UTM
UNIVERSITI TEKNOLOGI MALAYSIA

SCHOOL OF COMPUTING
Faculty of Engineering

SEMESTER 2

SESSION 2019/2020

SCSI2143

PROBABILITY & STATISTICAL DATA ANALYSIS

GROUP PROJECT

SURVEY ON THE TRANSPORTSTION PROBLEM FACED BY UTM STUDENTS

DUE DTAE: 12/04/20

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ABSTRACT

The general aim of this research was to ascertain the relationship between service quality and student satisfaction, the purpose and reasons for using campus shuttle were elucidated. The research methodology was a cross sectional survey at different bus stop for the Universiti Teknologi Malaysia (UTM).

1. INTRODUCTION

An efficient transportation system has a significant impact on the quality of life, opportunity for recreation, education, social and business. Passengers have varying competing means of transportation. The most used means of transportation apart from walking is by public transport, which includes taxi such as Grab, Maxim and others.

The research is about collecting information from all the relevant sources to find answers to the research problem, test the hypothesis and evaluate the outcomes through interviews & questionnaire.

The hypothesis for this study are as follow:

H1: there is a significant relationship between reliability and student satisfaction.

H2: there is a significant between assurance and student satisfaction.

H3: there is a significant relationship between tangibility and student satisfaction.

1. Reliability & Assurance	1. The shuttle bus arrives at the destination on time. 2. The bus never breaks down on road. 3. The shuttle buses have regular schedules 4. Drivers are polite
2. Tangible	1. Busses are well maintained 2. Drivers have in-depth occupational knowledge of their jobs.

Table 1(a) - ATTRIBUTES

2. BRIEF SUMMARY

Faculty of Computing students on frequent usage of shuttle bus by UTM students do this project. This is a survey mainly focused on the students of Undergraduate, Postgraduate and PhD. We asked students and made comparison. From our data we get to see that the transport students usually use is shuttle bus, we created a virtual spreadsheet providing the questionnaires and tried to reach as many students as possible.

3. METHODOLOGY

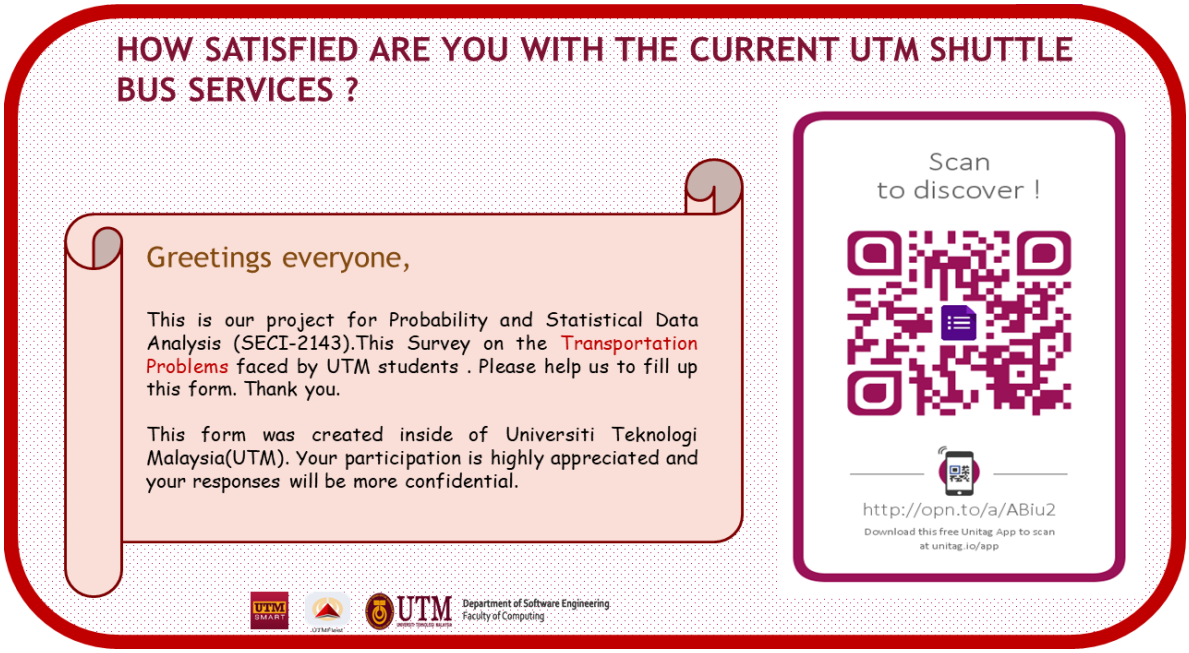
In choosing the best method of user requirement elicitation, several factors were taken into consideration firstly; the quantity of data to be collected is taken into account. Additionally, time constraint of the project mean that the study will need to be conducted and concluded in a short amount of time. With these two factors taken into account, time consuming and more directed requirement methods such as questionnaires and interviews.

This study is conducted using a survey, which satisfies the aforementioned factors and allows for a large quantity of data to be collected in a short amount of time. In order to ensure that responses collected are from the correct respondents (i.e. students), the survey is decided to be passed out online by using google form and distributed by social platform. There are 107 respondents have participated in this survey.

Furthermore, since the outbreak of COVID-19 not many students were interested and with that in mind, we decided that survey questions should be easy to answer and be in small quantity. We are using a various statistical measures.

I. **Population and Sample**
II. **Data Collection Procedure**
III. **Data Representation Procedure**

One way to achieve this is to ask questions that are more directed and allow respondents to easily give an answer, such as Yes/No questions. The questionnaire was constructed to examine a number of substantive areas and to acquire foundation information, such as demographics and transit performance information. The study included the following areas of inquiry. There are 11 questions have been asked in the questionnaire. A close ended questionnaire was circulated through Google Forms. An advertising placard, survey link and screenshots are attached below.



Survey Link: http://bit.ly/UTMTransportationproblemSurvey

E-portfolio link: https://eportfolio.utm.my/user/md-monirul-islam-molla/probability-statistical-data-analysis

YouTube Video link: https://youtu.be/HGh4CEoJMws

Questionnaire:

Transportation Problems Faced by UTM Students

HOW SATISFIED ARE YOU WITH THE CURRENT UTM SHUTTLE BUS SERVICES?

