

Flexible Train Ticketing System (FlexTT)

By

Gehan Yahya Yahya Alsalat

13459

Dissertation Submitted in Partial Fulfillment of the Requirements
For the Bachelor of Technology (Hons)
(Information & Communication Technology)

AUGUST 2012

Universiti Teknologi PETRONAS
Bandar Seri Iskandar
31750 Tronoh
Perak Darul Ridzuan

CERTIFICATION OF APPROVAL

Flexible Train Ticketing System (FlexTT)

By

Gehan Yahya Yahya Alsalat

A project dissertation submitted to the
Computer and Information Science Programme
Universiti Teknologi PETRONAS
in partial fulfillment of the requirement for the
BACHELOR OF TECHNOLOGY (Hons)
(INFORMATION & COMMUNICATION TECHNOLOGY)

Approved by,

(Dr. Rohiza Binti Ahmad)

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
AUGUST 2012

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

GEHAN YAHYA YAHYA ALSALAT

ABSTRACT

With the advent of ICT technologies especially the Internet, most business related operations are now conducted online. This includes the train ticket reservation. Many systems all over the world have implemented online train ticketing reservation; however they still have some limitations that require using some manual procedures. In this final year project, an attempt to develop a web-based system that provides an easy and flexible reservation procedures to overcome the problems in the existing systems. The purpose of this report is to give an overview on the Prototyping-based method which has been chosen by Author to develop this system and to show how this web-based system (Flexible Train Ticketing System (FlexTT)) would make it easy and convenient for users to perform tickets reservation anytime, anywhere with less time consuming and cost effective. Using this particular system, user is able to search for, book, pay, change and cancel a ticket at the touch of button, that means presence in the ticket counter no longer required. Furthermore Green IT concept is implemented in FlexTT by replacing paper tickets with mobile tickets. Besides FlexTT is able to detect passengers' absence and utilizes these seats. The scope of this final year project will be mainly on developing online functions (booking, cancellation and change ticket's date and time) and functions that are performed by sending and receiving short messaging service(SMS), which are(ticket cancellation, check ticket's status and notifications).

Keywords

FlexTT, Online Booking, Online Cancellation, SMS Cancellation, Online Payment, Utilization of Seats, mobile-Ticket(m-Ticket), Green IT.

ACKNOWLEDGMENTS

Praise be to Allah, The Most Gracious and The Most Merciful for His endless blessings throughout my life and the success He granted me during this Final Year Project.

My utmost appreciation and gratitude is towards my supervisor Dr. Rohiza Binti Ahmad for the dedication of her time and efforts, teaching, guiding me despite her many other obligations and always keeping her door open. Her knowledge, experience and support were very much helpful in passing so many obstacles that I faced. The trust she had on me pushed me forward towards achieving my goals.

My appreciation is also extended to my university (Universiti Teknologi PETRONAS) for providing me all the necessary assets and resources, not only to accomplish my tasks, but to enrich my character and knowledge further.

My appreciation is also extended to my family members for their continuous support and sincere prayers. Last but not least, I thank my friends, Wadhah, Fatimah, Arafat, Sabrin, Sameha, Leena, Gill , Areeg , Raja, Mihrab, Samah, Ahlam and Ebthal and everyone else who encouraged and supported me throughout four years of undergraduate studies.

TABLE OF CONTENTS

CERTIFICATE OF APPROVAL	i
CERTIFICATE OF ORIGINALITY	ii
ABSTRACT	iii
ACKNOWLEDGMENTS	iv
TABLE OF CONTENTS	v
LIST OF FIGURE	vii
LIST OF TABLES	ix
CHAPTER 1: INTRODUCTION	
1.1 Background of Study	1
1.2 Problem Statement	3
1.3 Significant of the Project	5
1.4 Objectives	5
1.5 Scope of The Study	6
1.6 Beneficiaries	6
CHAPTER 2: LITERATURE REVIEW & THEORY	
2.1 Technologies and Methods	8
2.1.1 Online Reservation	8
2.1.2 Online Payment Gateway	9
2.1.3 Online Refund Coupon	10
2.1.4 SMS Gateway	11
2.1.5 Mobile Ticket	12
2.2 Related Work	14
2.2.1 KTM Online Ticketing System	14
2.2.2 Indian Railways	15
CHAPTER 3: METHODOLOGY	
3.1 Prototyping-Based Methodology	17
3.1.1 Planning	19
3.1.2 Analysis	21
3.1.3 Design	22
3.1.3.1 System Architecture	22
3.1.3.2 Diagrams	24
3.1.4 Implementation	28

3.1.4.1 User Interface Design	28
3.1.4.2 Implement of FlexTT Functions	32
A. Implement Sign up function	32
B. Implement Sign In Function	32
C. Implement Train Schedule	33
D. Implement Online Search Function	34
E. Implement Online Booking Function	34
F. Implement Online Cancellation Function	35
G. Implement Online Date and Time Changes.	36
H. Implement Online Ticket Checking	36
I. Install Modem Software	37
J. Install SMS Server (Ozeki NG Server)	38
K. Implement SMS Cancellation and Ticket's Status Checking Functions	39
L. Prepare Pre- SEDX Poster	40
3.1.5 Verification and Validation	41
3.2 Key Milestone	41
3.3 Gantt Chart	43
3.4 Tool	44
3.4.1 System Hardware Requirements	44
3.4.2 System Software Requirements	44
CHAPTER 4: RESULTS AND DISCUSSION	
4.1 Result from survey	45
4.2 Data analysis (Survey)	52
4.3 Data analysis (Interviews-KTM)	53
4.4 Data analysis (Interviews–users)	54
4.5 Result from Usability Test	57
4.6 Data Analysis from Usability Test	61
CHAPTER 5: CONCLUSION AND RECOMMENDATIONS	
REFERENCES	63
APPENDIX	64

LIST OF FIGURE

Figure1:	Booking Ticket From Office Counter	4
Figure 2:	SMS Services Using Ozeki Server	12
Figure 3:	Mobile Ticket Principle	13
Figure 4:	Payment Method in KTM	15
Figure 5:	Prototyping-based methodology	18
Figure 6:	Online Questionnaire	21
Figure 7:	System Architecture	23
Figure 8:	Use Case Diagram (users)	24
Figure 9:	Use Case Diagram (System)	25
Figure 10:	Use Case Diagram (Verify Ticket)	25
Figure 11:	Sequence Diagram (booking)	26
Figure 12:	Sequence Diagram (Cancelation)	27
Figure 13:	Layout Principle	28
Figure 14:	Content awareness Principle	29
Figure 15:	User Experience Principle	30
Figure 16:	Consistency Principle	31
Figure 17:	Minimal user effort Principle	31
Figure 18:	Sign Up Form	32
Figure 19:	Sign in Form	33
Figure 20:	Train's Schedule	33
Figure 21:	Searching Table	34
Figure 22:	Online Booking and Printed Ticket	35
Figure 23:	Online Cancellation	35
Figure 24:	Change Ticket's Date or Time	36
Figure 25:	Online Check Ticket's Status	37
Figure 26:	GSM Modem-D-link DWM652	37
Figure 27:	Ozeki NG Server	38
Figure 28:	SMS Cancellation	39
Figure 29:	Check Ticket's Status	39
Figure 30:	Pre-EDX Poster	40
Figure 31:	Gantt Chart	43
Figure 32:	Status	45

Figure 33:	Age	46
Figure 34:	Subscribed Bank	46
Figure 35:	Online Banking	47
Figure 36:	Type of Transportation	47
Figure 37:	Booking Type	48
Figure 38:	payment Type	48
Figure 39:	Methods of Cancellation	49
Figure 40:	Cancellation Refund	49
Figure 41:	Refunded Ticket	50
Figure 42:	Opinion of FlexTT	50
Figure 43:	Miss the Train	51
Figure 44:	Users' opinion	51
Figure 45 :	Refund for Tickets Cancelled Last Minute	52
Figure 46 :	FlexTT is User Friendly	57
Figure 47 :	FlexTT has Smooth procedures	58
Figure 48 :	FlexTT contents and labels is very clear and consistent	58
Figure 49 :	FlexTT has Friendly Interface	59
Figure 50 :	Able ot use FlexTT with Minimal Efforts	60
Figure 51 :	Time spent using FlexTT	60
Figure 52 :	FlexTT is Good to be Implemented in Real Life	61

LIST OF TABLES

Table1:	Acronyms and Abbreviations Table	2
Table 3:	How FlexTT Will Increase the Revenue Of Train Company	6
Table 2:	System Hardware Requirements	44
Table 3:	System Software Requirements	44
Table 4:	Percentage of Online Booking for KTM and ETS	54

CHAPTER 1

INTRODUCTION

1.1 Background Of Study

In the 21st century, technology has influenced many aspects of people's life, including the way many of people make reservations. Whether booking tickets for a seat on an airplane or a room in a hotel, online booking systems make the booking procedures fast and easy, providing the customers with free access to the system anytime, anywhere and with less time and efforts.

Currently, In Malaysia, traveling by train has become one of the most popular ways of transportation for Malaysian Citizens and International Immigrants. It is very safe, convenient, fast and less costly comparing to traveling by car .By increasing the number of customers who are using the train as their type of transportation, it becomes very necessary to come up with online system that make it easy for users to book/pay/cancel/check their tickets.

The existing train company in Malaysia (KTM Berhad) has two types of train services, KTM intercity and ETS (Electronic Train Service). KTM intercity has already implemented online reservation while ETS still use manual booking and cancelation procedures, although online reservation has been implemented in KTM intercity but it still has some limitations. These limitations are, firstly, cancellation of the tickets requires the customer to present in the counter. Secondly, user can not change the tickets details (date, time, destinations) unless he or she must go to ticketing counter. Thirdly there is no waiting list feature that allow user to apply for waiting list. Fourthly online payment works only with credit card (visa, MasterCard and American Express).

Considering the above limitations , Flexible Train Ticketing System(FlexTT) is chosen by author to overcome these issues, FlexTT provides flexible reservation procedures that allows user to search, book, pay and cancel a ticket using online solutions and also cancel and check tickets by SMS. Furthermore FlexTT solves the problem of online payment that KTM has, as FlexTT allows customer to pay using their debit accounts (Saving or current account) using local payment gateway for example MEPS(Malaysian Electronic Payment System) which provides online payment for six online banks(Bank Islam, CIMB Bank (CIMB Clicks & CIMB Biz Channel),Hong Leong Bank, Maybank (M2U & M2E), Public Bank, RHB Bank).

Table 1: Acronyms and Abbreviations Table

Item No.	Acronym/Abbreviation	Description
1.	FlexTT	Flexible Train Ticketing System
2.	SMS	Short Messaging Service
3.	UTP	Universiti Teknologi PETRONAS
4.	SV	Supervisor
5.	KTM	Keretapi Tanah Melayu Berhad.
6.	ETS	Electric Train Services
7.	MEPS	Malaysian Electronic Payment System
8.	IR	Indian Railways
9.	EE	Electrical and Electronic
10.	ICT	Information & Communication Technology
11.	SSL	Secure Sockets Layer
12	SEDX	Science & Engineering Design Exhibition (Event in UTP)
13	QR	Quick Response Code

1.2 Problem Statement

1.2.1 Problem Identification

In Malaysia, the current online system being used for train ticketing system has some limitations as following:

- I. Cancellation of the tickets requires the customer to present in the counter which is not convenient as it requires the customers to travel all the way to the train counter and waste their time and sometimes waste their money especially if the cost of coming to the train counter exceeds the price of ticket's refund.
- II. Online payment only works with (Visa, MasterCard and American Express) credit cards, which is not practical since having credit card is difficult for individuals who did not have career placements or high income and train users are normally from individuals who do not have credit card.
- III. No waiting list function, which allows customer to be wait listed in preferred journey.
- IV. Ticket amendment(change the date and time of the journey) requires the customer to present in the counter.
- V. Obtain student's discount requires the student to present in the counter and show their student ID.
- VI. Using online booking, customer has to print the ticket using their own printer or come early to train office counter and print it there by providing ticket reference, this would require the customer to have a printer, otherwise coming early to train office counter to print the ticket, which reflects the aim of the online booking; as the customer still visit the counter.

- 1- Inside the train, checking the tickets is done manually by one the train staff, which does not detect the absence of passengers, thus utilize empty seats, as the train may travel with empty seats while there are some passengers from another stations who are willing to travel in that particular journey.

Problems with ETS system that still use the manual booking and cancelation:

- I. Booking , paying for , cancellation and getting refunded money are done manually that required the passenger to pass by the counter and queue for long time



Figure 1: Booking Ticket from Office Counter

- II. Checking seats availability can be done by calling customer service and also by using KTM website, but it is updated in every one hour.
- III. Cancelation of the ticket required passenger to come to the counter.
- IV. In case of journey cancelation, refund is 100% but passenger has to queue for long time to get the refund.
- V. Getting ticket discount (for student) required the presence of the passenger in the time of booking or at least bringing the student ID.
- VI. There are no restrictions that organize the passenger check in or check out (passengers may take advantage and pay less for their journey by booking a ticket with nearer station)

1.3 Significant of the Project

Author has chosen this project based on her personal experience with the existing train ticketing system, with all the problems and difficulties she faced in every single journey from and to UTP during her internship period, this encouraged her to develop this system to overcome all issues. So that, in this project, the existing problem of using counter to check, book, pay, and cancel a ticket will be replaced by more flexible technologies which is online/SMS solutions. The project would provide customers an easy way and accurate result in booking. This totally online solution would reduce time and effort spent. Moreover, helps improve the economy of many countries as well as the profits of businesses of the train ticketing company and improves efficiencies and increased sales and revenue.

1.4 Objectives

The main objective of this project is to develop reservation system for a train company with the following features:

- I. Booking the ticket can be done online or by coming to the counter.
- II. Cancellation of the ticket can be done online or by SMS.
- III. Passenger can check the ticket status online and by SMS.
- IV. Customers can instantly check availability rather than checking over the phone or presents in the train counter.
- V. Customer can change the ticket time or date.
- VI. Customer can apply for waiting list for particular journey.
- VII. Ensure maximum occupancy of the train seats since the empty seats due the absence of passengers is utilized as the system will verify the mobile tickets using QR (Quick Response) code and detect passengers' absence.
- VIII. For getting student discount, inserting student detail in the time of online booking is enough to get the discount, because checking student ID will be done inside the train.

1.5 Scope Of The Project

Regarding to the time constrains, the scope of FlexTT project will mainly focus on online services (booking, canceling and check ticket status, change ticket date and time) and SMS services (cancelation, notification and check ticket status), however it is important to note that, for future enhancement, author is willing to implement the waiting list features, mobile ticket, seats utilization.

1.6 Beneficiaries:

FlexTT would be beneficial to the following:

- **Customer:** online transaction would made customer's lives easier in terms of time and energy saving. It allows customers to book or cancel at the touch of button.

- **Business Owner:**
 - **Train Company:** providing flexible booking procedure would lead to customer satisfaction which leads to increase number of customers with lastly lead to more profits.
 - **Payment Gateway Company:** Since FlexTT is using online payment, this would provide more profit for the payment gateway provider.

Table 2: How FlexTT Will Increase The Revenue Of Train Company

Purchase	Cancellation	Refund	Repurchase	Revenues
Yes	Yes	50% or 100%	-	50% or 0%
Yes	-	-	-	100%
Yes	Yes	50%	Yes	150%
Yes	- (Miss train)	No refund	Yes	200%

Referring to the table above, it shows that due to the flexibility of FlexTT, it generates more revenue to the train company, as the revenue could reach 200% , this happen when FlexTT will detect the absence of passenger in real time, so the empty seat will be utilized by another person from coming stations.

- **Environment:** FlexTT is a Green-IT system since it aims to reduce using paper ticket by implement mobile ticket with QR code.

