798		.683	.920	.708
	N	363	363	363	363	363	363
CMRS	Pearson Correlation	.046	.053	.022	1	.030	.062
	Sig. (2-tailed)	.386	.315	.683		.574	.241
	N	363	363	363	363	363	363
CMSAF	Pearson Correlation	.933**	.856**	.005	.030	1	.931**
	Sig. (2-tailed)	.000	.000	.920	.574		.000
	N	363	363	363	363	363	363
CMSRUS	Pearson Correlation	.934**	.926**	.020	.062	.931**	1
	Sig. (2-tailed)	.000	.000	.708	.241	.000	
	N	363	363	363	363	363	363

** . Correlation is significant at the 0.01 level (2-tailed).

Appendix F

Multiple Regression Analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.964 ^a	.930	.929	.201	.930	951.899	5	357	.000

a. Predictors: (Constant), CMSAF, CMTAN, CMRS, CMRES, CMREL

ANOVA^a

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	193.233	5	38.647	951.899	.000 ^b
Residual	14.494	357	.041		
Total	207.727	362			

a. Dependent Variable: CMSRUS

b. Predictors: (Constant), CMSAF, CMTAN, CMRS, CMRES, CMREL

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	-.208	.079		-2.640	.009		
CMREL	.130	.054	.119	2.397	.017	.079	12.703
CMRES	.464	.037	.430	12.415	.000	.163	6.145
CMTAN	.007	.015	.006	.452	.651	.987	1.013
CMRS	.022	.015	.020	1.431	.153	.995	1.005
CMSAF	.372	.032	.450	11.556	.000	.129	7.762

a. Dependent Variable: CMSRUS

Collinearity Diagnostics^a

			Condition	Variance Proportions					
				(Constant)	CMREL	CMRES	CMTAN	CMRS	CMSAF
1	1	5.831	1.000	.00	.00	.00	.00	.00	.00
	2	.094	7.875	.01	.01	.01	.20	.07	.02
	3	.050	10.802	.00	.00	.00	.51	.47	.00
	4	.014	20.108	.93	.00	.00	.27	.46	.02
	5	.008	27.277	.05	.00	.58	.00	.00	.42
	6	.003	46.844	.00	.99	.40	.01	.00	.54



UUM
Universiti Utara Malaysia

Appendix G

Respondent Interview



Source: Nur Farihatul Solehah (2024)

Appendix H

Google Form



FACTORS INFLUENCING ROAD USER SATISFACTION FROM BUKIT KAYU HITAM TO ALOR SETAR, KEDAH

Assalamualaikum and Greetings,

My name is Nur Farihatul Solehah, students from the School of Technology Management and Logistics, College of Business at Universiti Utara Malaysia (UUM), currently conducting a survey focusing *Road User from Bukit Kayu Hitam to Alor Setar, Kedah* for my Master of Science in Transportation and Logistic Management requirement of BPMZ69912 Research Paper dissertation on:

"FACTORS INFLUENCING ROAD USER SATISFACTION FROM BUKIT KAYU HITAM TO ALOR SETAR, KEDAH"

I gratefully invite you to take part in this study as requirement for completing my master's program. This survey will takes about 3 to 5 minutes to fill and please read the instruction given to answered the questionnaire carefully.

All information given is **CONFIDENTIAL** and will be used only for this study.

If you have any questions, please do not hesitate to contact: Nur Farihatul Solehah (012-3526624 or farihatuls3@gmail.com)

I would like to express my gratitude in advance for your time and response which are important to this research.

Section 1: Please fill in your information below

Bahagian 1: Sila isi maklumat anda di bawah

Gender (Jantina) *

☐ Male (Lelaki)

☐ Female (Perempuan)

Age (Umur) *

☐ 18 - 27

☐ 28 - 37

☐ 38 - 47

☐ 48 and above (48 dan ke atas)

Occupation (Pekerjaan) *

☐ Student (Pelajar)

☐ Government Sector (Sektor kerajaan)

☐ Private Sector (Sektor swasta)

☐ Self-employed (Bekerja sendiri)

Driving license (Lesen memandu) *

☐ Yes (Ya)

☐ No (Tidak)

Vehicle Type (Jenis kenderaan) *

☐ Private Vehicle (Kenderaan Persendirian)

☐ Public Transport (Pengangkutan Awam)

☐ Trucks (Trak)

☐ Other: _____

Purpose of Travel (Tujuan perjalanan) *

☐ Hometown (Kampung Halaman)

☐ Vacation (Bercuti)

☐ Transit (Persinggahan)

☐ Study (Belajar)

☐ Work (Kerja)

☐ Other: _____

Section 2: Please choose the number in the box to indicate how far you satisfied or unsatisfied with each statement by using the following scale:

Bahagian 2: Sila pilih nombor dalam kotak untuk menunjukkan sejauh mana anda berpuas hati atau tidak berpuas hati dengan setiap pernyataan dengan menggunakan skala berikut:

1 – Very Satisfied

2 – Satisfied

3 – Neither Satisfied nor Satisfied (N)

4 – Unsatisfied

5 – Very Unsatisfied

(VS)

(S)

(N)

(U)

(VU)

ROAD USER SATISFACTION (RUS)

KEPUASAN PENGGUNA, JALAN RAYA

RUS1: Has the condition of roads improved? *
(Adakah keadaan jalan raya bertambah baik?)

1

2

3

4

5

☐
☐
☐
☐
☐

RUS2: Did the travel time of your frequent trips decrease or increase? *
(Adakah masa perjalanan perjalanan kerap anda berkurangan atau meningkat?)

1

2

3

4

5

☐
☐
☐
☐
☐

RUS3: How satisfied are you with the roads in general? *
(Sejauh manakah anda berpuas hati dengan jalan raya secara umum?)

1

2

3

4

5

☐
☐
☐
☐
☐



FACTORS INFLUENCING ROAD USER SATISFACTION FROM BUKIT KAYU HITAM TO ALOR SETAR, KEDAH

Your response has been recorded

[Edit your response](#)
[Submit another response](#)

This content is neither created nor endorsed by Google. [Report Abuse](#) · [Terms of Service](#) · [Privacy Policy](#)

Google Forms

Appendix I

Bukit Kayu Hitam Road





Source: Nur Farihatul Solehah (2024)