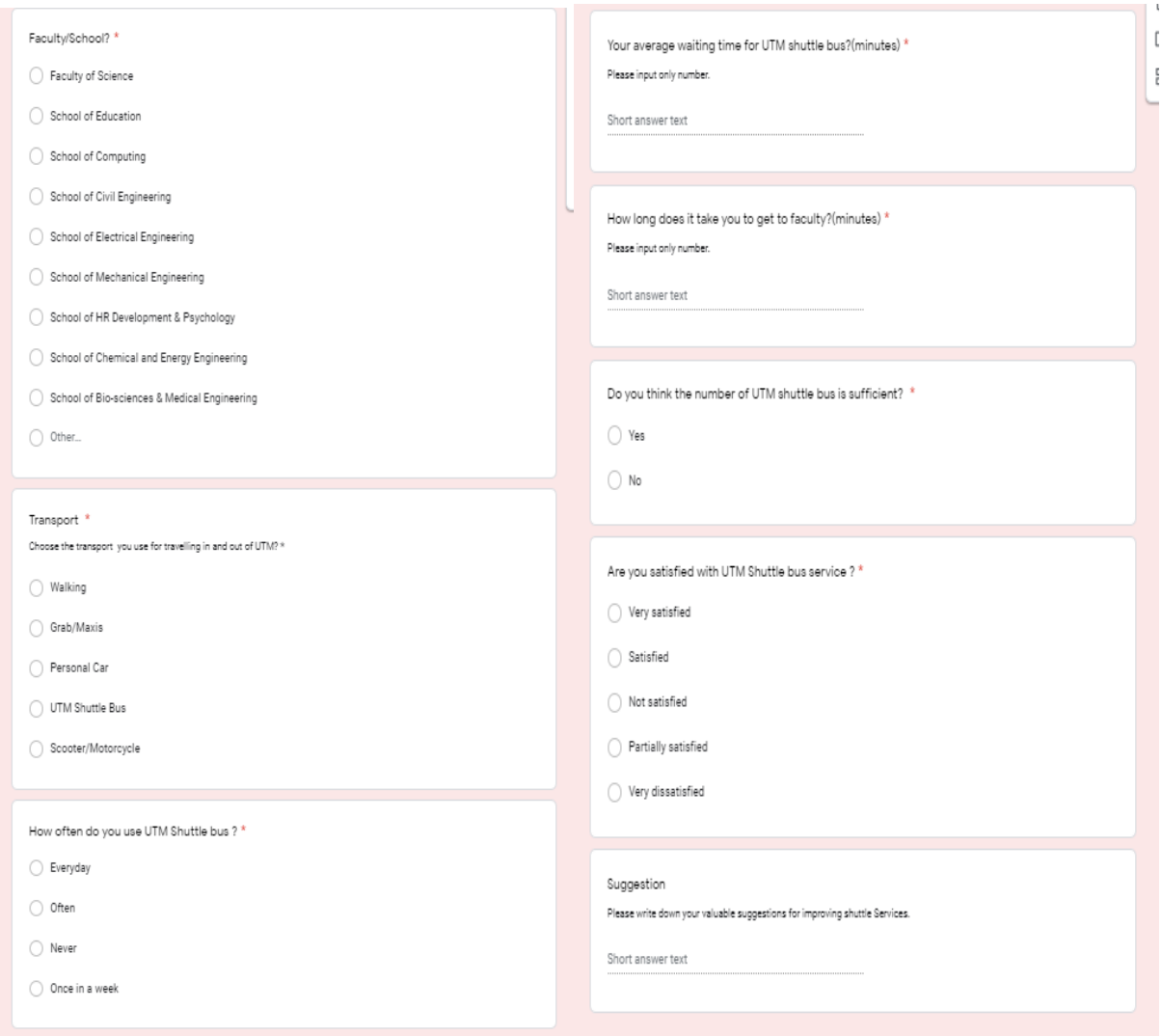
Greetings everyone, this is our project for Probability and Statistical Data Analysis (SECI 2143). This survey about analysing the problems faced by UTM students regarding the transportation system around UTM. Please help us to fill this form. Will take 2 minutes of your precious time. Thank you.

N.B: This form was created inside of UNIVERSITI TEKNOLOGI MALAYSIA (UTM). Your participation is highly appreciated and your responses will be more confidential.

Email address *

Valid email address

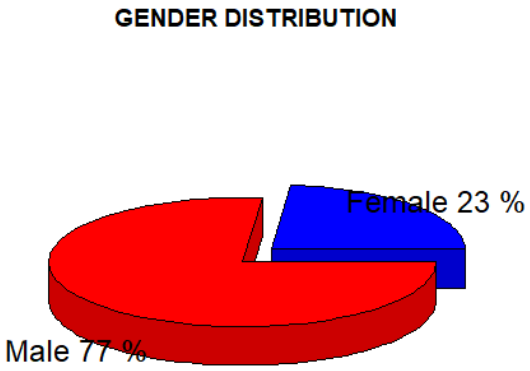
This form is collecting email addresses. Change settings



4. DATA ANALYSIS & RESULTS

4.1 GENDER DISTRIBUTION

Around 107 students were participated in our survey on the transportation problems faced by UTM Students and based on the data representation in **Figure 4.1(a)**, most of the participants are male (77%) and (23%) are female.



Pie Chart - Figure 4.1(a)

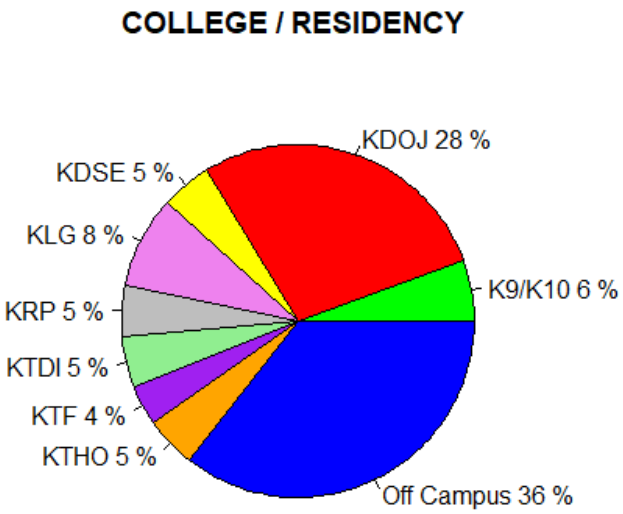
```
Gender.freq <- table(DataSet[,4])
lbls <- paste(names(Gender.freq))
pct <-round(Gender.freq/sum(Gender.freq)*100)
lbls <-paste(lbls, pct)
lbls <-paste(lbls, "%", sep = "")
pie3D(Gender.freq,labels = lbls,
      main="GENDER DISTRIBUTION" ,col = c("blue","red" ), explode = 0.1)
```

4.2 COLLEGE / RESIDENCY DISTRIBUTION

COLLEGE/RESIDENCY	NO. STUDENTS
K9-k10	6
KDOJ	30
KDSE	5
KLG	9
KRP	5
KTDI	5
KTF	4
KTHO	5
Off Campus	38

Table 4.2(a)

This table shows the number of student staying in their residents. The majority of students are staying off campus (36%) and kdoj (28%).

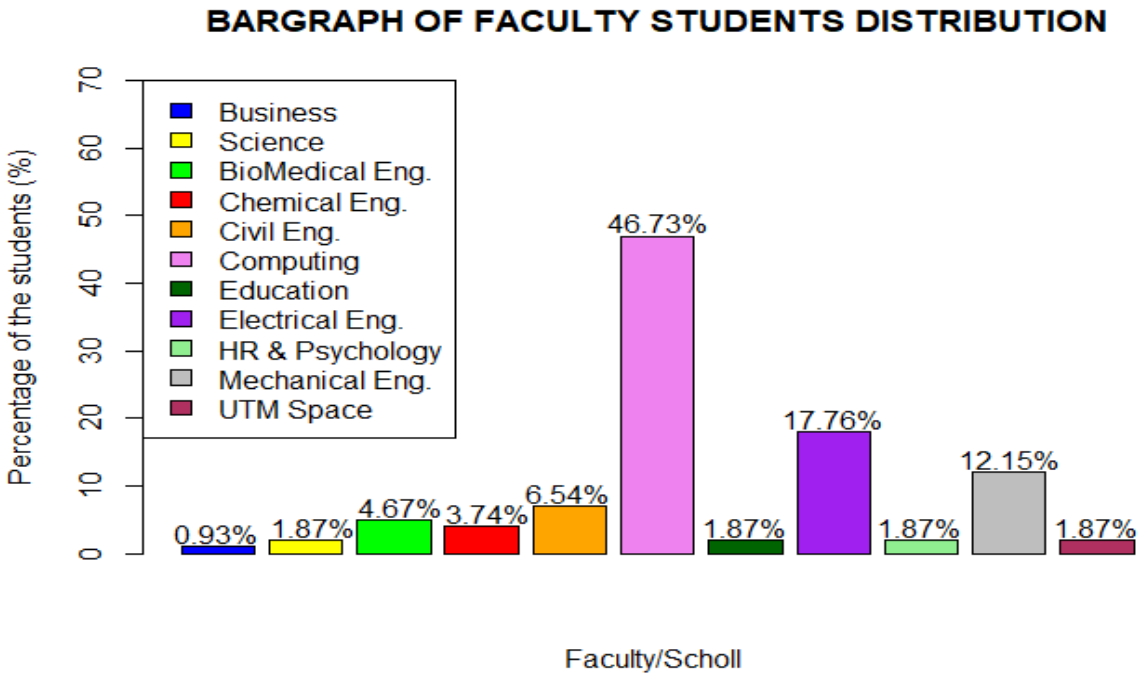


Pie Chart - Figure 4.2(a)

```
College.freq <- table(DataSet[,5])
lbls <- paste(names(College.freq))
pct <-round(College.freq/sum(College.freq)*100)
lbls <-paste(lbls, pct)
lbls <-paste(lbls, "%", sep = "")
pie(College.freq,labels = lbls,main="RESIDENCY / COLLEGE " ,
    col = c("green","red" ,"yellow", "violet", "grey", "lightgreen","purpl
e", "orange","Blue"))
```

4.3 WHICH FACULTY ARE YOU FROM?

From the total number of responses we got according to **figure 4.3(a) ,** graph 46.73% of student from school of Computing faculty, 17.76% students from school of Electrical engineering faculty, 6.54% students from school of Civil engineering faculty, 12.15% students from school of Mechanical engineering, 1.87 % students from UTM space, 3.74% students from school of Chemical engineering, 4.67% students from Bio-sciences and medical engineering, 0.93% of student from Azman Hashim international Business school and 1.87% of students from school of school of HR development and psychology.