CHAPTER 2

LITERATURE REVIEW

2.1 Technologies and Methods

2.1.1 Online Reservation

Online travel and ticket booking is one of the top E-Commerce industries. As they present a mix of products: flights, hotels, tickets, restaurants, activities and vocational packages [11]. By any measure, travel reservations constitute one of the largest and fastest growing segments of electronic commerce. Moreover online travel continues to be one of the most successful e-commerce categories on the Internet [12]

According to Dave Evans “Online booking systems are becoming increasingly prevalent in today’s society across various industries, it provides a whole host of online booking benefits for companies and consumers in contrast to old-fashioned face-to-face, telephone and fax.” . By implementing online booking, company’s business is opened for 24/7 so the customers can instantly check availability rather than have to check over the phone or via email. Staff save valuable time dealing with bookings and can spend their time elsewhere on more pressing issues. Clients can check availability and book instantly, thus completing a booking without having to wait for staff to confirm.[13]

On the other hand, as increasing number of people book online, existing e-ticket systems can not satisfy customers' growing demand. Customers complain about most of the current e-ticket systems for the lack of "reservation" functionality. They also complain that these systems are not "intelligent" enough as a traditional travel agent who can deal with more complicated personal preferences and due to these complains, some customers still rely on traditional travel agents instead of booking online. Traditional travel agents take advantage of their expertise and intelligence to help customers to save time on search; meanwhile they can provide support during customer’s decision making process. Therefore, it is very necessary for the online ticket

booking systems to support reasoning functionality and provide more intelligent services. [12]

In Malaysia, the number of customers who book their tickets using online booking are only 3% of total number of passengers, author had visited KTM main office in Kuala Lumpur and conducted an interview with Mr. Kesavan , who is responsible about KTM online system, he mentioned that only 200 passengers per day who are booking using online system, which is only 3% of the total number of passengers, this statistic shows that, the online ticketing system in Malaysia needs some enhancements that would encourage users to book online.

2.1.2 Online Payment Gateway

Worldwide proliferation of the Internet led to the birth of electronic commerce, a business environment that allows the transfer of electronic payments as well as transactional information via the Internet. Electronic commerce flourishes based upon the openness, speed, anonymity, digitization, and global accessibility characteristics of the Internet. The technological aspect of an electronic payment system includes the system's expandability, its efficiency and security in handling each transaction, its compatibility with other payment systems, and its level of complexity for consumers to adapt to the system. Above all, security is an utmost technical concern.[14]

Online transaction is convenience, it removes administrative resources required by invoices, cheques and cash also it can benefit businesses by extending customer base; boosting cash flow; reducing costs; enhancing customer service and improving competitive advantage.[1] Currently, payment through internet became very secure compare to previous time this is duo to the secure connection that SSL (Secure Sockets Layer).

Disadvantage of using credit card for payment over debit card is that not all people has a credit card while FlexTT implements more flexible payment method using

MEPS- Financial Process Exchange (FPX), FPX is an alternative payment channel for customers to make payment at e-market places such as websites and online stores. It leverages on the Internet banking services of participating banks and provides fast, secure, reliable, real-time online payment processing. FPX provides a complete end-to-end business transaction, resourceful payment records, simplified reconciliation and reduced risks as fund movements are between established financial institutions.

Supported by the local financial institutions, such as Bank Islam Malaysia Berhad, CIMB Bank, Hong Leong Bank Berhad, Maybank Berhad, Public Bank Berhad dan RHB Bank.[17]

2.1.3 Online Refund Coupon

There may be circumstances in which it is necessary to refund tickets, for example for any reason, the train might be cancelled, or the customer might cancel the ticket within allowable time, in such circumstances, the train's company has to find a flexible and efficient way to refund the ticket price back to the customer, one of these existing ways is that, the money will be refunded back to the same credit card/debit card that used in the time of booking. This refund approach seems to be efficient and comfortable but it does not work with customers who need to use this refunded money immediately, as this approach takes long time, almost a week. Furthermore, not all customers have purchased their ticket using online transaction, they may booked the ticket from the counter, so it become very important to come up with a solution that provide easy and convenient refund procedure, FlexTT is implementing online refund coupon concept, where the customer will be given three refund options, first, the refunded money will be sent back to the credit or dept card, second to get it is a refunded coupon that can be used for another purchase, thirdly to get the refund as a cash by visiting the nearest FlexTT counter.

2.1.4 SMS Gateway

The initial use of Short Messaging Service (SMS) was for notifying a mobile user of voicemail. Soon after that, SMS evolved to become one of the most successful mediums for communication and a channel to provide value added services. SMS broadcasting is the delivery of information to mobile phones via the Internet and SMS gateway. [2]

SMS campaign gives companies the ability to run campaigns via the SMS medium. This includes the ability to create polls, feedback systems, automated inquiries, coupons, call center call backs & etc via 2-way messaging.[2].

FlexTT is going to use this SMS services for ticket cancelation, targeted users can now use his/her mobile phone to cancel a ticket instead of having to be seated in front of a computer or present in the office counter, also FlexTT will use SMS campaign to inform passengers about train journey status notifications such as reminder of journey date and time, delays and cancellations. In the past it was difficult to have accurate media channel to reach passengers quickly. But nowadays with the developed communication, almost all users now carrying a mobile device, this would help FlexTT to reach its customer and provide them with accurate and up to date information.

FlexTT would use the SMS services for ticket cancelation, which will make it very easy for customer to cancel the ticket any time, simply with sending SMS with cancel instruction following by the ticket code. Then customer will receive SMS asking for confirmation. As the customer confirm, the ticket will be cancelled and refund coupon details will be sent to the customer by SMS as well as will be updated in customer's account in FlexTT.

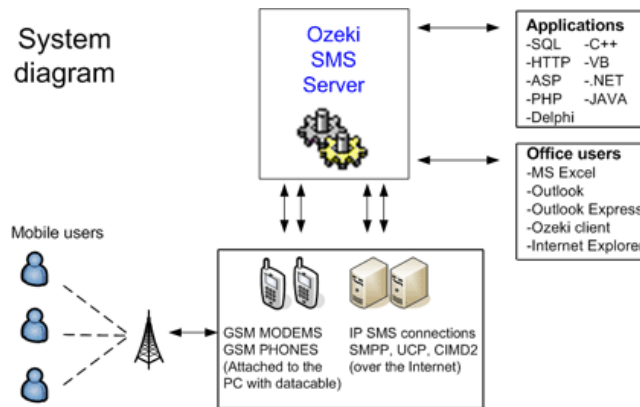


Figure 2: SMS Services Using Ozeki Server

2.1.5 Mobile Ticket

M-Ticket is a SMS-based mobile coupon and mobile ticketing service; it is 100% compatible with all mobile phones. M-Ticket technology enables the scanning, redemption and tracking of unique digital coupons and tickets from basically every mobile phone in the market [3].

Travelers, ticket issuers and agents and Mobile Network Operators (MNOs) alike could benefit from value added services designed to enhance the travel and entertainment experience that could be created for, delivered to and consumed on the mobile device alongside an M-Ticket[16]

Ease of use was seen as a key potential benefit of M-Ticketing. The use of a mobile phone makes it convenient to buy tickets while on the move or away from a normal purchase point; this helps users to avoid queues and make better use of ‘dead’ time. [15]

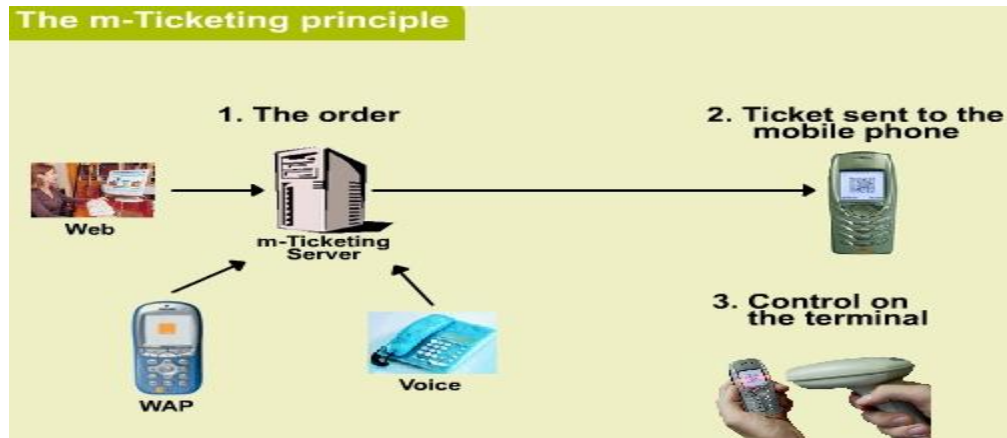


Figure 3: Mobile Ticket Principle

Benefits of M-ticket:

1. Improved consumer convenience.
2. Increased revenue by increasing accessibility of tickets.
3. Considered as Green IT since it is replacing paper ticket and reduced ticket printing/ mailing cost.

Disadvantages

1. Can be forged.
2. People may not own a phone.
3. If the phone battery runs out, the mobile ticket is made unusable.

FlexTT is implementing M-ticket to provide a flexible solution to obtain the ticket easily without the need of printing especially if the customer does not have a printer, or when the customer is booking a ticket while on the move(using online booking through smart phone) or away from printer.

Furthermore, the aim of using this technology is to control and verify tickets in efficient way that allow FlexTT to detect the passenger's absence, because every tickets will be verified by QR quick response code reader and FlexTT database will be updated with the empty seats which can be utilized.

2.2 Related Work

2.2.1 KTM Online Ticketing System

There are some existing train ticketing systems in the market. In Malaysia the current system KTM, it is implementing online booking but they do not implement online/SMS cancelation and check ticket status.

Advantages

This KTM system implements online booking, online payment and allow users to check availability of tickets.

Disadvantages

From KTM terms & conditions, it states the following:

- “Advance booking may be made within 30 days prior to travel date. However, tickets cannot be purchased through this web-site for travel less than 48 hours from departure time”[17] this is not a flexible booking since it allows user to use online booking only before 48 hours.
- “Minimum amount for each transaction should be at least RM/SGD20.00”[17]. if single journey costs less than RM 20, user has to book for two ways journey, which is not convenient to users who is willing to use train service for one way and thinking to return using other type of transportation.
- Payment method in KTM system involve only Visa, MasterCard and American express, while in FlexTT there is MEPS FPX option which allow users to book using their debit account (saving/ current) from six banks in Malaysia.

Maybank

Summary Of Payment

Merchant Name : KTM BHD-E-TICKET (EC)
Merchant Email : farihan@ktmb.com.my
Amount : MYR 42.00
Order No/Reference No/Bill Acc No : 12010317168146

Payment Information

Credit card no. :

Credit Card Type :

Expiry Date (MM/YY) :

Security Code :

VERIFIED by VISA
MasterCard SecureCode
AMERICAN EXPRESS

○ Figure 4: Payment Method in KTM

- “No refund, cancellation or transfer is allowed via this web-site. However request for refund of ticket may be made at any KTM ticket counters upon presentation of the ticket ID and Reference numbers as proof “[17]
 - Cancellation of the ticket, required passenger to present in KTM counter and present the ticket while in FlexTT, cancelation can be done online or by SMS.
- “Discounted fares or concessions are not applicable for purchase via E-Ticket” [17] while in FlexTT user can obtain the discounted fares by inserting the student id or discount code. As these proofs will be checked by train staff inside the train because the system has real time connection to the database and can detect the passengers who has discounted fair.

2.2.2 Indian Railways

Indian Railways (IR) has 114,500 kilometers of total track over a route of 65,000 kilometers and 7,500 stations. It has the world's fourth largest railway network after those of the United States, Russia and China.. The railways carry over 30 million passengers. It is the world's fourth largest commercial or utility employer, by number of employees, with over 1.4 million employees. As for rolling stock, Indian Railways owns over 240,000 (freight) wagons, 60,000 coaches and 9,000 locomotives.[15]

Comparing to Malaysia, Indians are using train as their type of transportation since 1853. A huge number of passengers is travelling by train daily, as a result, Indian Railways reservation system is one of the best systems that provide online ticketing reservation, it provides online booking, online cancellation, it also provide SMS Service (checking Train Alert, Train Status, Seat Availability, Train Schedule, Train Information, Train Time Table, Train Fares) and implementing M-ticket (mobile ticket), furthermore, one of the unique feature of Railway is that, train ticket can be generated through ATM machine[9] however cancellation of I- Ticket(booked ticket is sent via courier) required passenger to present in the office counter or send it to IR address while FlexTT provide online and SMS cancellation for both type of tickets(e-tickets and tickets from counter).

CHAPTER 3

METHODOLOGY

3.1 Prototyping-based Methodology

In this final year project, Prototyping-based Methodology was chosen by author because this methodology used usually when the business process is likely to be changed as the project proceeds or when the project sponsor has little idea of what system to be built. The analysis, design, and implementation phases performed concurrently and on each cycle resulting in a system prototype that will be reviewed by the project sponsor. The cycle repeated continually based on the sponsor comments until the prototype successfully meets the requirements. The last prototype will then be called the system.

This method would be helpful to the developed FlexTT system as the “analysis, design and implementation” phases would work concretely. Furthermore FlexTT system requires efficient and accurate results so that interaction with the user or sponsor from time to time is required. The main elements that this methodology goes through are the following:

- Requirements gathering and system development planning.
- Basic analysis and design will be conducted and immediately starting work on a quick system prototype.
- An initial system prototype will be developed with the minimum features of the system. This first system prototype will be shown to the user to get comments.
- Based on user’s comments analysis, design and implementation phases will be repeated and new features will be added.
- Process will be repeatedly performed until the system is completed.

Prototyping development needs only initial basic analysis and design, but as the result important system functions may not be recognized until somewhere in the middle of project timeline. Thus there is a possibility to alter the initial design decision and start all over again from the beginning. It can delivers system quickly to users, though it not exactly meets the requirements [10].

Besides, author would prefer this way to really understand user's requirements. Sometimes even though system requirements have been listed after discussing them with users, at the end of system development life cycle, user may not find the system meets the expectations. Thus, author would prefer to engage user in the system development life cycle to make sure final system is as expected by the user. Moreover, Timeline of the system development is limited as developer has to finish it in a short time. Consequently this methodology is chosen because of its advantage of saving time and cost. With this methodology system prototype is developed quickly and main functions may be produced first. In another hand, Prototyping methodology may not be the best methodology for complex systems.

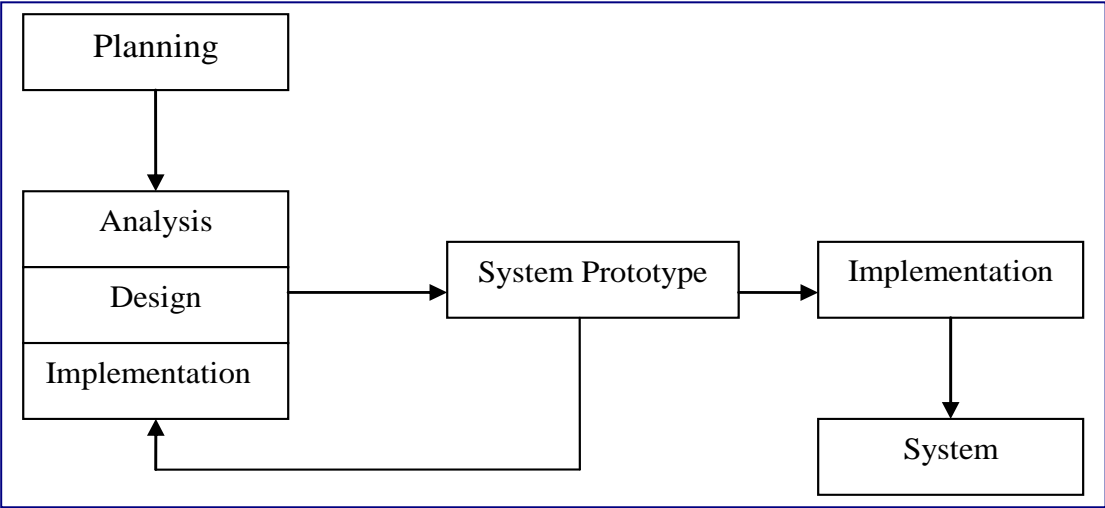


Figure 5 : Prototyping-based Methodology

3.1.1 Planning

The planning phase is the fundamental process in FlexTT project initiation and management. During the project initiation, the system's business values are identified and the system's feasibility analyses are presented to the supervisor who accepted and approved the project idea. After the approval, requirements are gathered, analyzed and validated. The Project activities for planning phase as following:

3.1.1.1 Feasibility study

FlexTT system feasibility analyses are presented to author's supervisor with full explanation about the volubility of this system. Technically and financially FlexTT can be built, it is a web-based system which developed using HTML, PHP, and MySql. It is required using GSM Modem-D-link DWM652 which is available in UTP wireless lab.