Bar Graph - Figure 4.3(a)

```
Faculty.freq <-table(DataSet[,6])
Faculty.freq <-round(Faculty.freq /sum(Faculty.freq )*100)
barplot(Faculty.freq, xaxt = "n", ylim = c(0,70), xlab = "Faculty/Scholl",
 ylab ="Percentage of the students (%)",main="BARPLOT OF FACULTY STUDENTS
DISTRIBUTION",
 col = c("blue","yellow","green","red","orange","violet","darkgreen","purp
le", "lightgreen","grey", "maroon"))
 legend("topleft",legend = c("Business","Science","BioMedical Eng.","Chemi
cal Eng.","Civil Eng.","Computing","Education","Electrical Eng.", "HR & Ps
ychology","Mechanical Eng.", "UTM Space"),
 fill = c("blue","yellow","green","red","orange","violet","darkgreen","pur
ple","lightgreen","grey","maroon"))

text(0.7,3, "0.93%")
text(2,4, "1.87%")
text(3.2,7,"4.67%")
text(4.4,6,"3.74%")
text(5.5,9,"6.54%")
text(6.7,49,"46.73%")
text(7.9,4,"1.87%")
text(9.10,20,"17.76%")
text(10.3,4,"1.87%")
text(11.5,14,"12.15%")
text(12.7,4,"1.87%")
```

```
Faculty.freq<-DataSet[,6]
summary(Faculty.freq)
```

```
##   Azman Hashim International Business School
##                                            1
##                            Faculty of Science
##                                            2
## School of Bio-sciences & Medical Engineering
##                                            5
##    School of Chemical and Energy Engineering
##                                            4
##                  School of Civil Engineering
##                                            7
##                           School of Computing
##                                           50
##                           School of Education
##                                            2
##             School of Electrical Engineering
##                                           19
##        School of HR Development & Psychology
##                                            2
##             School of Mechanical Engineering
##                                           13
##                                   UTM Space
##                                            2
```

```
FacultyStudents=c(1,2,5,4,7,50,2,19,2,13,2)
summary(FacultyStudents)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   2.000   4.000   9.727  10.000  50.000
```

```
unique.value <- unique(FacultyStudents)
unique.value
```

```
## [1]  1  2  5  4  7 50 19 13
```

```
unique.match <- match(FacultyStudents, unique.value)
unique.match
```

```
##  [1] 1 2 3 4 5 6 2 7 2 8 2
```

```
unique.freq <- tabulate(unique.match)
unique.freq
```

```
## [1] 1 4 1 1 1 1 1 1
```

```
unique.max <- which.max(unique.freq)
unique.max
```

```
## [1] 2
```

```
FacultyStudents_mode <- unique.value[unique.max]
FacultyStudents_mode
```

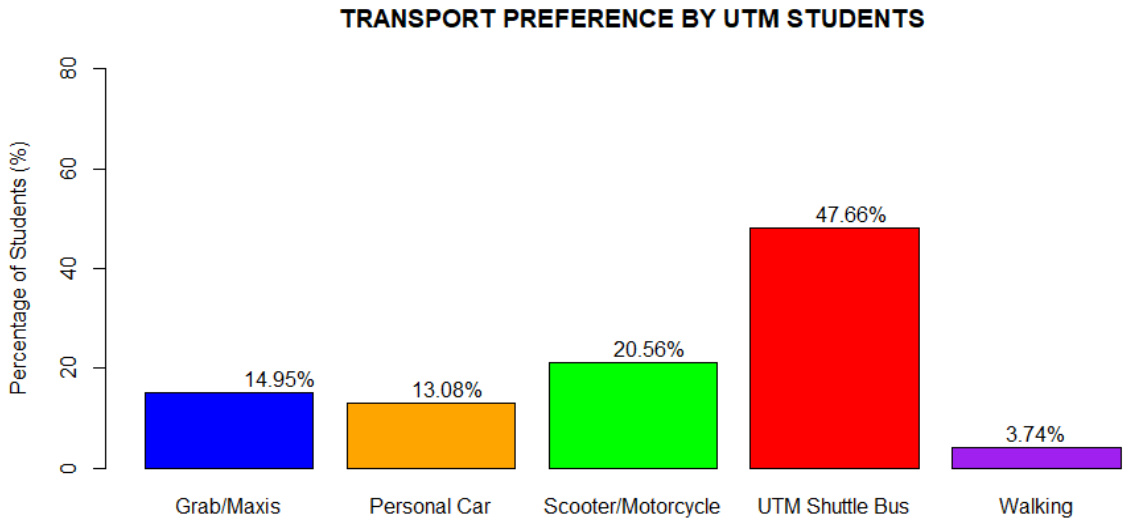
```
## [1] 2
```

```
stem(FacultyStudents)

##
##   The decimal point is 1 digit(s) to the right of the |
##
##   0 | 12222457
##   1 | 39
##   2 |
##   3 |
##   4 |
##   5 | 0
```

4.4 TRANSPORT PREFERENCE BY UTM STUDENTS

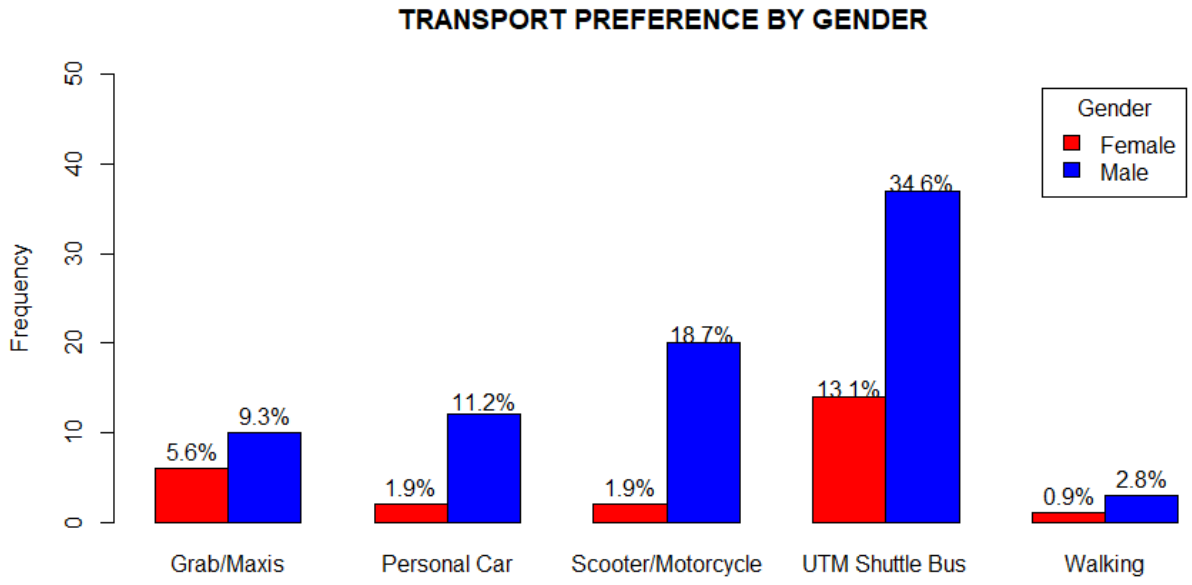
It is revealed in **figure 4.4(a)** that majority of the respondents both male and female use the campus shuttle bus for their transportation and few of them use their personal transportation (i.e grab,maxim etc..). The highest percentage of students who use UTM shuttle bus is 47%, 20.56% prefer their motorcycle/ scooter, 13% prefer their personal car whereby 14.98% use grab, maxim or taxi and less than 4% prefer walking.

```
summary(Transport.freq)

##         Grab/Maxis       Personal Car Scooter/Motorcycle    UTM Shuttle
Bus
##                 16                 14                 22
51
##            Walking
##                  4

TransportPreference=c(16,14,22,51,4)
summary(TransportPreference)

##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##     4.0    14.0    16.0    21.4    22.0    51.0
```



Bar plot - Figure 4.4(a)

```
Transport.freq <- table(DataSet[,7])
Transport.freq <-round(Transport.freq /sum(Transport.freq )*100)
barplot(Transport.freq , ylim = c(0,80),ylab = "Percentage of Students (%)
", main = "TRANSPORT PREFERENCE BY UTM STUDENTS",
   col = c("blue","orange","green","red","purple","yellow"))
text(18, "14.95%")
text(2,16, "13.08%")
text(3.2,24,"20.56%")
text(4.4,51,"47.66%")
text(5.5,7,"3.74%")
```

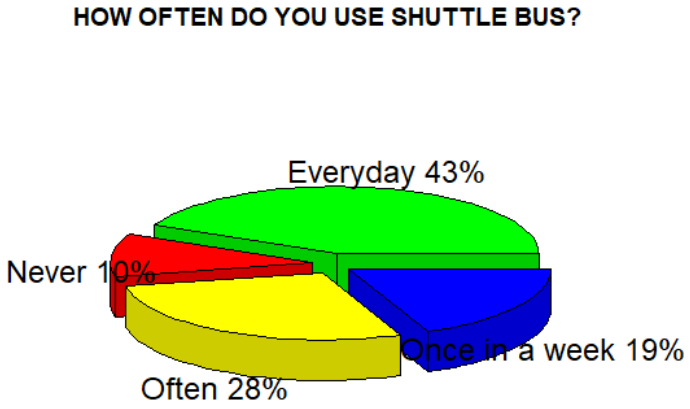


Bar plot - Figure 4.4(b)

```
Summary <- table(DataSet$Gender, DataSet$Transport..Preference.for.travell
ing.in.and.out.of.UTM.)
barplot(Summary , main = "TRANSPORT PREFERENCE BY GENDER ", ylim = c(0,50)
, ylab ="Frequency", col = c("red", "blue"), beside = TRUE)
legend("topright", inset=.03, title="Gender", legend = rownames(Summary),
fill = c("red", "blue"))
text(1.5,8,"5.6%")
text(2.5,12,"9.3%")
text(4.5,4,"1.9%")
text(5.5,13.5,"11.2%")
text(7.5,4,"1.9%")
text(8.5,22,"18.7%")
text(10.5,16,"13.1%")
text(11.5,39,"34.6%")
text(13.5,3,"0.9%")
text(14.5,5,"2.8%")
```

4.5 HOW OFTEN STUDENTS USE UTM SHUTTLE BUS?

It has come to enlighten 43% students who responded use UTM shuttle bus every day, 28% of students use often, around 19% of students are use UTM bus once in a week and only 10% never use UTM shuttle bus.



Pie Chart - Figure 4.5(a)

```
UseBus.freq <- table(DataSet[,8])
lbls <- paste(names(UseBus.freq ))
pct <-round(UseBus.freq /sum(UseBus.freq)*100)
lbls <-paste(lbls, pct)
lbls <-paste(lbls, "%", sep = "")
pie3D(UseBus.freq,labels = lbls,main="HOW OFTEN DO YOU USE SHUTTLE BUS? ",
    col = c("green","red" ,"yellow","Blue"), explode = 0.1)
```

4.6 WHAT IS YOUR AVERAGE WAITING TIME FOR BUS?

```
WaitingTime<-(DataSet[,9])
summary(WaitingTime)

##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    0.00   15.00   15.00   18.74   25.00   45.00

unique.value <- unique(WaitingTime)
unique.match <- match(WaitingTime, unique.value)
unique.freq <- tabulate(unique.match)
unique.max <- which.max(unique.freq)

WaitingTime_mode <- unique.value[unique.max]
WaitingTime_mode

## [1] 15
```

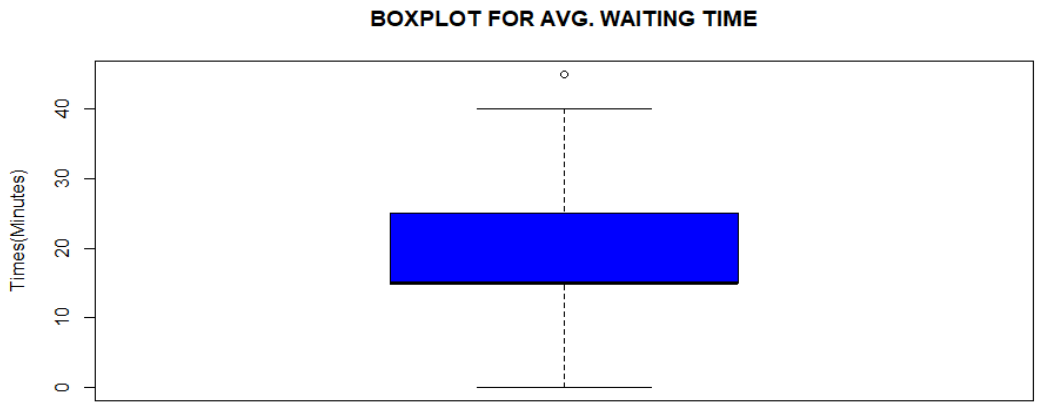
There are two major sources of frustration that can be extracted from the result. The box plot 1 below shows that waiting time can be differing to one other because of their respected destination. The highest waiting time is 45 minutes' least waiting time is 15 minutes.

In order to explain in depth, different approaches were used to visually represent our research data such as **boxplot**, **histogram** and **stem & leaf graph**.

Minimum	0
Q1	15
Median	15
Q3	25
Maximum	45
Mean	18.74
Mode	15

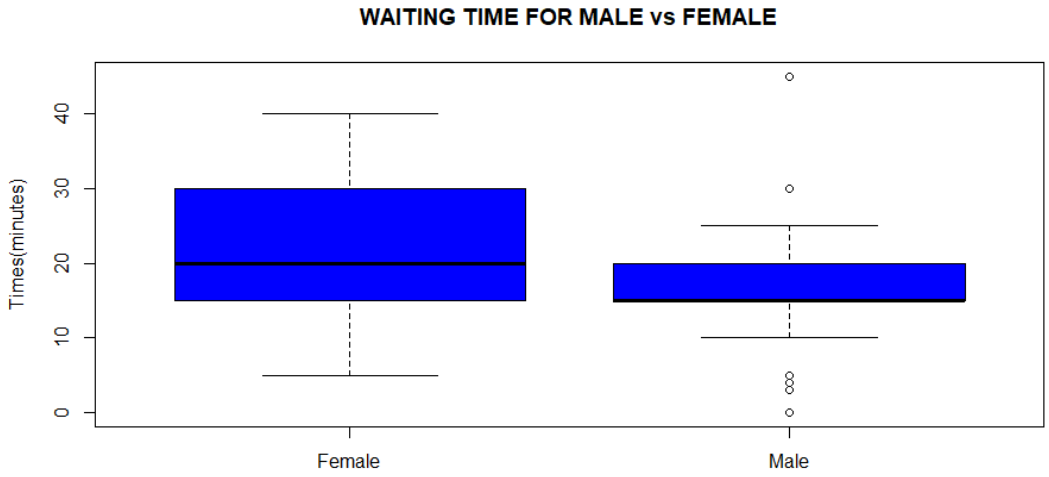
Table 4.6(a)

```
boxplot(WaitingTime,
        ylab="Time (Minutes)", col="blue",
        main="BOXPLOT FOR AVG. WAITING TIME")
```