3.1.1.2 Preliminary Data Gathering

a) Direct Observation

An individual were observed by author when they were booking using existing system. From this observation, author could observe individuals' behavior towards the current services in KTM, one of these behaviors is , customer are getting frustrated when they are queuing especially when they are willing to book a ticket for the nearest journey as in busy days the queue can reach 45-50 people , and sometimes they got a ticket but for a journey which is one or two hours later, this is due to the poor customer service that KTM has, which does not clearly inform customer about the availably of seats, which cause that, customer has to come early to be able to get a seat.

b) Interviews

Interviewers were chosen carefully by the author, depending on their frequent and interests of using train services. author had visited KTM main office in Kuala Lumpur and conducted two interviews with two of KTM staff, author also had conducted an interview with a lecturer from IT Department Dr Low Tan Jung and two postgraduate students from Electrical and Electronic Engineering Department, who are traveling by train almost every week , author had also interviewed six other people who are using the train as their type of transportation while travelling to another state in Malaysia.

After these interviews took place, author could get clear idea of users' opinions and needs, author asked the interviewers an open-ended questions that provide more details that would help author to understand and analysis the current problems in existing train ticketing system and also to find the best solution for these problems. Author also got some recommendations and suggestions from the interviewers which are explained in result and discussion chapter.

c) Literature Study

A literature study is a study in which author is searching in the internet for any existing train ticketing system, selected papers, and journals to find out the best solution of implementing unique and flexible system, and trying to overcome the current issues that the existing systems have.

As stated in the literature review, author has conducted full research on the technologies that are implemented in FlexTT which are online booking, online payment using credit and debit account, refund coupon, online/SMS cancelation, mTicket and seats utilization. Author critically discusses on their advantages and limitation of these technologies and how they would provide flexibility to FlexTT.

d) Questionnaire

A questionnaire is a research tool which consists of a series of questions for the purpose of gathering information from respondents. With the powerful features that Google Questionnaire has, author used it to gather user's behaviors, views and opinions about the existing system as well as about FlexTT.

Author has designed the questions that contain 13 questions that obtain demographic details and users' behaviors and opinions. By using Google Questionnaire, author could contact a large number of people at a relatively low cost in short time. However, using closed questions makes it too difficult to examine complex issues and opinions.



The image shows a screenshot of an online questionnaire titled "Flexible Train E-ticketing System". The form is overlaid on a background image of a clock. The questionnaire includes several sections with radio buttons and checkboxes:

- Required**
- Your Status :**
 - Employee
 - Student
- Your Age :**
 - 15-20
 - 21-30
 - 31-40
 - 41-50
 - 51-60
 - 61-70
 - 71+
- Your Subscribed bank :**
 - You may choose more than one.
 - Bank Islam
 - CIMB
 - Hong Leong Bank
 - MyBank
 - Public Bank
 - RHB Bank
 - Other:
- Which online banking do you use :**
 - You may choose more than one.
 - CIMB (CIMB clicks, CIMB Biz Channel)
 - Hong Leong Bank
 - MyBank

Figure 6: Online Questionnaire

3.1.2 Analysis

During the analysis phases, it is necessary to investigate the current system, identify improvement opportunities, and develop a concept for FlexTT. The analysis strategy is developed to analyze the current system and to design a new system. Then the requirement's gathering through interviews leads to the development of a concept for a new system. The analysis, system concept, and the models are combined into a document.

3.1.3 Design

The design phase determines the system specification on how the system will operate. This leads to the development of the basic architecture design for the system that describes the hardware, software and network structure that will be used. The interface design specifies how the user will move through the system and the reports that the system will use. Besides, database and file specifications are developed by defining the location and data to be stored.

3.1.3.1 System Architecture

The term system architecture describes the overall design and structure of a system. As information technology has expanded to include a wide range of physical devices, a method is required to organize and connect these items together in a cohesive manner. It also describes complex computer software tools that include multiple modules.

For a web-based train ticketing system, its architecture consists of server that holds the database and the system and provides the information and responds to the client's request, client computer which sends the request to the server in order to use the system, client phone which send cancelation SMS or check status SMS, and handset device to verify tickets which integrate to the system database to check passengers tickets and update passengers' presence and database of the system as stated in the following figure:

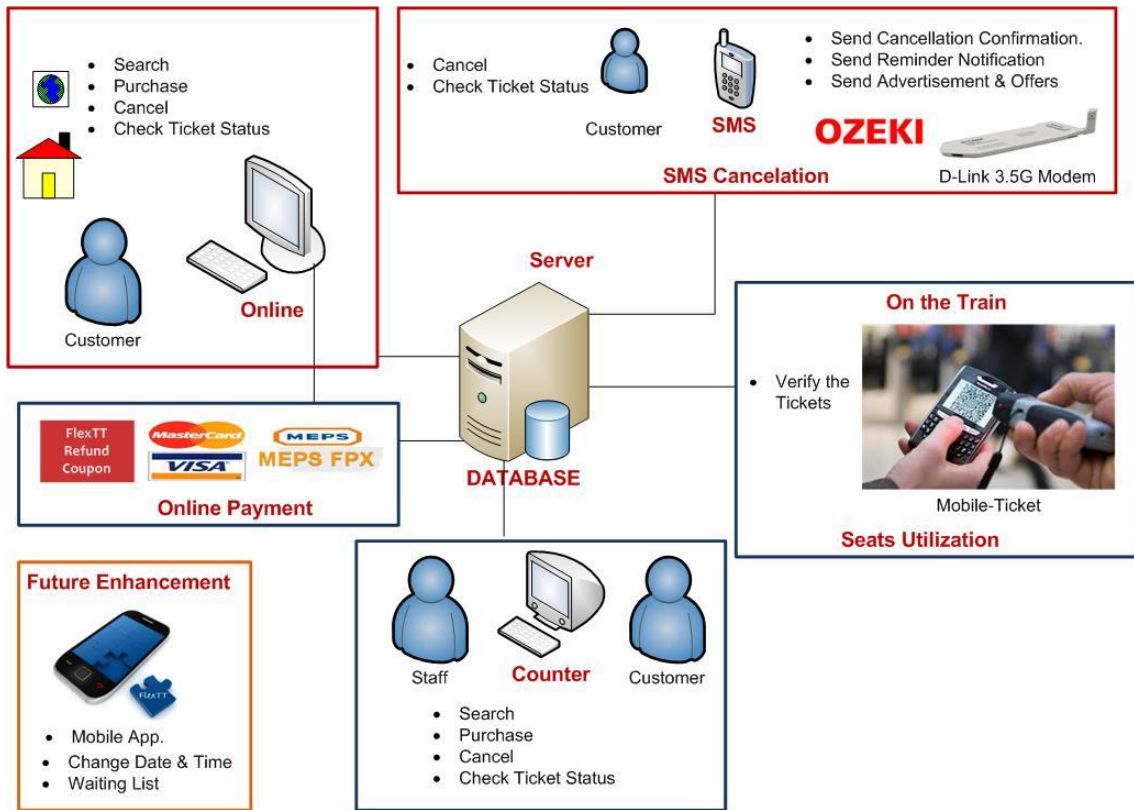


Figure 7: System Architecture

a) Online booking

It is the web-based system that allow customer to search, book, pay, check and cancel a ticket, and also to change ticket’s date and time. It is developed using Html, php web language with mysql database.

b) SMS Services

FlexTT system provides a new feature which was not developed before, it allow customer to check their ticket status, cancel ticket by sending SMS then receive confirmation SMS , once customer cancel the ticket, the database has to be updated so that cancelled ticket can be used by another customer and ticket’s refund money will be as refund coupon that the customer can use it for future purchase. Furthermore SMS will be sent to the customer as a reminder of journey date and time. For this service, 3.5G modem will be integrated with FlexTT system to provide two ways SMS between user and FlexTT system.

c) Online Payment & Refund Coupon

In FlexTT system, payment for ticket is done through online payment services, FlexTT provide flexible payment through different online payment methods, which are credit card account, debit account, and FlexTT refund coupon.

d) M-ticket and utilization of empty seats

Inside the train, a handset device for verifying ticket will be integrated with the system database, m-tickets will be verified inside the train to figure out absence passengers so these empty seat can be utilize by another passenger from coming station, who is willing to travel by this specific journey.

3.1.3.2 Diagrams

Use case diagram (1 of 2)

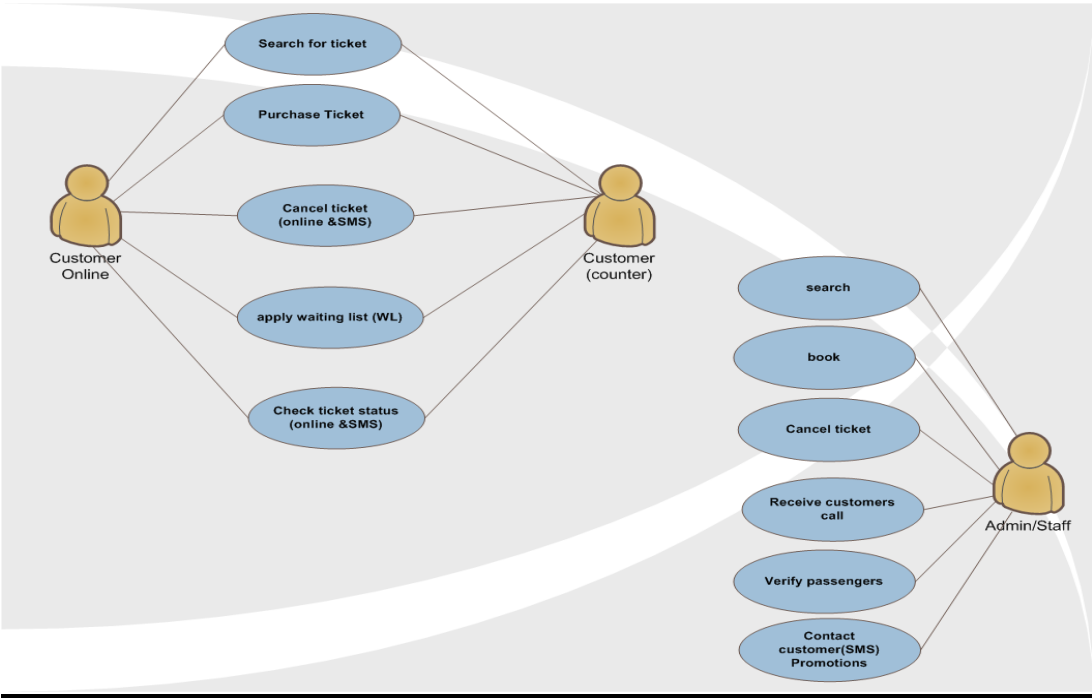


Figure 8: Use Case Diagram (users)

Use case diagram (2 of 2)

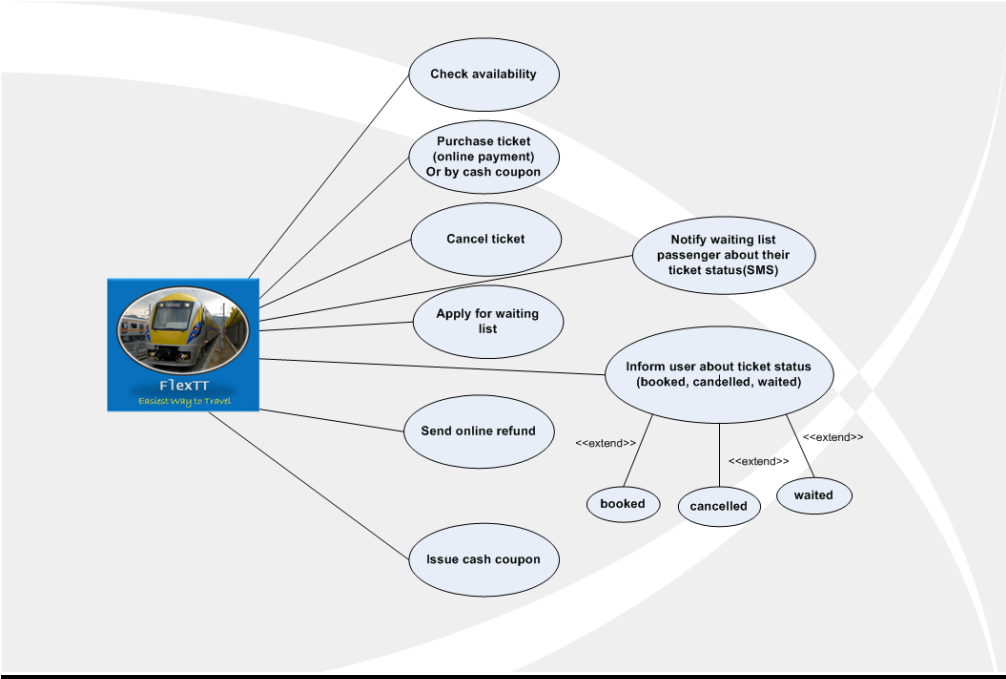


Figure 9: Use Case Diagram (System)

Use case diagram (1 of 3)

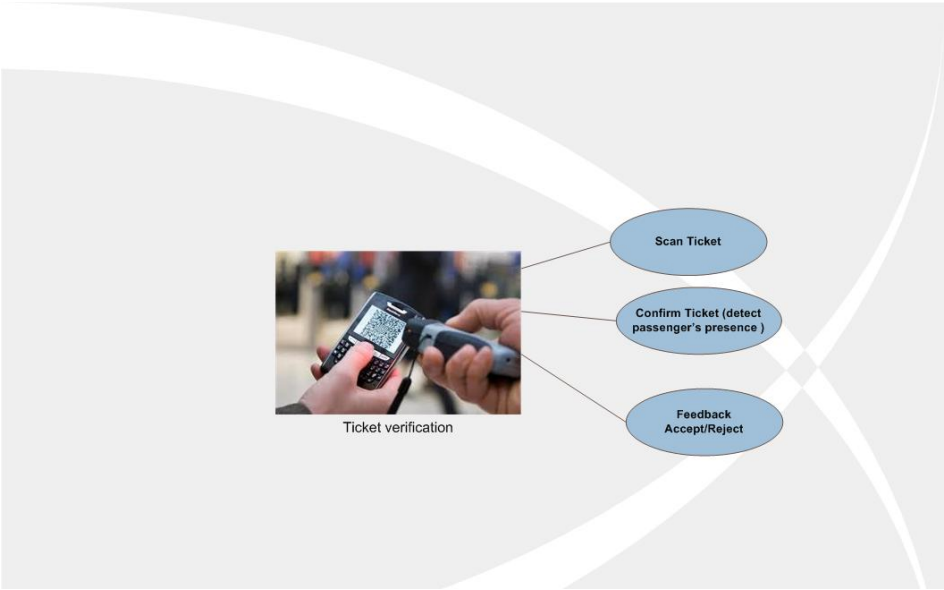


Figure 10: Use Case Diagram (Verify Ticket)

Sequence Diagram (booking Ticket)