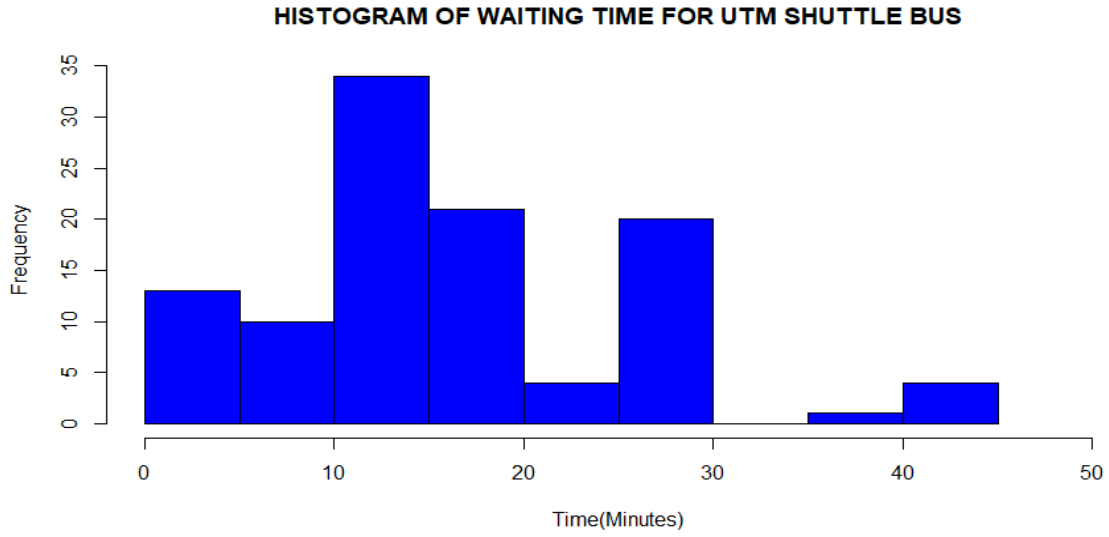
Box plot - Figure 4.6(a)

```
boxplot(WaitingTime ~DataSet$Gender, xlab=" ", ylab="Time (minutes)",
        main="WAITING TIME FOR MALE vs  FEMALE", col="Blue")
```



Box plot - Figure 4.6(b) shows the comparison between male students and female students, according to boxplot waiting time for female student is more than male students.

```
hist(WaitingTime,
     xlab="Time (Minutes", ylab="Frequency", ylim=c(0,40),xlim=c(0,50),col
="blue", main="HISTOGRAM OF WAITING TIME FOR UTM SHUTTLE BUS")
```



Histogram - Figure 4.6(c) - shows that the most frequent waiting time is from 0 to 30 minutes. The least frequent waiting time is varying from 30 to 40 minutes and Similarities can be found in frequency in waiting time from 15 to 20 minutes & 25 to 30 minutes.

```
stem(WaitingTime, scale = 2)
##   The decimal point is at the |
##
##    0 | 0
##    1 |
##    2 |
##    3 | 00
##    4 | 0
##    5 | 000000000
##    6 |
##    7 |
##    8 |
##    9 |
##   10 | 0000000000
##   11 |
##   12 |
##   13 |
##   14 |
##   15 | 000000000000000000000000000000000
##   16 |
##   17 |
##   18 |
##   19 |
##   20 | 00000000000000000000
##   21 |
##   22 |
##   23 |
##   24 |
##   25 | 0000
##   26 |
##   27 |
##   28 |
##   29 |
##   30 | 00000000000000000000
##   31 |
##   32 |
##   33 |
##   34 |
##   35 |
##   36 |
##   37 |
##   38 |
##   39 |
##   40 | 0
##   41 |
##   42 |
##   43 |
##   44 |
##   45 | 0000
```

Stem & leaf - Figure 4.6(d) represents a stem leaf graph according to the average waiting to for UTM bus. This graph we can see that the leaf represents the ones place and the stem will represent the rest of the number (40^{th} place and higher). So we can also easily get the median (15) be finding the middle of the leaves.

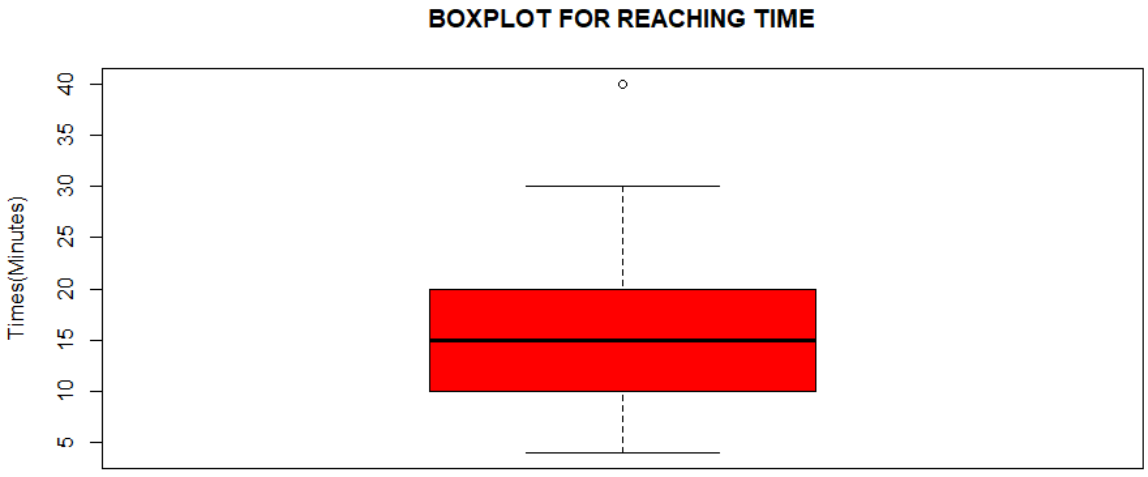
4.7 HOW LONG DOES IT TAKES TO REACH THE FACULTY?

```
ReachingTime<-(DataSet[,10])
summary(ReachingTime)

##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    4.00   10.00   15.00   15.19   20.00   40.00

unique.value <- unique(ReachingTime)
unique.match <- match(ReachingTime, unique.value)
unique.freq <- tabulate(unique.match)
unique.max <- which.max(unique.freq)
ReachingTime_mode <- unique.value[unique.max]
ReachingTime_mode

## [1] 15
```

Minimum	4
1st Quadrate	10
Median	15
3rd Quadrate	20
Maximum	40
Mean	15.19
Mode	15

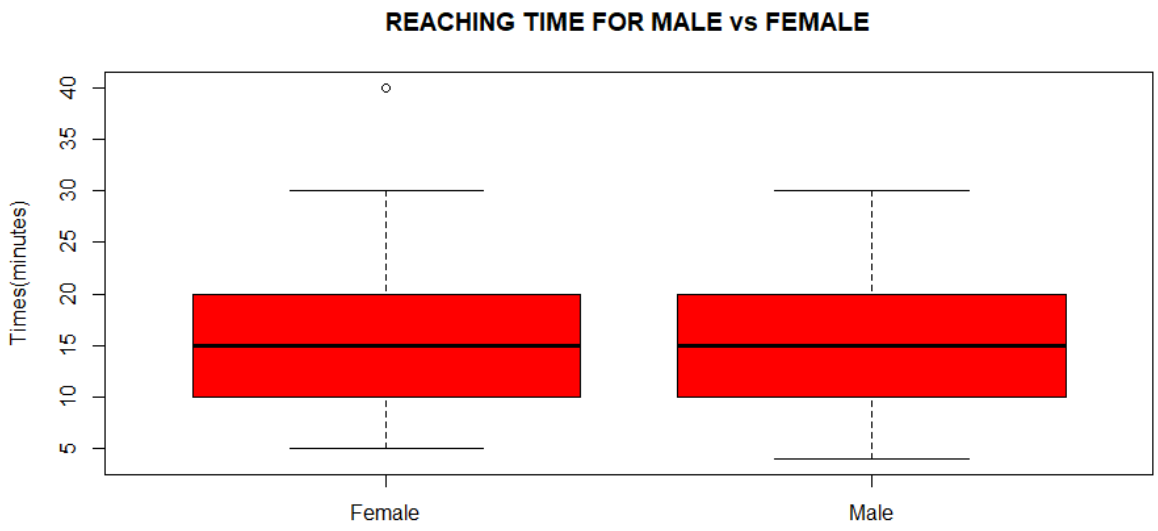
Table 4.7(a)

```
boxplot(ReachingTime,
        ylab="Time (Minutes)", col="red",
        main="BOXPLOT FOR REACHING TIME")
```



Box plot - Figure 4.7(a)

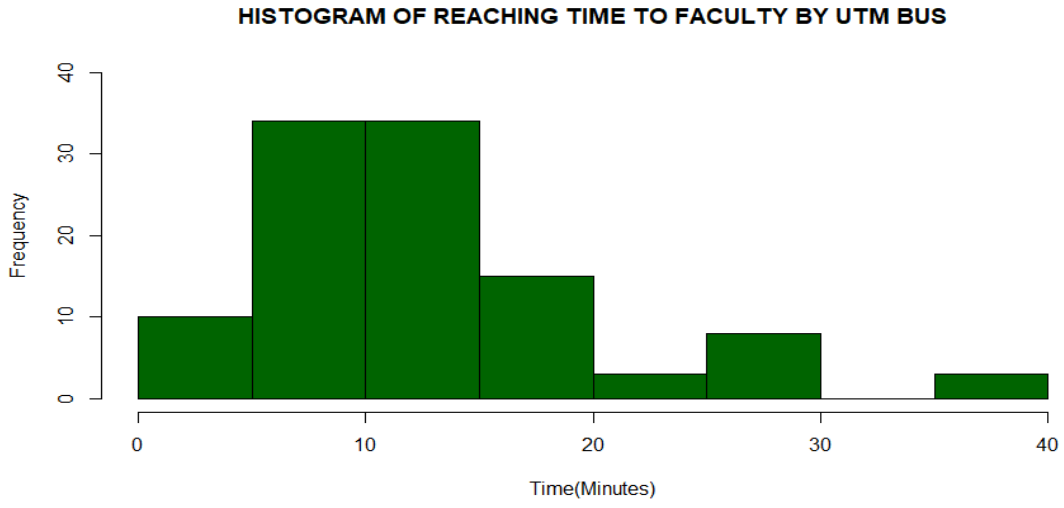
```
boxplot(ReachingTime ~DataSet$Gender, xlab=" ", ylab="Time (minutes)",
        main="REACHING TIME FOR MALE vs FEMALE", col="red" )
```



Box plot - Figure 4.7(b)

From representation of boxplot, we found similar result between our comparisons, there is not much difference for reaching time. The maximum reaching time is 30 minutes for both male and female and minimum reaching time is 4 minutes. Reaching time may very because of their respected destination. Though the equal median for both boxplots so we can identify as symmetrical distribution.

```
hist(ReachingTime, xlab="Time (Minutes)", ylab="Frequency", ylim=c(0,40),
     main="HISTOGRAM OF REACHING TIME TO FACULTY BY UTM BUS",col="darkgree
n")
```



Histogram - Figure 4.7(c)

4.8 SUMMERY OF WAITING TIME AND REACHING TIME

```
plot(WaitingTime~ReachingTime, main="SCATTER PLOT WITH REGRESSION LINE ",x
lim=c(0,45),xlab="Waiting Time(Minutes)", ylab="Reaching Time (y=0.1658x +
12.079) mint.", col="blue")
abline(lm(ReachingTime~WaitingTime),col="blue", lwd="4")
```

Scatter plot - Figure 4.8(a)

The above figure shows a scatterplot for the waiting and reaching time data listed in the following table. This scatterplot shows a strong, positive, linear association between average waiting time and total reaching time for students. There appear to be some outliers in the data. From our survey as this scatter plot shows the result concluded that maximum reaching time and waiting time for students is no more than 45 minutes. This graph assessed the overall time for both waiting and reaching time from UTM shuttle bus

In addition to the actual time ranging between 0 to 45 minutes in the data set, the 94 percent of the actual waiting and reaching time observations range vary between 5 to 30 minutes. Here also we can see a regression line with an equation y= 0.1658x + 12.079. Now we can able to calculate the value of y by using this equation.

4.9 FREQUENCY DISTRIBUTION GRAPH

Frequency distributions are visual displays that organize and present frequency counts so that the information can be interpreted more easily. Frequency distributions can show absolute frequencies or relative frequencies, such as proportions or percentages.

In addition, we kept in mind that satisfaction is important so from based on respondent satisfaction we measured the waiting time respectively for each student. For this analysis we selected the group of average waiting time (Minutes) require for UTM shuttle bus.

```
show(WaitingTime)

##   [1]  5 20 20 15 15 45 15 20 20 15 20 25 15 15 20 10 25 15 10 20 10 30
20 20 15
##  [26] 20 20 20 15 15 30  5 15 25 15 15 15 20 30 20 10 15 20 15  0  3 30
40 30 15
##  [51] 30 30 20 15 10 30 45  5  5 30 15 30 30 15 15  4 15  3 15 30 20 15
30 10 20
##  [76] 30 15 15 20  5 30 45 45 30  5 30 15 15 10  5 15 25  5 30 10 10 30
15 15 20
## [101] 10 15 15  5 20 15 30

summary(WaitingTime)

##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    0.00   15.00   15.00   18.74   25.00   45.00

Interval=seq(0,49,by=7)
Interval

## [1]  0  7 14 21 28 35 42 49
```

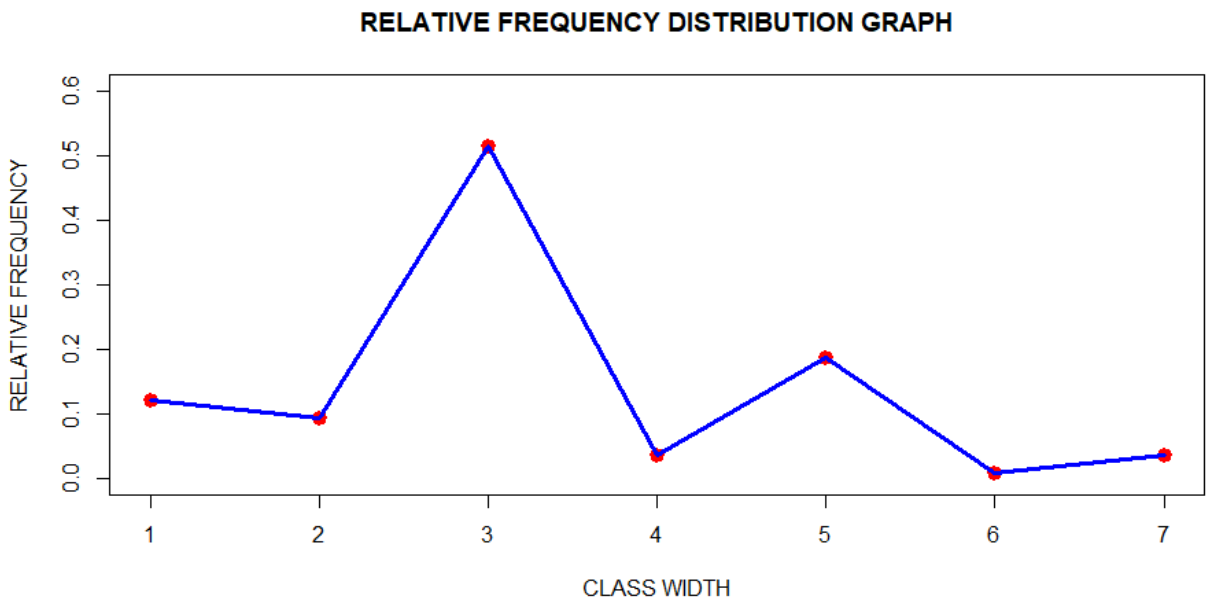
Interval	Times	Frequency	Midpoint	Class Boundaries		Relative Frequency	Cumulative Frequency	Relative Frequency(%)
0	6	13	3	-0.5	6.5	0.12149533	13	12.1495327
7	13	10	10	6.5	13.5	0.09345794	23	9.3457944
14	20	55	17	13.5	20.5	0.51401869	78	51.4018692
21	27	4	24	20.5	27.5	0.03738318	82	3.7383178
28	34	20	31	27.5	34.5	0.18691589	102	18.6915888
35	41	1	38	34.5	41.5	0.00934579	103	0.9345794
42	48	4	45	41.5	48.5	0.03738318	107	3.7383178