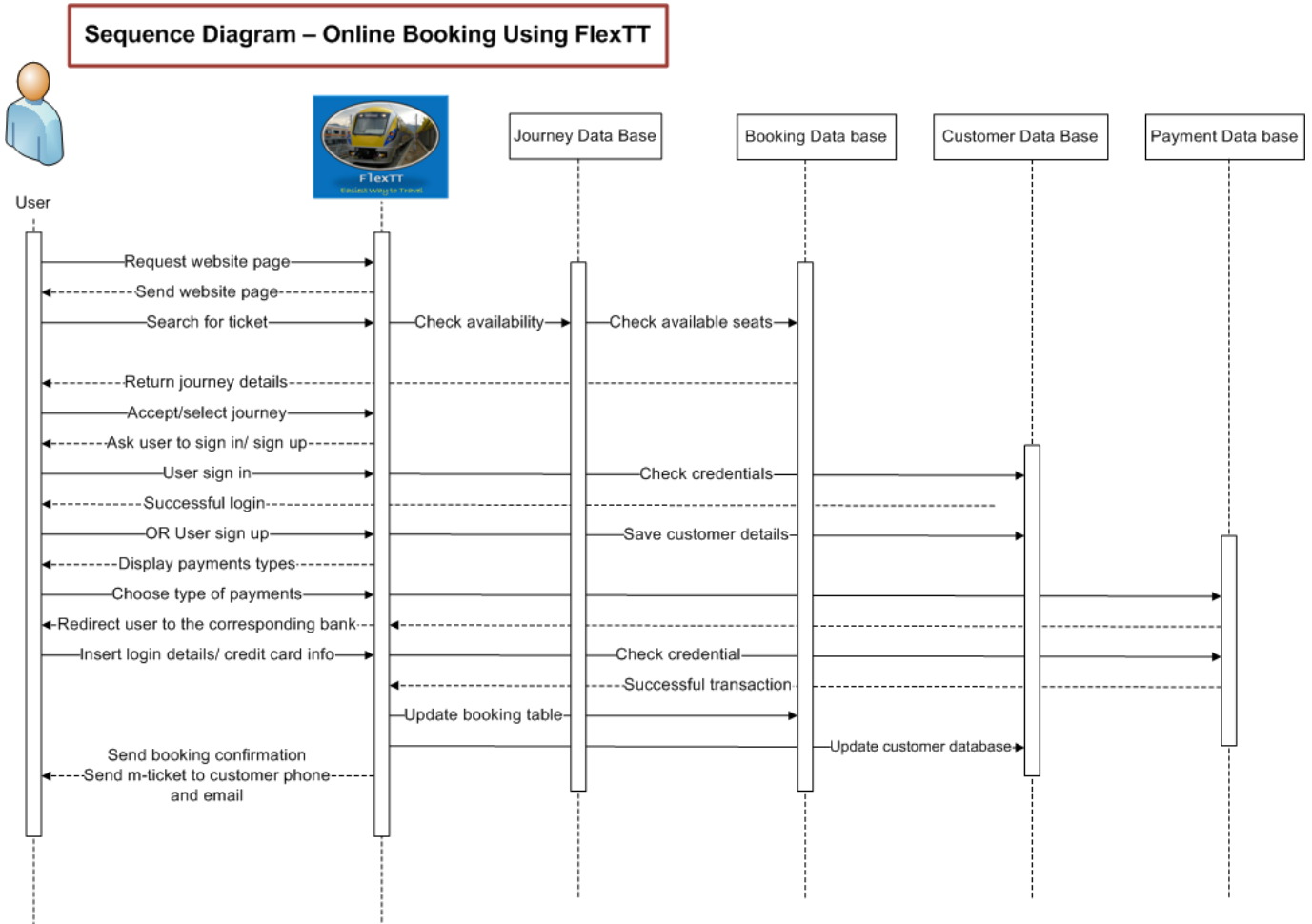


Figure 11: sequence Diagram (booking)

Sequence Diagram (Cancelling Ticket)

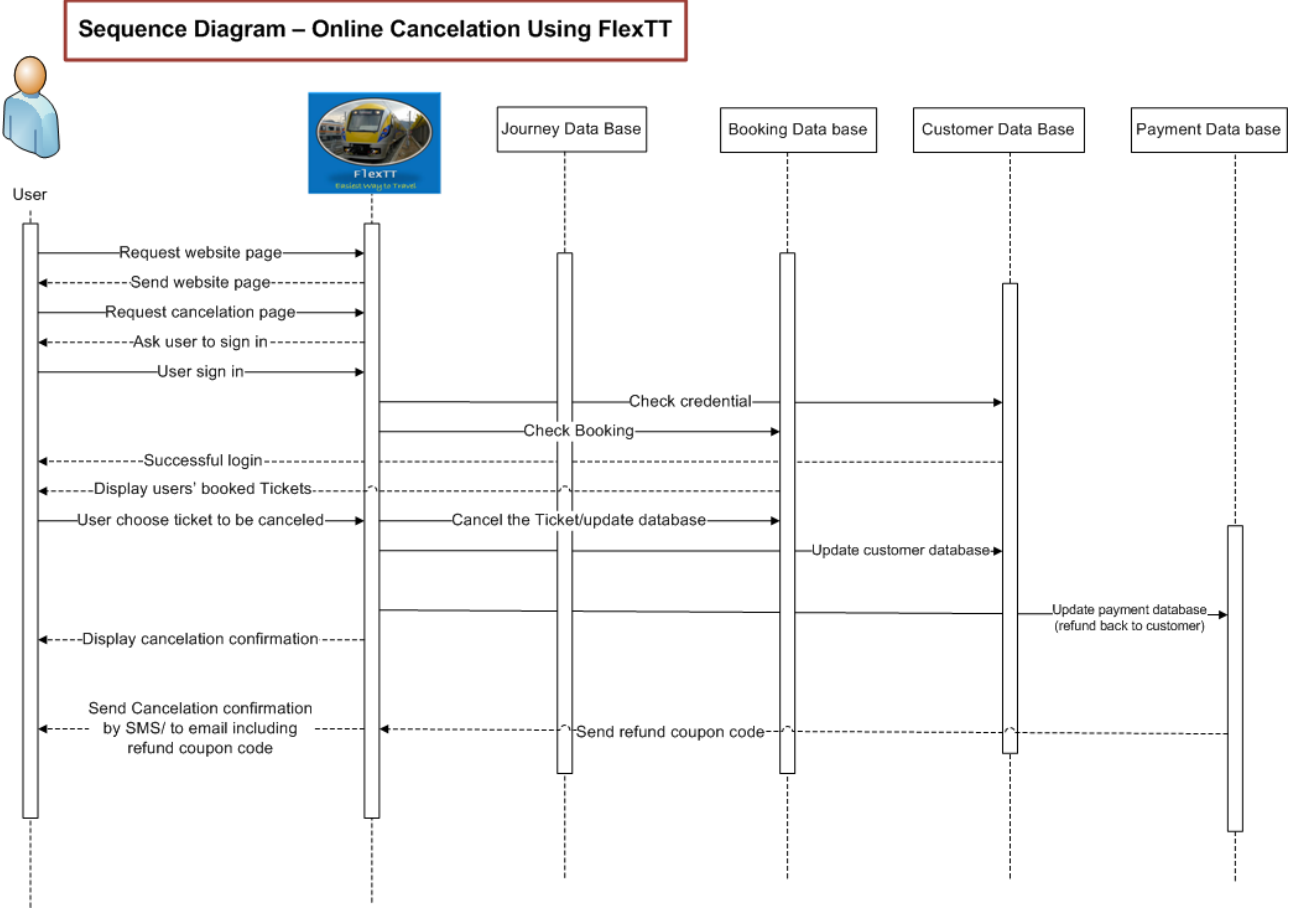


Figure 12: sequence Diagram (Cancellation)

3.1.4 Implementation

During this phase, there will be system construction to build and test the system to ensure it performs as designed. Then it will come with the first prototype which is usually the first part of the system that the user will use.

3.1.4.1 User Interface Design

Description of the user interface

FlexTT interface has been designed according to six principles of user interfaces design, so that it will be able to attract user and give users great satisfaction and good user experience while using this system. Every design in was purposely chosen by author based on the principles for example:

a. Layout

FlexTT website design is divided into a few main boxes which are the navigation area which is at left side of the page except, the work area which is located at the middle of the page and the status area which is located at the bottom of the page.



Figure 13: Layout Principle

b. Content awareness

The function of this principle is for the user to alert where actually there are. Content awareness principle will give the customer knowledge about where are they during the buying transaction and the user will not frustrate according to the user experience. The users should always be aware of the information is being displayed. In order to make sure that the customer could keep track their transaction we provide title to alert them. We also provide short and specific title for better view and memory.



Figure 14: Content awareness Principle

c. Aesthetics

The principle of aesthetics has been implemented to the interface design to ensure that the interface is pleasing to the eyes of the customer. This is because author was very concern as the customers are the main element that will support the survival of the FlexTT System. Author used blue as the theme color because this color gives pleasure and clam mood to the customer. Blue also show professionalism in conducting a business. Other than that author used another color which is white.

d. User experience

User experiences are the most important things that will make sure that FlexTT interfaces are successful enough to attract the users' attention. User experience is actually what the user feel about the interfaces. That is why the usage of color, the label and the title is easy to be finding and hence will avoid customers' frustration, and of course will lead to the users' satisfaction.

User experiences also related to usability, weather the website is reliable, user friendly, safe to be used or not. FlexTT interface are user friendly as author use simple and common word that usually understandable by the customer.

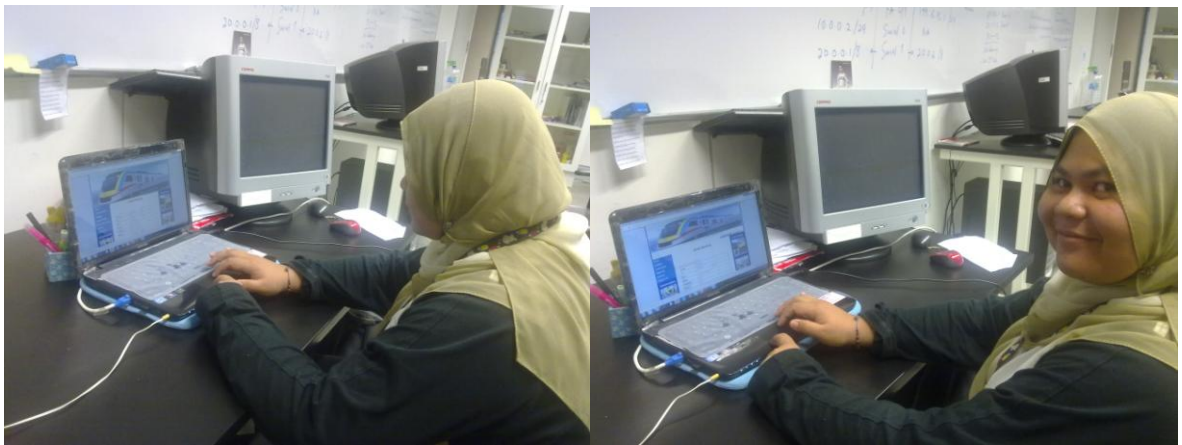


Figure 15: User Experience Principle

e. Consistency

FlexTT interfaces are design to be similarly operated and use similar elements for similar task. By doing so, customer will be easier to learn and use even for the novice users. Besides, consistency of the system capable to help users remember how to use it easily. Other than that, consistency is essential to avoid confusion for the users while using the system.

Consistency principle will make sure that the elements and the operations use for each page is the same. This is to ensure that the customer to memorizes the steps in using the websites. Not only that, it will be easy to learn and use. This will lead to the customer satisfaction.



Figure 16: Consistency Principle

f. Minimal user effort

Customer usually prefers to get what they want as fast as possible. According to the concept of three click rules, user should be able to go from the start or main menu of the system to the information or action they want in three clicks only.

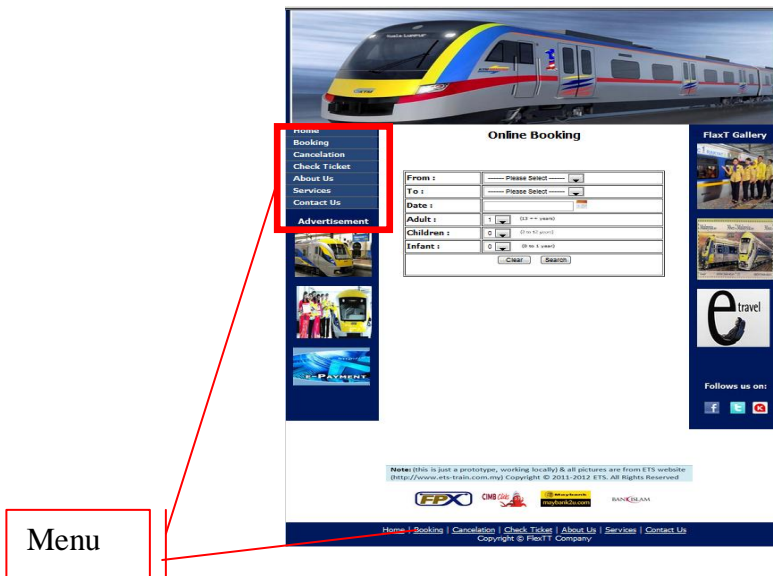


Figure 17: Minimal user effort Principle

3.1.4.2 Implementation of FlexTT Functions

A. Sign up function

In order for a user to use FlexTT, he/she has to sign up first to obtain an account that can be accessed to book, cancel, check ticket's , change the ticket's date or time. User will sign up by inserting his/her details including the email as user name and phone number; as a result FlexTT will have contacts for its customers to inform its customers about the new offers besides remind them about their journey date and time.



Figure 18: Sign Up Form

B. Sign In Function

User is required to sign in before he/she can book, cancel and check a ticket, this is because every user will have an account that will have all the information of booking details, enabling the customer to check their tickets status , cancel a ticket and change the ticket time.

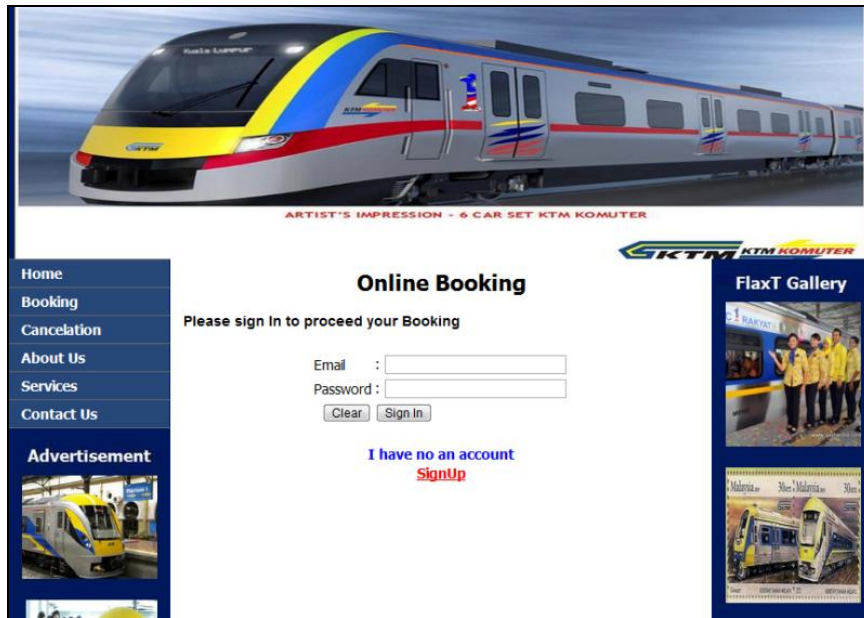


Figure 19: Sign in Form

C. Train Schedule

User can check train's schedule for all fixed journeys with their scheduled time and prices, this would make the process of searching more efficient.

From	To	Time	Price (RM)
Kuala Lumpur	Ipoh	08:00am	25
Kuala Lumpur	Seremban	10:00am	23
Kuala Lumpur	Singapor	01:00pm	100
Ipoh	Kuala Lumpur	02:00pm	25
Seremban	Kuala Lumpur	04:00pm	23
Singapor	Kuala Lumpur	06:00pm	140

Figure 20: Train's Schedule

D. Online Search Function

FlexTT has a flexible search function that allow user to search for available journeys and their times and numbers of available seats. User will choose the origin, the destination, date, and number and type of passengers.

Online Booking	
From :	Kuala Lumpur
To :	Ipoh
Date :	15-AUG-2012
Adult :	1 (13 + years)
Children :	0 (2 to 12 years)
Infant :	0 (0 to 1 year)
<input type="button" value="Clear"/> <input type="button" value="Search"/>	

Figure 21: Searching Table

E. Online Booking Function

Once user search for and select the targeted journey, user will go through online payment process that required him/her to use either credit, debit card or online banking. Upon user's confirmation of booking, M-ticket will be sent to his phone and also it can be printed.

From technical side, ticket will be booked and it will have ticket number and ticket code. The ticket is generated randomly so every ticket will be having a unique code that is used in time of SMS cancellation.

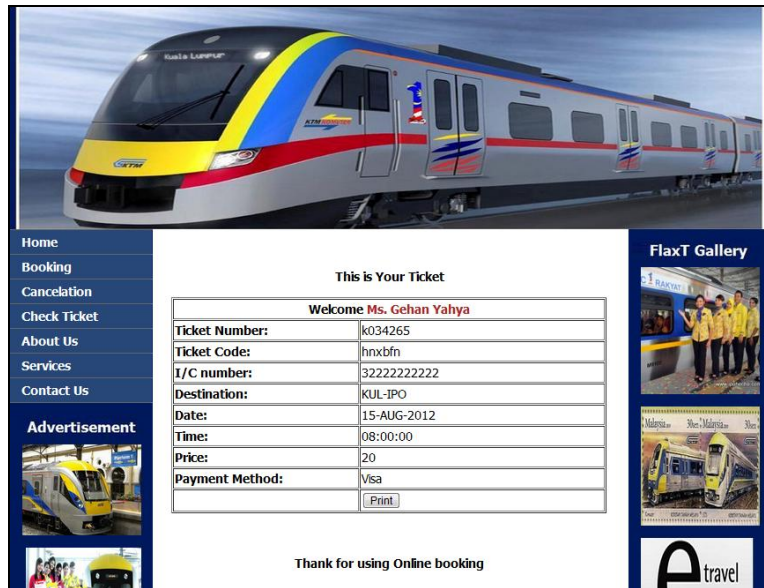


Figure 22: Online Booking and Printed Ticket

F. Online Cancellation Function

Ticket which was booked using online can be cancelled online, user has to click on cancellation link then user will require to sign in into his/her account. Once user successfully sign in, all the valid tickets which were booked by this particular user will appear, and user can choose the journey that he/she wants to cancel, then upon user's cancellation confirmation, the ticket will be cancelled, and released to be booked by another user.

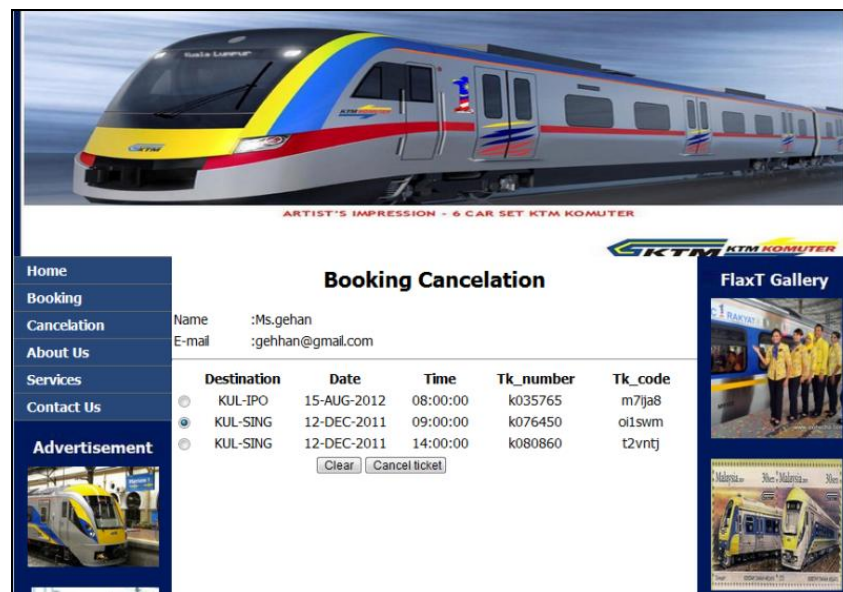


Figure 23: Online Cancellation

G. Online Date and Time Changes.

In some cases, user need to change the ticket's time and date, FlexTT provides this flexible function. User has to click on change time ticket link, then user will be directed to sign in page that requiring him/her to sign in, then user can change the time and date, if the new date and time is available, to the new ticket will be booked in the targeted new date and time, and the old ticket will be released to be booked by another user.

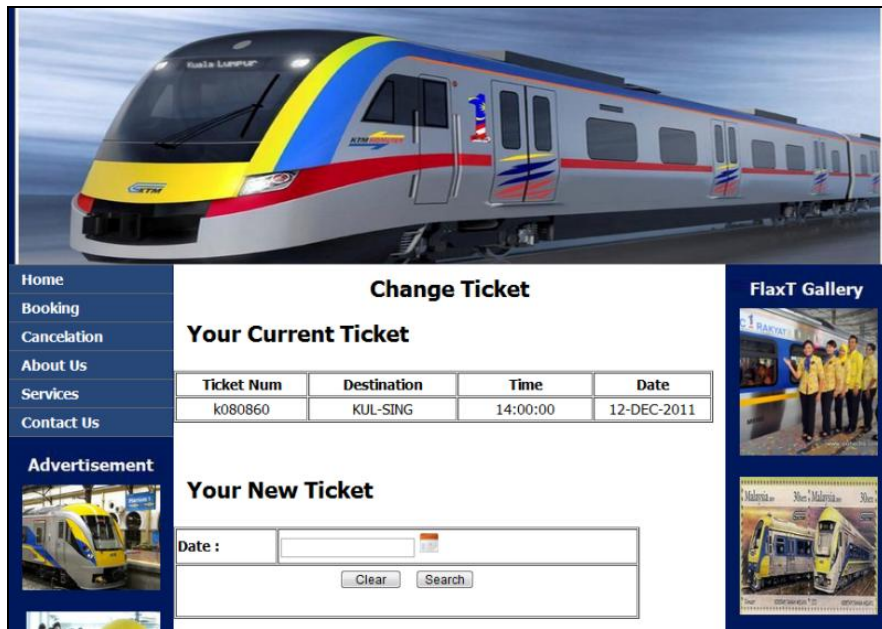


Figure 24: Change Ticket's Date or Time

H. Online Ticket Checking

User also can check his/her ticket's status by clicking on check ticket hyperlink, then user will be directed to sign in page, then all tickets that this particular user book or cancel will appear

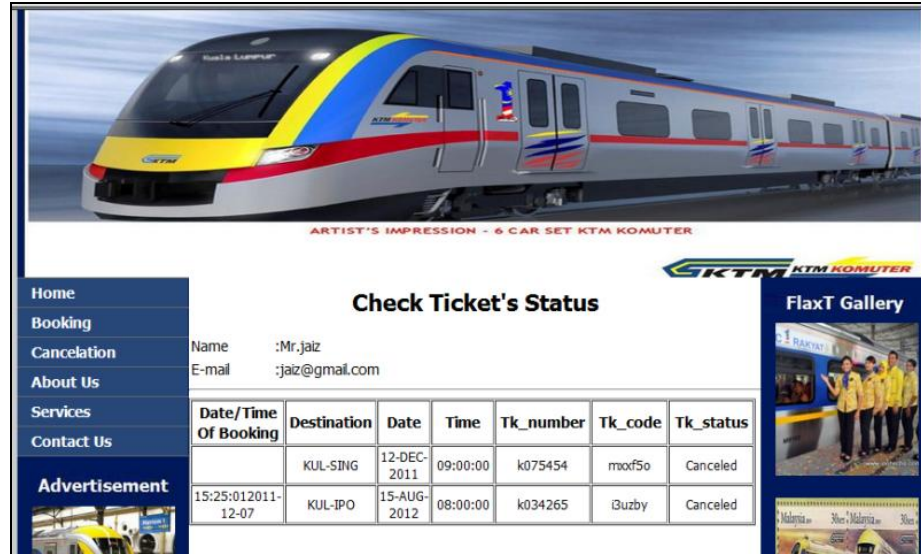


Figure 25: Online Check Ticket's Status

I. Install Modem Software (GSM Modem-D-link DWM652)

D-link DWM652 is a 3.5G GSM modem that integrated with SIM card to send and receive SMS from and to FlexTT users. Author installed its software to her laptop and now author is in the process of connecting this modem with Ozeki NG server which will be explained in the next step.



Figure 26: GSM Modem-D-link DWM652

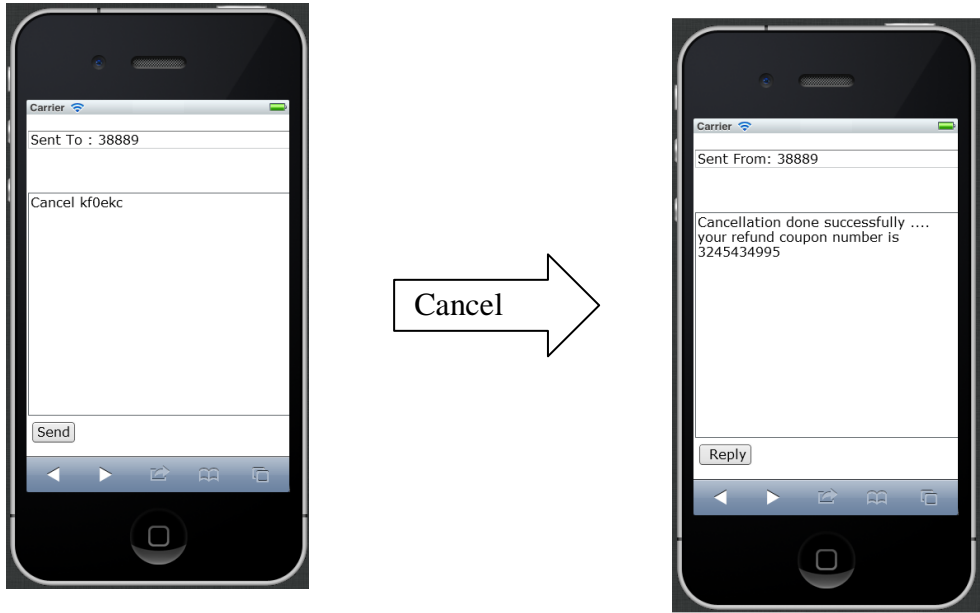


Figure 28: Cancel Ticket (SMS)

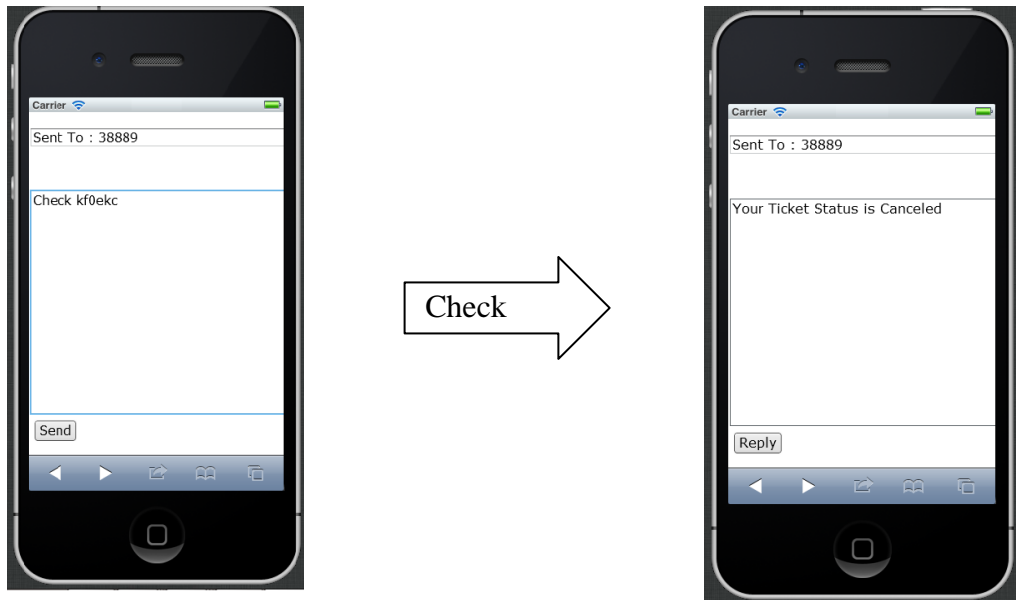


Figure 29: Check Ticket's Status

L. Prepare Pre- SEDX Poster

Pre- EDX Poster is the poster has to be submitted to be evaluated and a competition is running to select the most interesting project to be presented in SEDX event.

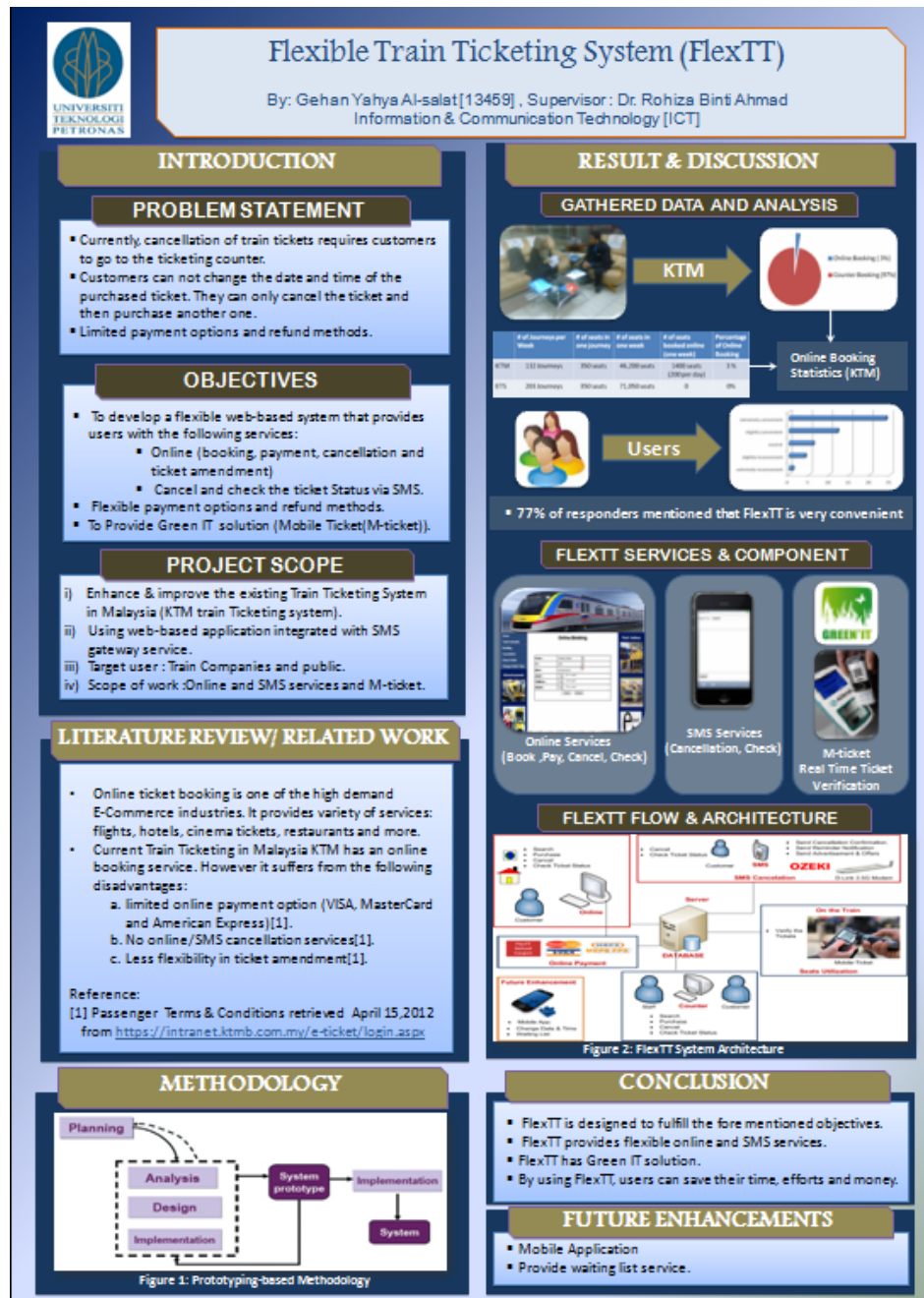


Figure 30: Pre-EDX Poster

3.1.5 Verification and Validation

Author was testing and validating the system to ensure that the system meets requirements and specifications and that it fulfills its intended purpose. Author conducted a usability test by asking some users to test the system and perform booking, checking, cancelling ticket online and by SMS. After that users were given a survey to express their opinion about the flexibility and usability of FlexTT.(refer to result and discussion)

3.2 Key Milestone

Author has chosen the significant events or stages of FlexTT to be the key milestone, this is to help the author to assess progress as the project go, mark the formal end of iteration, indicate the completion of a project phase, validate a project's progression, justify work already completed, and mark the successful completion of a major deliverable or deliverables, estimate the duration of every event and keep tracking whether the project is on schedule. The main key milestones of FlexTT as following :

1 Initial Phase

- 1.1 Choose Supervisor
- 1.2 Choose Project's topic
- 1.3 Apply for GSM Modem
- 1.4 Feasibility Study
- 1.5 Determine Business Need
- 1.6 Prepare project proposal

2 Planning phase

- 2.1 Requirements Gathering
- 2.2 Questionnaire
- 2.3 Interview
- 2.4 Direct Observation

- 2.5 Literature Study
- 2.6 Requirement from Supervisor
- 2.7 Preparing Extended Proposal
- 2.8 Result analysis
 - 2.8.1 Prepare statistic result
 - 2.8.2 Discuss and analysis result
- 2.9 Recommendation
- 2.10 Conclusion