Table 4.9(a)

```
Classes= cut(WaitingTime,Interval, right=FALSE)
Classes= transform(table(Classes))
Classes$Relative_freq <-(Classes$Freq /sum(Classes$Freq))
Classes$Cumulative_Freq <-cumsum(Classes$Freq)
Classes$Percentage_RF <-(Classes$Relative_freq *100)
Classes
```

```
##   Classes Freq Relative_freq Cumulative_Freq Percentage_RF
## 1   [0,7)   13   0.121495327              13    12.1495327
## 2  [7,14)   10   0.093457944              23     9.3457944
## 3 [14,21)   55   0.514018692              78    51.4018692
## 4 [21,28)    4   0.037383178              82     3.7383178
## 5 [28,35)   20   0.186915888             102    18.6915888
## 6 [35,42)    1   0.009345794             103     0.9345794
## 7 [42,49)    4   0.037383178             107     3.7383178
```

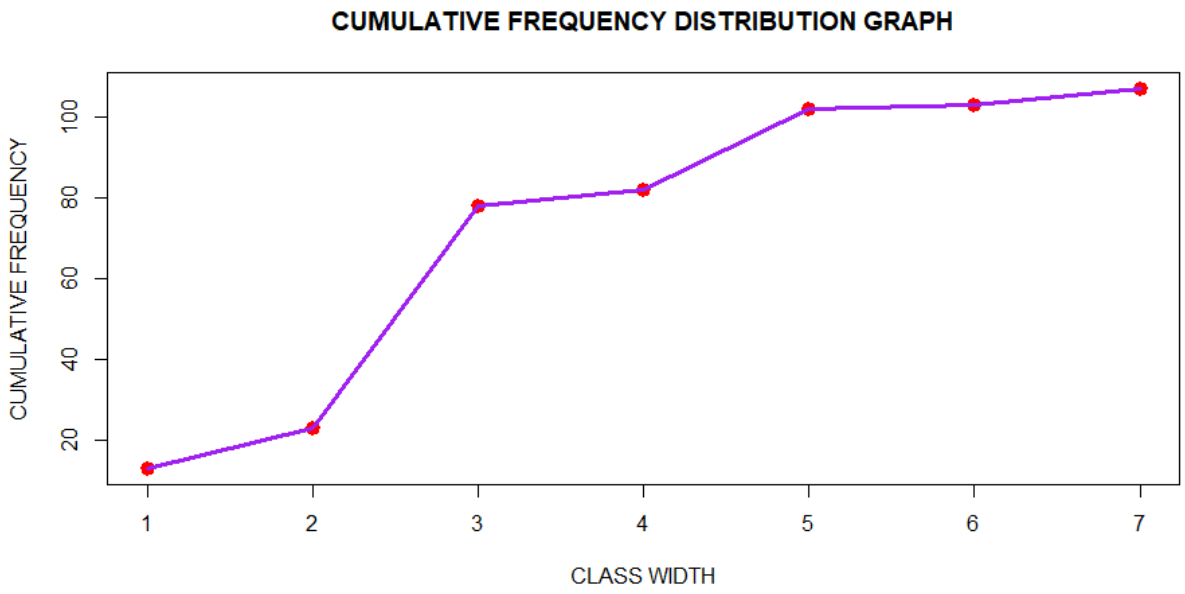
```
plot(Classes$Relative_freq, ylim=c(0,0.6),col="red",lwd="5",
     xlab ="Class width", ylab="Relative  frequency",
     main="RELATIVE FREQUENCY DISTRIBUTION GRAPH",)
lines( Classes$Relative_freq,col="blue",lwd="3")
```



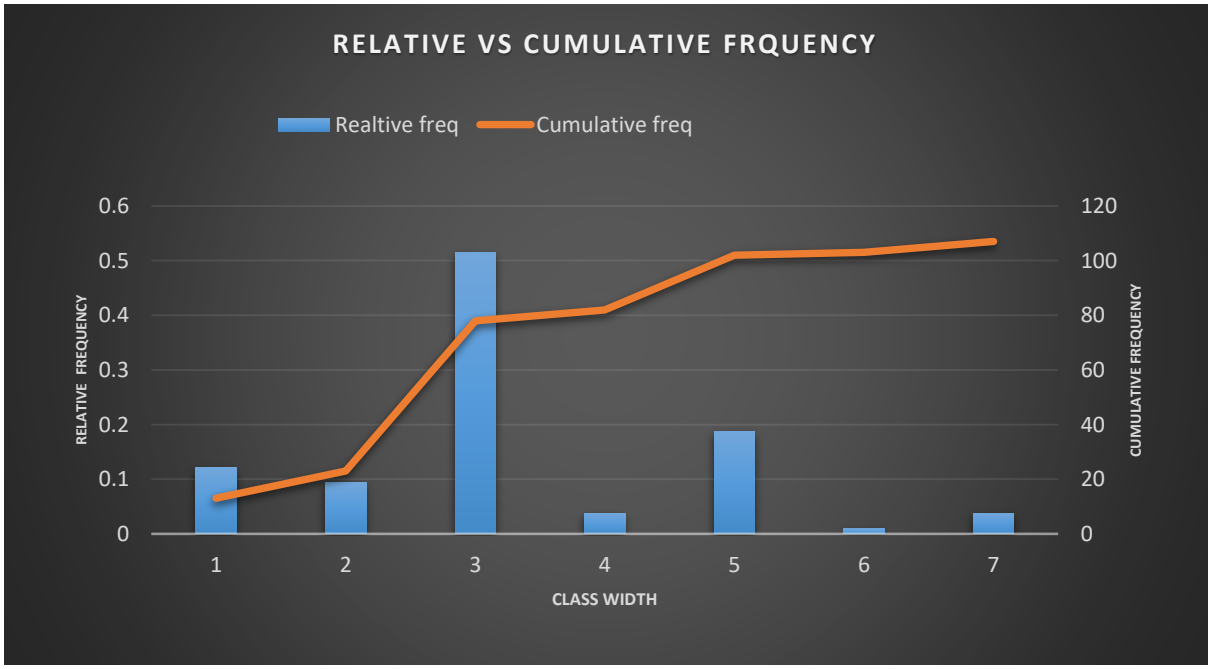
Line graph - Figure 4.9(a)

Relative frequency refers to the percentage or proportion of times that a given value occurs within a set of numbers, such as in the data recorded for a variable in a survey data set and since we already have data frequency distribution table it is easy to know that how often something happen

```
plot(Classes$Cumulative_Freq, main="CUMULATIVE FREQUENCY DISTRIBUTION GRAP
H", xlab ="Class width", ylab="Cumulative  frequency",col="red",lwd="5")
lines( Classes$Cumulative_Freq,col="purple",lwd="3")
```



Line graph - Figure 4.9(b) represent a **cumulative frequency** distribution graph .in this graph X axis represents the Classes and Y axis represents all range of cumulative frequency. Cumulative frequency is used to determine the number of observations that lie above (or below) a particular value in a data set please refer to **Table 4.9(a).**