3 Design Phase (implementation)

- 3.1 Sketch the interface
- 3.2 Look for interface template
- 3.3 Prepare the interface
- 3.4 Link the pages
- 3.5 Implement Sign up function
- 3.6 Implement sign in function
- 3.7 Implement Train Schedule
- 3.8 Implement Online Search Function
- 3.9 Implement Online Booking Function
- 3.10 Implement Online Cancellation Function
- 3.11 Implement Online Date and Time Changes.
- 3.12 Implement Online Ticket Checking
- 3.13 Implement SMS Functions
 - 3.13.1 Install Modem Software.
 - 3.13.2 Install SMS Server
 - 3.13.3 Implement SMS cancelation
 - 3.13.4 Implement SMS checking ticket.
 - 3.13.5 Implement SMS notification

4 submission and Deadlines

- 4.1 Prepare Progress report

4.2 Pre-SEDX

4.2.1 Prepare SEDX Poster

4.2.2 Finish System Functions

4.3 Dissertation

4.4 SEDX

4.5 VIVA

4.2.1 Prepare presentation

4.2.2 Rehearsal

4.6 Final Dissertation

3.3 GANTT CHART

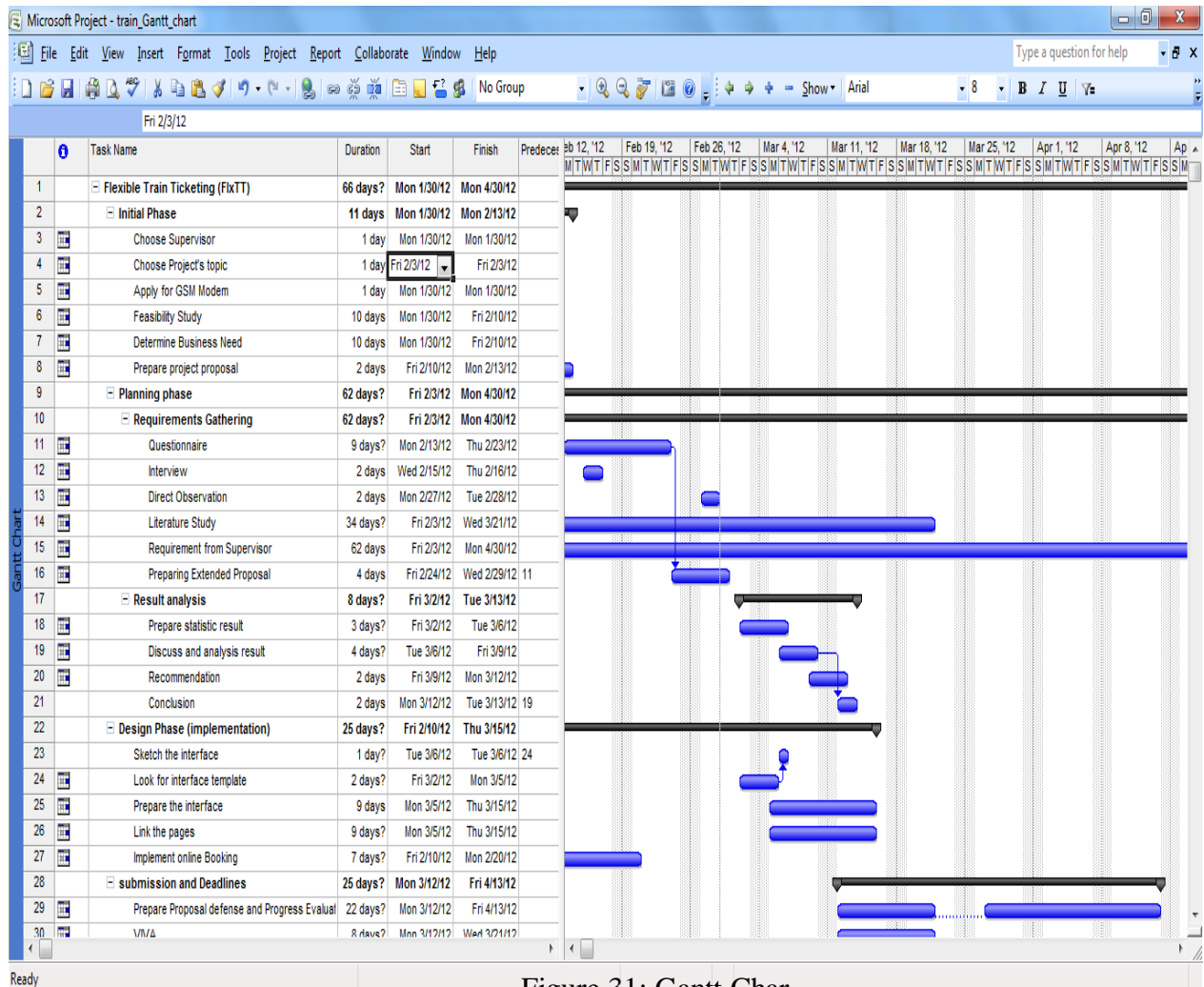





Figure 31: Gantt Char

3.4 Tools




3.4.1 System Hardware Requirements

Table 3: System Hardware Requirements

Hardware	Description	Picture
Laptop	client computer which sends the request to the server in order to use the system	
Server	server that holds the database	
GSM Modem	•GSM Modem-D-link (DWM652),	

3.4.2 System Software requirements

Table 4: System Software requirements

Dreamweaver	Dreamweaver (Html, PHP, java script)	
Xampp server	Local server + integrated with mySql database	
Ozeki NG server	To send and receive SMSs between users and system	

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Result from survey

Here is listed the result of the questionnaire that was created using Google survey and sent through emails and Google groups, 66 respondents replied back and this result is presented on question based, and author already calculate the percentage of each answer.

Part A: Background

1. Status:

- 8% of the correspondents (5 respondents) are Employees.
- 92 % of the correspondents (61 respondents) are Students.

Status

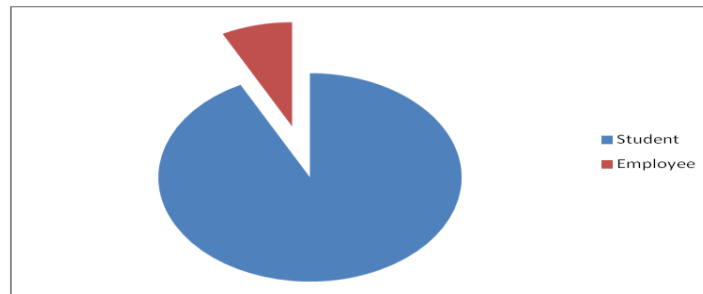


Figure 32 : Status

2. Age:

- 20 % of the correspondents (13 respondents) are 15 – 20 years old.
- 77 % of the correspondents (51 respondents) are 21 – 30 years old.
- 3 % of the correspondents (2 respondents) are 31 – 40 years old.
- 0 % of the correspondents (0 respondent) are 41 – 50 years old.
- 0 % of the correspondents (0 respondent) are 51 – 60 years old.
- 0 % of the correspondents (0 respondent) are 61 – 70 years old.
- 0 % of the correspondents (0 respondent) are more than 70.

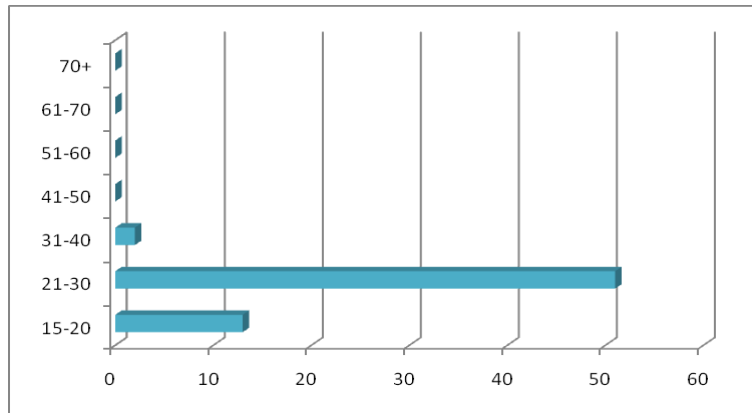


Figure 33: Age

3. Subscribed Bank:

- (7 respondents) are Bank Islam.
- (64 respondents) are CIMB.
- (1 respondent) are Hong Leong Bank.
- (9 respondent) are MyBank.
- (1 respondent) are Public Bank.
- (0 respondents) are RHB Bank.

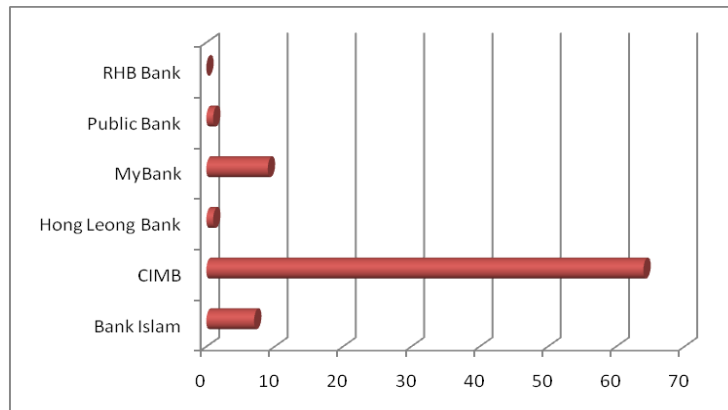


Figure 34: Subscribed Bank

4. Which online banking do you use?

- (56 respondents) answered CIMB (CIMB clicks)
- (0 respondents) answered Hong Leong Bank
- (2 respondents) answered Bank Islam
- (8 respondents) answered MyBank
- (1 respondents) answered RHB Bank
- (1 respondents) answered Public Bank.
- (4 respondents) answered VISA credit card
- (11 respondents) answered I don't use online banking.

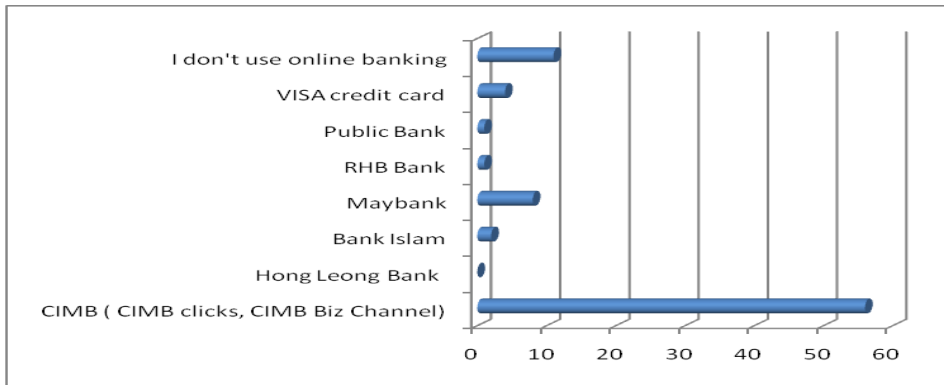


Figure 35: Online Banking

5. What type of transportation do you use for travelling (locally)?

- (2 respondents) answered Plane
- (46 respondents) answered bus
- (33 respondents) answered car
- (40 respondents) answered train

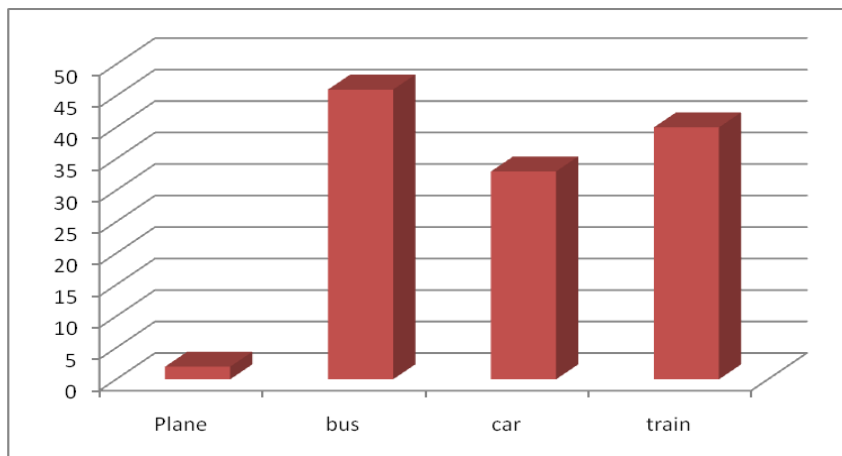


Figure 36: Type of Transportation

6. How normally do you book your ticket (train ticket)?

- (5 respondents) answered online.
- (43 respondents) answered office counter.
- (4 respondents) answered ticketing agency.

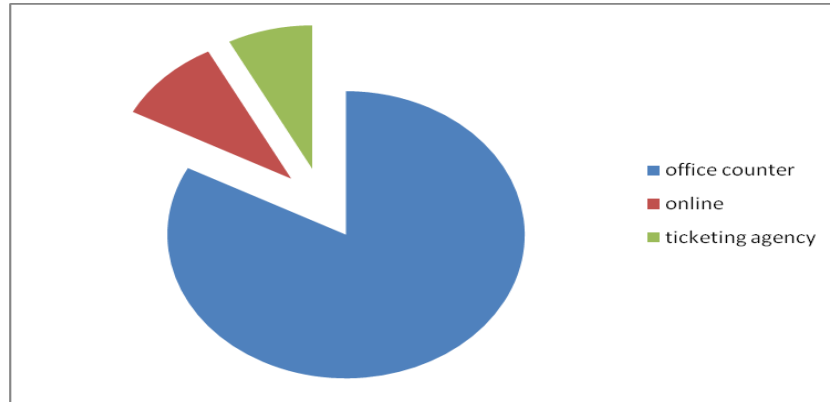


Figure 37: Booking Type

7. If you book online, what type of credit card/ account do you use?

- (6 respondents) answered Visa
- (3 respondents) answered Master
- (6 respondents) answered Saving
- (2 respondents) answered Current
- (24 respondents) answered I have never booked online

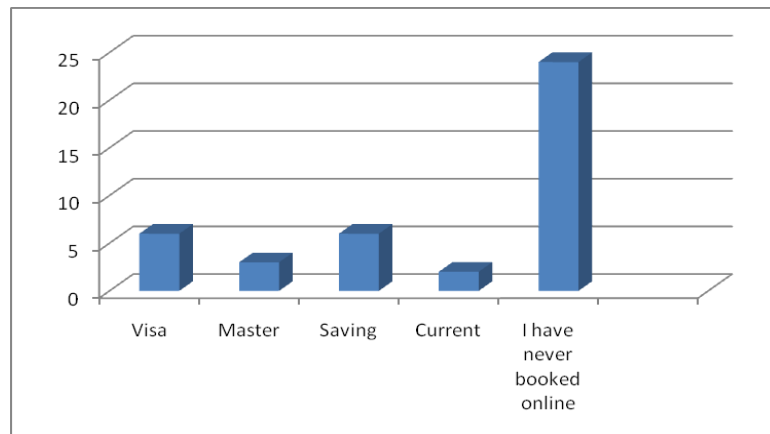


Figure 38 : payment Type

8. In some cases,you may need to cancel your ticket, how do you normally do that ?

- (2 respondents)answered online cancellation
- (6 respondents) answered Go to the counter
- (5 respondents) answered calling customer service
- (15 respondents) answered I did not have time to cancel it , then I lost its refund.
- (17 respondents) answered I have never cancelled my ticket.

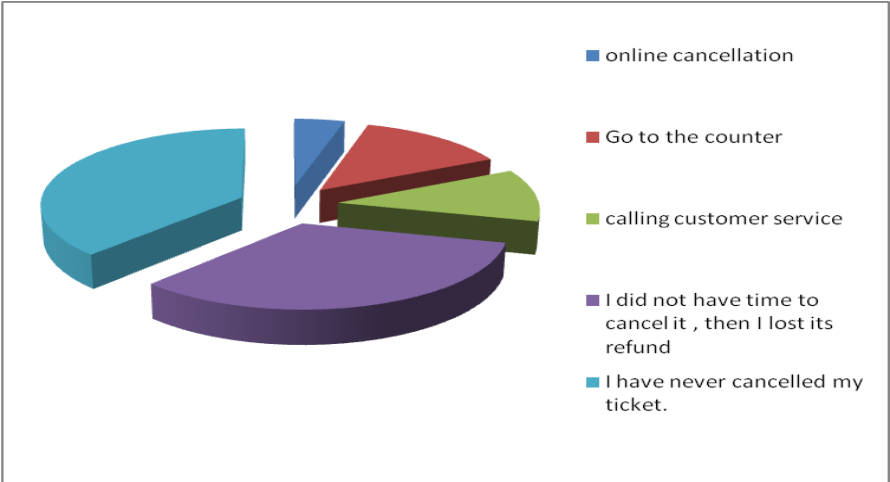


Figure 39: Methos of Cancellation

9. How much refund did you got when you cancelled your ticket on time?

- (1 respondents)answered 100% of ticket price
- (9 respondents) answered almost %50 only.
- (8 respondents) answered Nothing
- (28 respondents) answered I don't know, I have never cancelled my ticket.

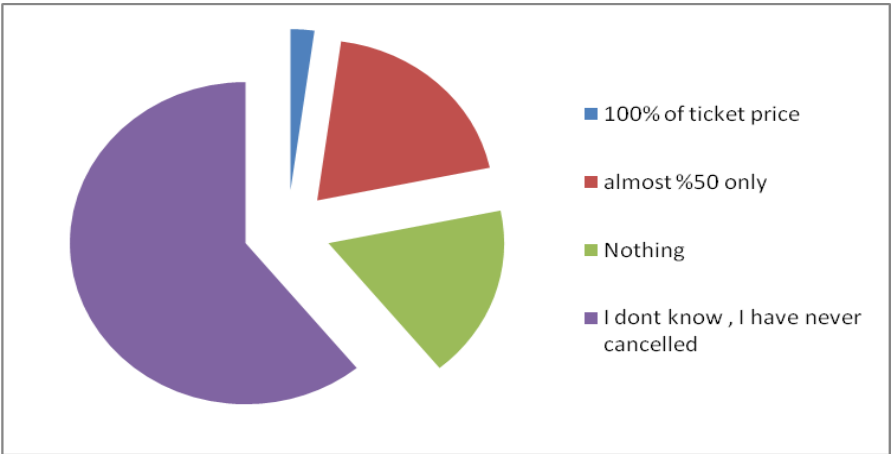


Figure 40: Cancellation Refund

10. in your opinion, what is a suitable refund that have to be returned, if the passenger cancel the ticket within allowable time?

- (25 respondents)answered 70% of ticket price
- (3 respondents) answered between 60% - 70% of ticket price
- (1 respondents) answered 60% of ticket price
- (18 respondents) answered at least 50% but not less than that.

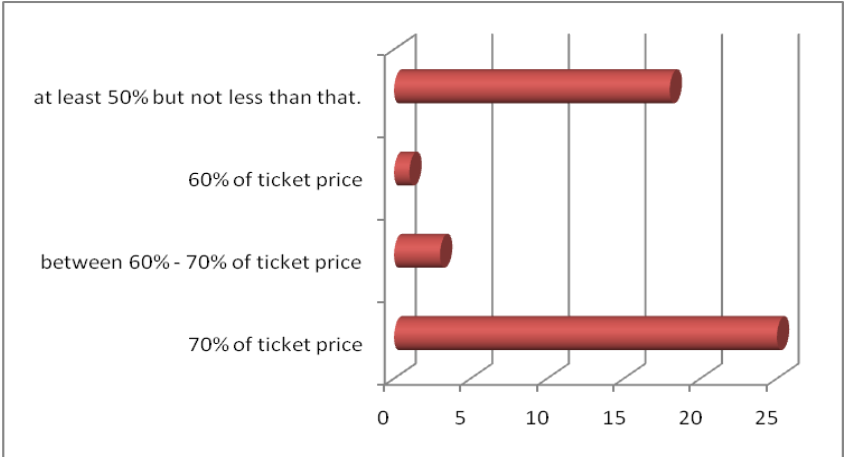


Figure41 : Refunded Ticket

11. In your opinion, to what extent do you think developing web-based system that allow passenger to send late notification online or by SMS(means cancelling the ticket at the last moment one hour before the journey), so passenger can get back some refunds?

- (1 respondents)answered extremely inconvenient
- (4 respondents) answered slightly inconvenient
- (6 respondents)answered neutral
- (12 respondents) answered slightly convenient.
- (24 respondents)answered extremely convenient

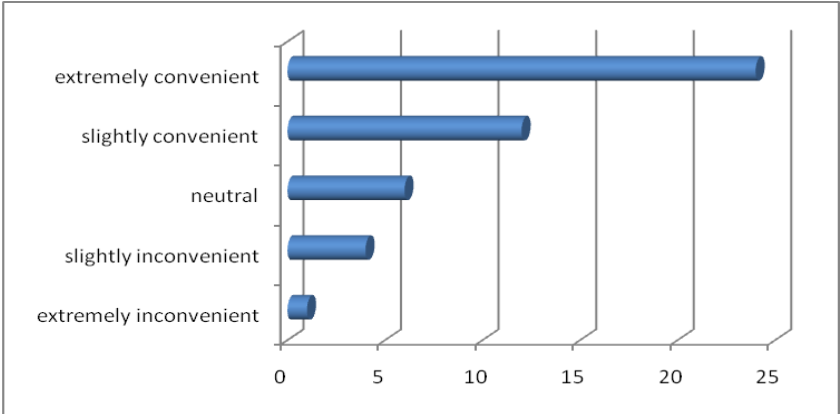


Figure 42: Opinion of FlexTT

12. Have you ever missed your train, because your were late ?

- (13 respondents)answered Yes
- (33 respondents) answered No

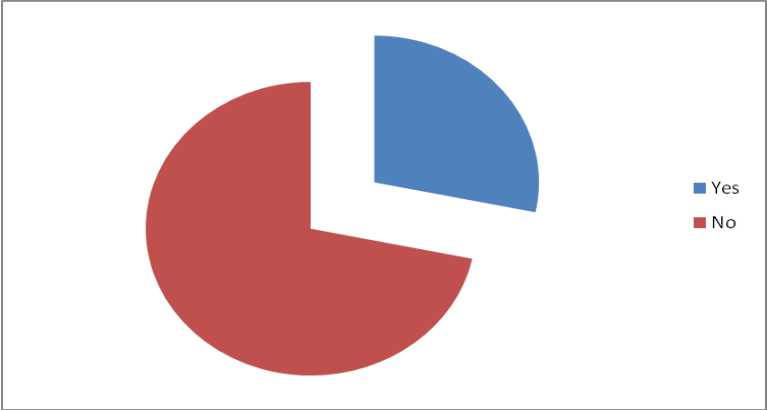


Figure 43: Miss the Train

13. In your opinion, to what extent do you think developing web-based system that allow passenger to send late notification online or by SMS(means cancelling the ticket at the last moment one hour before the journey), so passenger can get back some refunds?

- (0 respondents)answered extremely inconvenient
- (7 respondents) answered slightly inconvenient
- (3 respondents)answered neutral
- (16respondents) answered slightly convenient.
- (24 respondents)answered extremely convenient

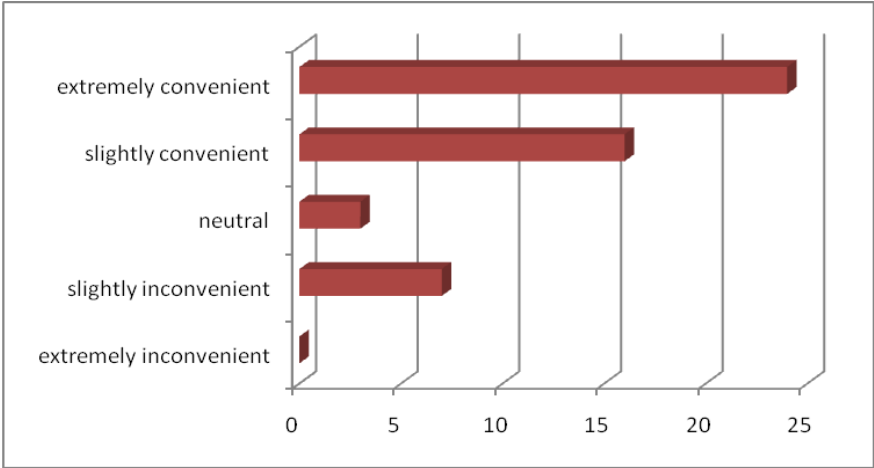


Figure 44: Users' opinion

14. In your opinion, if the passenger sent late notification within allowable time, what is suitable refund that have to be returned to him/her?

- (16respondents)answered 60% of ticket price
- (17 respondents) answered between 40% - 60% of ticket price
- (4 respondents)answered 40% of ticket price
- (10 respondents) answered at least 30% but not less than that.

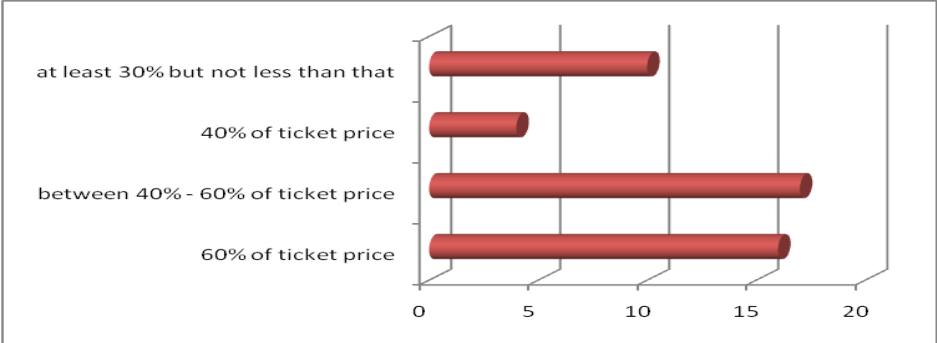


Figure 45: Refund for Tickets Cancelled Last Minute

4.2 Data Analysis from Survey

From the data that were gathered from Surveys, author found that most of the responders agreed with the importance of enhancing the existing train system, most of the responders have mentioned that implementing this system is extremely convenient and the system will get customer satisfaction and this would increase the profits of trains' Companies. Referring to the questions that were asked in the survey, author found that 92% of the responders were students, while 8% were employees, this is because of the fact that, author has sent this survey some of the university's Google group, in addition to some of her colleagues in author's internship company.

For the subscribed banks, it was obvious from the result that most of the responders are users of CIMB bank with its online application-CIMB clicks-, the author can relate this result to the fact that, UTP used to have CIMB branch in UTP campus.

Regarding to the booking method, 65% of the responders appear to use office counter, this can show that, even KTM booking service has already offered online booking but customer still use counter booking.

For the question that asked about the credit card, most of the responders chose the option (I never booked online) and only two of them chose visa, author can understand that not all people have credit card, this strongly recommend using MEPS payment gateway that implemented in FlexTT system as it will allow customer to use their debit account (saving or current) for online payment.

For overall opinion related questions which asked about of FlexTT system, the vast majority of train customers that were involved in the survey would prefer to use such a system that will implement the features as online booking/ cancelation and SMS booking/cancelation, where they have rated it as an extremely convenient system, which shows that FlexTT will achieve customer satisfaction.

Lastly, for the recommended amount of refundable money, most of the responders chose 70% of refunded ticket price to be paid back; they might feel that it is not fare to detect 50% of the ticket price because of cancelation.

4.3 Data Analysis (Interviews with KTM Staff)

Author had visited KTM main office in Kuala Lumpur and conducted an interview with Mr. Kesavan , who is responsible about KTM online system, he mentioned that only 200 passengers per day who are booking using online system, which is only 3% of the total number of passengers, while in ETS, no online service is done yet which mean 0% of online tickets , as it was calculated in the table below (table 4) this statistic shows that, the online ticketing system in Malaysia needs some enhancements that would encourage users to book online.

Table 4 : Percentage of online Booking for KTM and ETS

	# of Journeys per Week	# of seats in one journey	# of seats in one week	# of seats booked online (one week)	Percentage of Online Booking
KTM	132 Journeys	350 seats	46,200 seats	1400 seats (200 per day)	3 %
ETS	203 Journeys	350 seats	71,050 seats	0	0%

4.4 Data Analysis (Interviews with Train users)

Author had interviewed almost twelve individuals, one of them is a lecturer from IT department and Two are master students from EE Department and three are author’s colleagues from author’s internship company (Tricubes Company) and four are undergraduate students from UTP and the last two were normal train users who author met them in the train station while waiting for the train. Author has chosen individual with different races, incomes and prospective to obtain different opinions, because if author had interviewed only UTP undergraduate students, author would not obtain an accurate data as undergraduate students are using train service rarely, maybe during long holidays, in contracts to interview different type of people who are using the train services almost every week.

For the question that asked about whether the interviewer has car and what type of transportation that they are using for travelling; Dr. Low Tan Jung the lecturer in UTP mentioned that, most of the time he is using his car but he had the experience of traveling by the train from Ipoh to KL or from Batu gajah to KL. While the two master students and two colleagues from Tricubes Company mention that, even if they have their own car but they are travelling by train, this is duo to that travelling by train is much cheaper and convenient to travel by car. And they only travel by car if they will be a cluster of people or have heavy equipments to carry. For the rest of the interviewers they don’t have a car and they normally use train or bus.

For the question that asked, how normally you booked the train ticket, no one of the twelve interviewers have booked online, they all using the office counter, the lecturer and the two master students they normally book in advance which means they travel all the way from UTP or Tronoh to Batu Gajah to book the ticket and they have mentioned that, booking their ticket are wasting their time as travelling to Batu Gajah and coming back to UTP takes 40 minutes, while the rest of interviewers are booking the ticket at the same day, this is because of that, they do not have their own car, so they just call the ETS office and check the availability then go to train station, book the ticket then travel, but they mentioned that, not every time they could get the ticket as some times when they reach the office counter, they found that the ticket are sold out so they wait for the following train which normally after two to three hours. And sometimes they prefer to use the bus especially if they call the train office counter and no one answer.

For the question that asked about whether you needed to cancel your ticket, most of the interviewer did not face this situation, unless the two master students who booked tickets in advance for their project's cluster then in the day of travelling they cluster have another work inside UTP, so they mentioned that, they were very busy to go to Batu Gajah to cancel the tickets, then they lost the ticket refund. in addition, going to Batu Gajah to cancel the ticket may cost more than the ticket refund.

For the questions that asked about whether they missed the train, two of the interviews replied yes, it was because of the traffic jam.

For the question that asked about their opinion about FlexTT train ticketing system, most of the interviewers mentioned that FlexTT will be extremely convenient to have such system that allow them to check availability, book, pay, cancel, get refund in a click of button. One of the interviewers mentioned that it will be an amazing solution for his struggling with the existing train ticketing system as he use ETS train almost every weekend.

In conclusion, it is obvious from the interviews analysis that customers are really struggling in order to book/cancel their tickets and how would the limitation of the current system affect customer chose, as some interviewers mentioned that in some cases they may travel by bus if they could not ensure abstaining train ticket. Also they express about their opinion of FlexTT that will be very convenient and cost effective.

4.5 Result from Usability Test

Here is listed the result of users' opinion of FlexTT after they have go through a usability test , 6 respondents replied back and this result is presented on question based, and author already calculate the percentage of each answer.

1. FlexTT is user friendly

- 66.67 % of the correspondents (4 respondents)answered strongly agree
- 33.33 % of the correspondents (2 respondent) answered slightly agree
- 0% of the correspondents (0 respondent)answered neutral
- 0% of the correspondents (0 respondent) answered slightly disagree.
- 0% of the correspondents (0 respondent) answered strongly disagree.

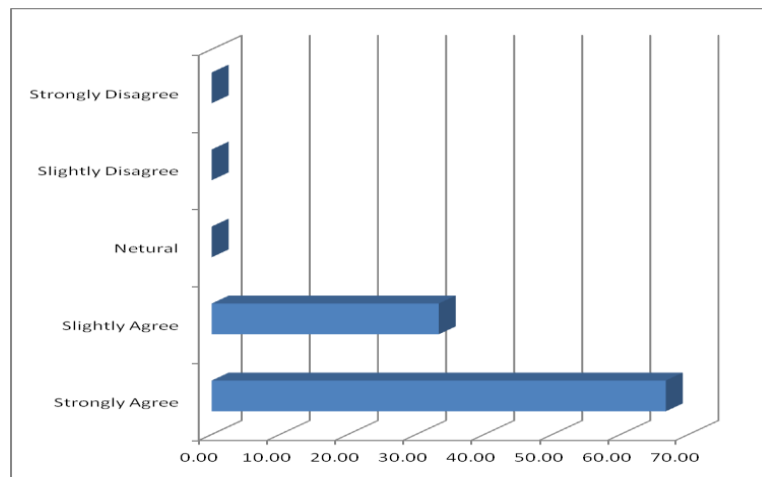


Figure 46: FlexTT is User Friendly

2. I booked , payed for , cancel , check my ticket smoothly using FlexTT (without the developer help or explanations)

- 16.67 % of the correspondents (1 respondents)answered Yes , I did not need any help
- 83.33 % of the correspondents (5 respondents) answered Yes, but I needed minor help
- 0% of the correspondents (0 respondent)answered No, I could not book the ticket by myself.