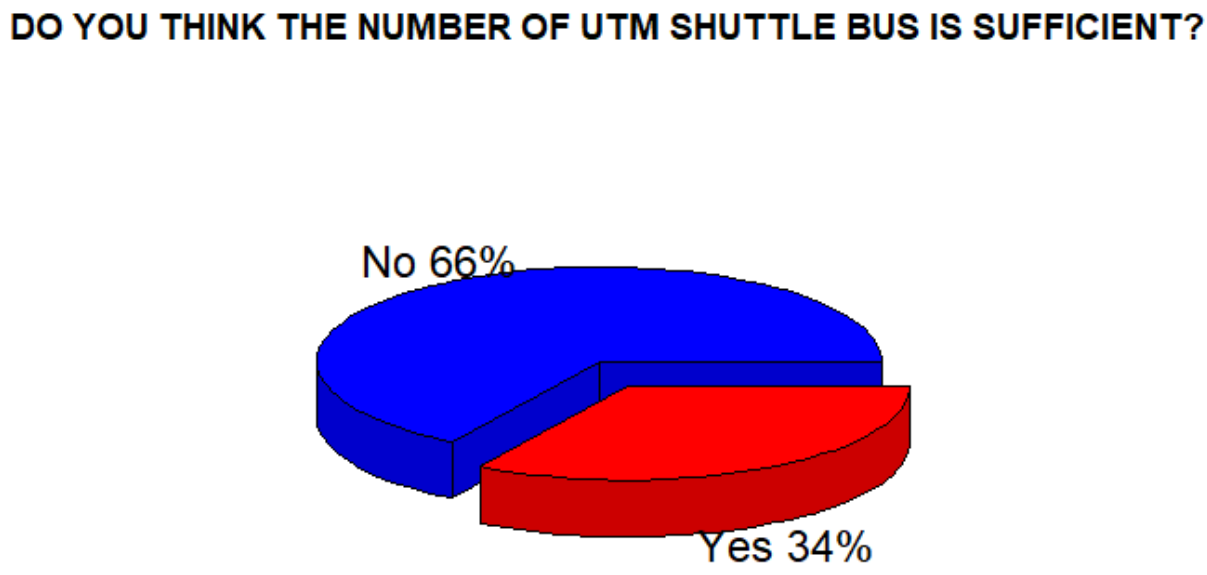


Clustered Colum graph - Figure 4.9(c) represents Relative frequency vs Cumulative frequency for better visualization.

4.10 UTM BUS SUFFICENCY

This question asked the respondents the number of UTM shuttle bus is sufficient or not, over 60% of the 107 respondents answered “No” which makes it 71 students, and less than 35% answered “Yes”, figure 4.10(a) provides a graphical representation of the result 3D pie chart constructed by R programming.

The result shows that number of shuttles buses is not sufficient, and a large portion of students desires it.

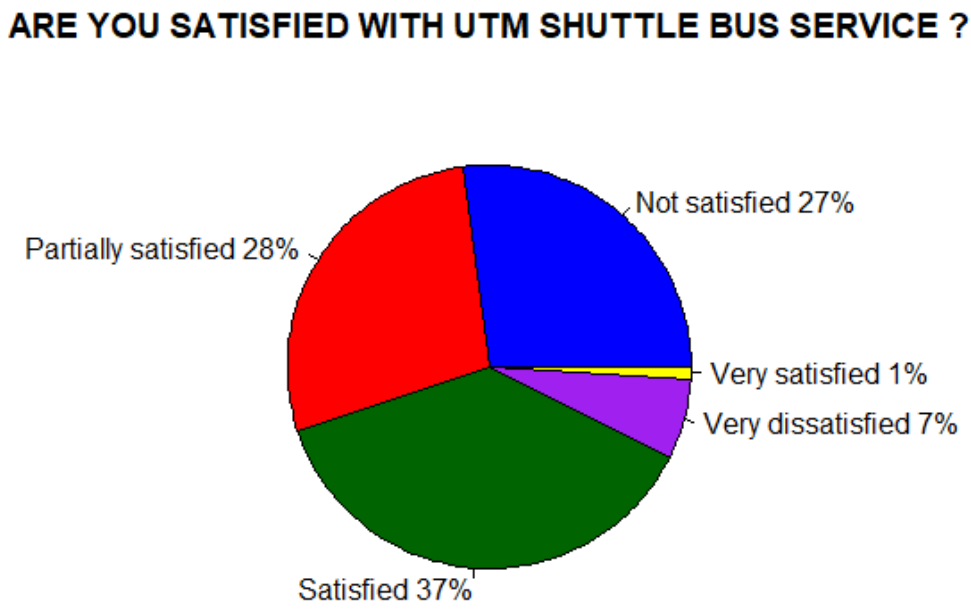


Pie Chart - Figure 4.10(a)

```
Sufficient.freq <- table(DataSet[,11])
lbls <- paste(names(Sufficient.freq))
pct <-round(Sufficient.freq/sum(Sufficient.freq)*100)
lbls <-paste(lbls, pct)
lbls <-paste(lbls, "%", sep = "")
pie3D(Sufficient.freq,labels =lbls, col = c("blue","red" ), explode = 0.1,
      main="DO YOU THINK THE NUMBER OF UTM SHUTTLE BUS IS SUFFICIENT?")
```

4.11 STUDENTS SATISFACTORY

The respondent is asked whether he/she is satisfied with the UTM Shuttle bus service in the past. According about 107 responses, this pie chart **Figure 4.11(a)** demonstrates around 34% of student is not very satisfied with the services. Total 38% responded are satisfied with the service and 28% students are partially satisfied.



Pie chart - Figure 4.11(a) differentiates between the levels of satisfactions.

```
Satisfactory.freq<- table(DataSet[,12])
lbls <- paste(names(Satisfactory.freq))
pct <-round(Satisfactory.freq/sum(Satisfactory.freq)*100)
lbls <-paste(lbls, pct)
lbls <-paste(lbls, "%", sep = "")
pie(Satisfactory.freq, labels = lbls,
    main="ARE YOU SATISFIED WITH UTM SHUTTLE BUS SERVICE ?",
    col = c("blue","red","darkgreen","PURPLE" ,"yellow"))
```

4.12 SUGGESTIONS

in order to determine the source of dissatisfactory for students we asked them for the suggestions to improve the UTM shuttle bus service. However, a significant number of students in this survey could enhance the futures of our institutions by:

- Including a technology emphasis in future campus master plans.
- Addressing transportation planning issues, especially transit service and facilities, in future campus master plans, and
- working more closely with their municipal counterparts in all aspects of planning.
- Please refer to **DataSet** for more suggestions.

5. CONCLUSION AND RECOMMENDATIONS

The University Transportation Survey is one of a few attempts to document and understand transportation on and around university campuses. The results of the survey can best be used in the day-to-day setting where a university, a transit agency, a student government, or others are comparing their own circumstance to those found around the University. Majority of the respondents for the study use the campus shuttle every other day because of the lower transport fares for mainly educational reasons. Different methods were used to test our hypotheses for the study. The students indicated that campus shuttle bus service is of poor quality. The results portray that student are not fully satisfied with the services. On this not, transport section should look at the attributes of assurance, tangibility, empathy and receptively to improve perception of service quality. This will help them to maintain and satisfied students will make positive recommendation to other students.

Improving public transport service quality is an effective way to enhance bus attractiveness, this research constructed a satisfaction evaluation. By analysing the different segment's satisfaction evaluation and influencing factors of satisfaction, the study found that the bus type and arrival time is the primary factor that affects the overall satisfaction.

This study has not, for example, determined the "best" or most productive shuttle service for travel around a central campus. This effort is beyond the scope of this project. However, as the body of data and information increase related to university transit systems, one of the first efforts should be a closer examination of these specific types of service. Determining the characteristics that enhance productivity by service type would provide extremely useful information for university related transit systems across the University Technology Malaysia.

Generally, universities take their campus master planning quite seriously. Most do an excellent job of planning for the future of their campuses. However, university communities could enhance the future of their communities by: Completing a master transportation plan for the community that includes transportation facilities, transit service and facilities, bicycle and pedestrian networks, and access and mobility for its citizens, and Working more closely with their university counterparts in all aspects of planning.

In a quote worth repeating from James H. Miller in his work titled "Transportation on College and University Campuses:"

"Greater efforts need to be made to share information on successes, failures, and lessons learned. … efforts and programs should be developed to facilitate the sharing of information between university communities, and also to translate the knowledge gained to applications for all communities."