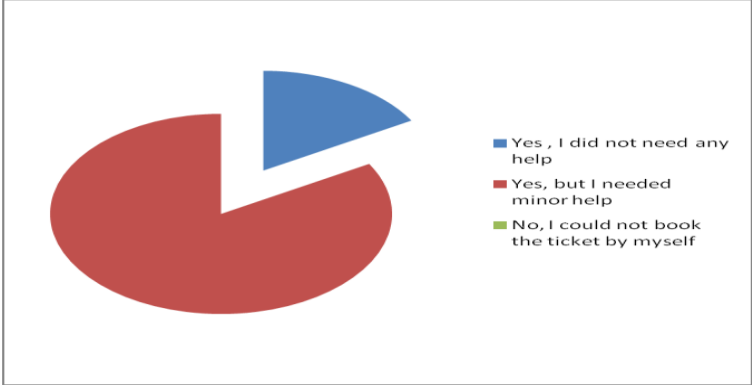


Figure 47: FlexTT has Smooth procedures

3. The website contents and labels is very clear and consistent

- 2. 100 % of the correspondents (6 respondents) answered strongly agree
- 3. 0 % of the correspondents (0 respondent) answered slightly agree
- 4. 0% of the correspondents (0 respondent) answered neutral
- 5. 0% of the correspondents (0 respondent) answered slightly disagree.
- 6. 0% of the correspondents (0 respondent) answered strongly disagree.

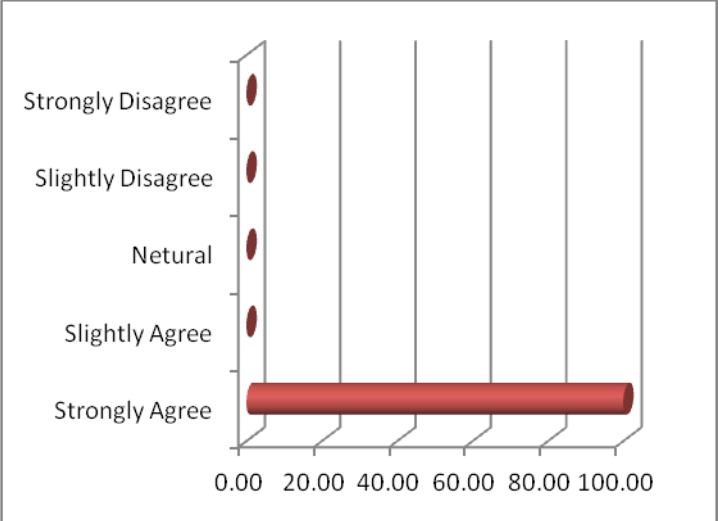


Figure 48: FlexTT contents and labels is very clear and consistent

4. I like the FlexTT interface (the chose of color and pictures)

7. 66.67 % of the correspondents (4 respondents) answered strongly agree
8. 16.67% of the correspondents (1 respondent) answered slightly agree
9. 16.67% of the correspondents (1 respondent) answered neutral
10. 0% of the correspondents (0 respondent) answered slightly disagree.
11. 0% of the correspondents (0 respondent) answered strongly disagree.

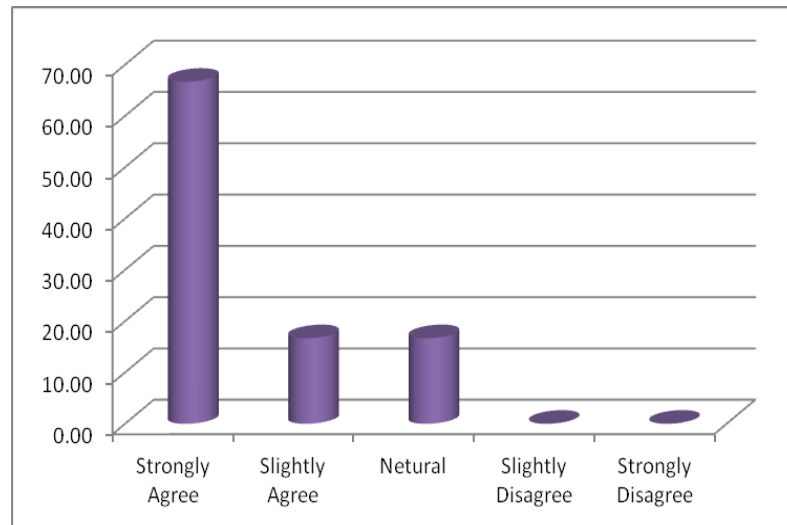


Figure 49: FlexTT has Friendly Interface

5. I was able to book, pay, cancel my ticket with minimal efforts

12. 33.33 % of the correspondents (2 respondents) answered strongly agree
13. 66.67% of the correspondents (4 respondent) answered slightly agree
14. 0% of the correspondents (0 respondent) answered neutral
15. 0% of the correspondents (0 respondent) answered slightly disagree.
16. 0% of the correspondents (0 respondent) answered strongly disagree.

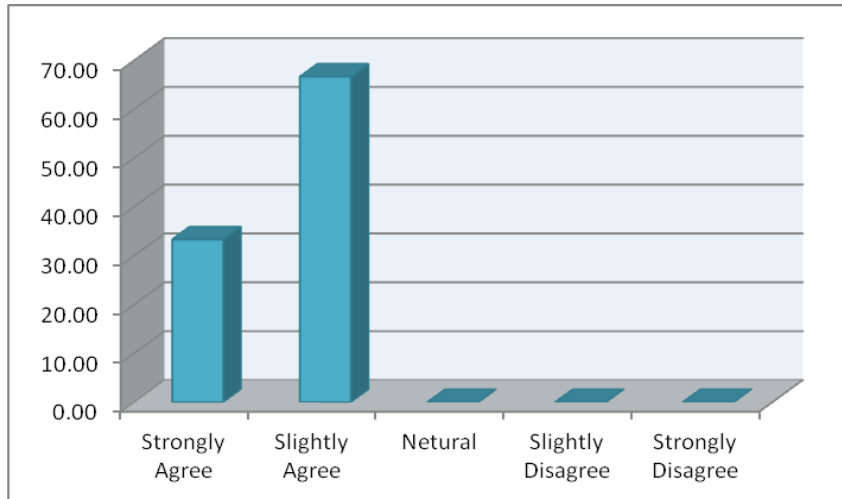


Figure 50: Able ot use FlexTTwith Minimal Efforts

1. How many time you spend to book, check, cancel your ticket using FlexTT.

- 16.67 % of the correspondents (1 respondent) answered less than 3 minutes.
- 66.67% of the correspondents (4 respondents) answered between 3 to 5 minutes.
- 16.67% of the correspondents (1 respondent) answered between 5 to 10 minutes.
- 0% of the correspondents (0 respondent) answered more than 10 minutes.

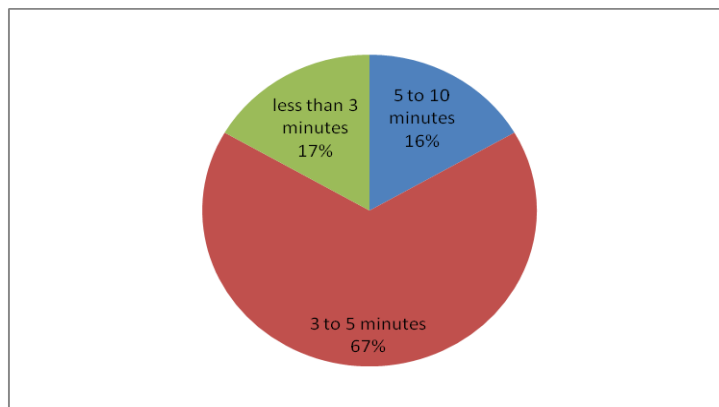


Figure 51: Time spent using FlexTT

2. FlexTT is good system to be implemented in real life

- 83.33 % of the correspondents (5 respondents) answered strongly agree
- 16.67% of the correspondents (1 respondent) answered slightly agree
- 0% of the correspondents (0 respondent) answered neutral
- 0% of the correspondents (0 respondent) answered slightly disagree.
- 0% of the correspondents (0 respondent) answered strongly disagree.

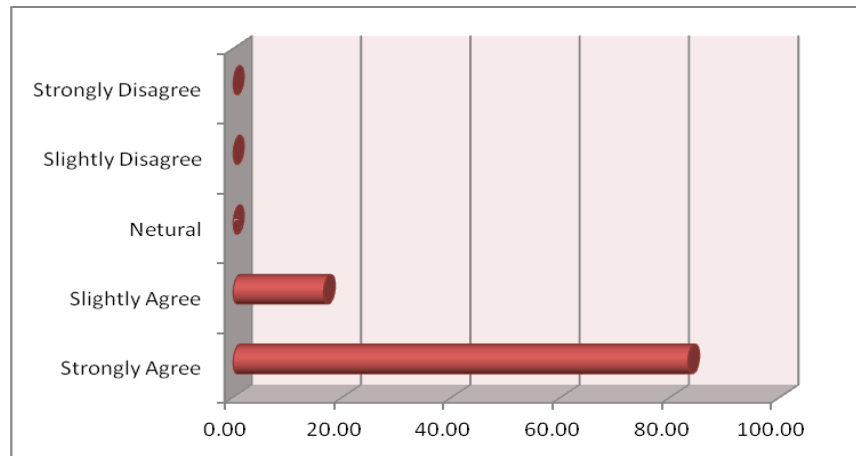


Figure 52: FlexTT is Good to be Implemented in Real Life

4.6 Data Analysis from Usability Test

From the answer of the question that asked the users whether they needed help from the developer, 83.33% of the responders needed minor help, thus author realized that, minor changes have to be made on the parts that the users faced some difficulties to perform, an example is the sign in page, the user did not realized that if he/she is booking for first time, he/she has to create an account first

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

FlexTT is a flexible train ticketing system that has been developed in this final year project. It makes the booking procedure fast, easy and efficient, by providing the customers with free access to the system anytime, anywhere and with less time and efforts. Presence in the train office counter is no longer required in order to book/pay for /cancel a ticket, to get the ticket's refund and to obtain student's discount.

FlexTT has implemented several types of technologies, online services, online payment, refund coupon, SMS services, M-tickets and seats utilization, but the scope of FlexTT in this final year project, is to fully implement the online services (booking, cancellation and change ticket date and time) SMS services (cancellation, ticket status checking).

The recommendations for FlexTT is to implement waiting list features, m-ticket and seats utilization since these features are very important to achieve the goal of FlexTT system which aim to provide flexibility and efficiency for the existing reservation procedures.

UP To date, author has implemented all the targeted implementations that were aimed to be done in this final year project and for the recommended features which mentioned above; author is planning to implement them in the future.

REFERENCES

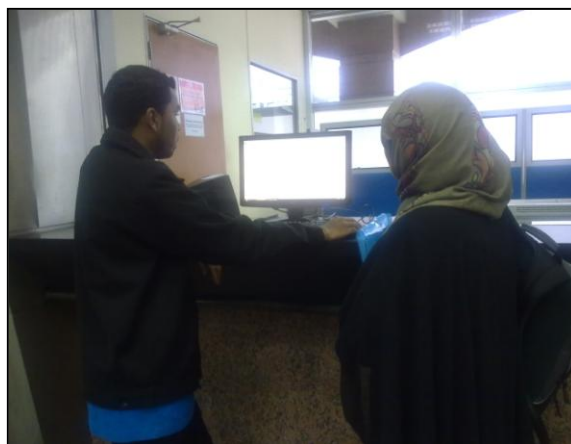
- [1] Unknown, Electronic Payments Benefits, *Electronic Payments co.uk* Retrieved February 29, 2012, from http://www.electronic-payments.co.uk/benefits_index.jsp
- [2] Unknown , Introducing SMS Broadcasting & SMS Campaign, *websms2u*, Retrieved February 29, 2012, from <http://www.websms2u.com/>
- [3] Unknown, M-Ticket Retrieved February 29, 2012 from <http://www.mticket.co/>
- [4] Unknown, Paperless m-Tickets, *adcentered* Retrieved February 29, 2012 from http://adcentered.typepad.com/adcentered/2006/10/paperless_mtick.html
- [5] George Szifo, 10 Advantages of Online Booking Software, *ezinearticles*, Retrieved February 27, 2012, from <http://ezinearticles.com/?10-Advantages-of-Online-Booking-Software&id=4397594>.
- [6] Unknown, Tickets, *ETS Train*, Retrieved February 28, 2012, <http://www.ets-train.com.my/web/ets/ticket>
- [7] Abhay, Indian Railways Ticket Cancellation *ekikrat.in* Retrieved February 27, 2012, from <http://ekikrat.in/Indian-Railways-Ticket-Cancellation>
- [8] Zhuo-yi, C., Huei, L., & Miao, W. M. (2012). Design of portable checking and ticketing systems based on GPRS. *Procedia Engineering*, 29(0), 4002-4006.
- [9] Gupt.A.Kumar, Man. P. A. (2011). Railway train ticket generation through ATM machine: A business application for indian railways. Volume 2
- [10] Unknown, System Development Life Cycle (SDLC) Methodologies, from http://www.slepi.net/entry/sdlc_methodologies.
- [11] Poggi, N.; Carrera, D.; Gavalda, R.; Torres, J.; Ayguade, E.; , "Characterization of workload and resource consumption for an online travel and booking site," *Workload Characterization (IISWC), 2010 IEEE International Symposium on* , vol., no., pp.1-10, 2-4 Dec. 2010

- [12] Yu Zhang; Hao Sheng; Huajun Chen; Zhaohui Wu; , "Applying Hypothetical Queries to E-Commerce Systems to Support Reservation and Personal Preferences," Database Engineering and Applications Symposium, 2007. IDEAS 2007. 11th International , vol., no., pp.46-53, 6-8 Sept. 2007
- [13] Dave Evans, (2010, May 26), Key Benefits of an Online Course Booking System, Key, accessplanit Retrieved February 27, 2012, from <http://www.accessplanit.com/blog/post/05/2010/Key-Benefits-of-an-Online-Course-Booking-System>
- [14] Zon-Yau Lee, Hsiao-Cheng Yu, & Pei-Jen Ku. (2001), *an Analysis and Comparison of Different Type of Electronic Payment systems* retrieved February 27, 2012 from <https://www.scss.tcd.ie/~htewari/4D1/papers/payment.pdf>
- [15] Unknown, Indian Railways, retrieved April 15,2012 from http://en.wikipedia.org/wiki/Indian_Railways
- [16] unknown, February 2012 Mobile Ticketing White Paper, *nfc-forum* retrieved Feb 19,2012 from http://www.nfcforum.org/resources/white_papers/GSMA_Mobile_Ticketing_White_Paper.pdf
- [17] unknown, Passenger Terms & Conditions retrieved April 15,2012 from <https://intranet.ktmb.com.my/e-ticket/Rules.htm>
- [18] unknown, MEPS FPX (Launched in 2004) retrieved April 15,2012 from <http://www.meps.com.my/meps/services/e-payment-sevices/f>

APPENDIX



Direct observation



Interviews (KTM main Office, Kuala Lumpur)

Interviews



Mr. Hermawan Nugrono
(PHD Student –EE – UTP)



Miss. Leena Arshad
(MSc Student –EE – UTP)



Mr. Ruslan
(Wireless Technology - Lab Technician –
UTP)



Miss. Sabrin Omer
(Undergraduate Student – UTP)

Usability Test Survey

FlexTT Usability Testing

Welcome Dear Users, this survey aims to test the usability of FlexTT system, you will answer this survey after you test the functions of the system... Thank you so much for your cooperation

*** Required**

FlexTT is user friendly *

Strongly disagree	Slightly disagree	Netural	Slightly agree	Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I booked , payed for , cancel , check my ticket smoothly using FlexTT (without the developer help or explanations) *

- Yes , I did not need any help
- Yes, but I needed minor help
- No, I could not book the ticket by myself

The website contents and labels is very clear and consistent *

Strongly disagree	Slightly disagree	Netural	Slightly agree	Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I like the FlexTT interface (the chose of color and pictures) *

Strongly disagree	Slightly disagree	Netural	Slightly aagree	Strongly aagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>