



SECI2143
Probability & Statistical Data Analysis

Project 1

Theme : Survey on transportation among Universiti Teknologi Malaysia (UTM) Students

Section : 09

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Google Form Link:

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TABLE OF CONTENTS

No.	Contents	Page
1	Introduction	3
2	Data Collection	4
3	Data Analysis	5
	3.1 Gender	5
	3.2 Age	5
	3.3 Type of transportation	6
	3.4 Owned a car in UTM	7
	3.5 Frequency of using private car	8
	3.6 Frequency of using public transportation	9
	3.7 Satisfaction when using public transportation	10
	3.8 Time spent to school by public transportation	11-12
	3.9 Consumption of transportation	13
	3.10 Frequency of going out	14
	3.11 Time to go out a destination	15
4	Conclusion	16

1.0 Introduction

UTM JB is the second-largest public university campus in Malaysia, covering a vast area of 1148 hectares. Ease of transportation is an essential factor in any UTM student's life. While private cars like grab and maxim are a quick and easy option, they cost an arm and a leg. The use of bikes and walking is also common among students. Some students tend to rely on public transportation which can have inconvenient timings. We hope that by investigating this issue, we can come up with solutions to make transportation for students more affordable and more convenient.

For this reason, we decided to investigate and analyse transportation patterns among UTM students. This was done by collecting data through a survey that asked a range of questions about transportation preferences. The survey was conducted online and made as short and simple as possible, which allowed us to reach our desired number of respondents in a short period of time. A sample was collected (64 responses) which was later used for our analysis.

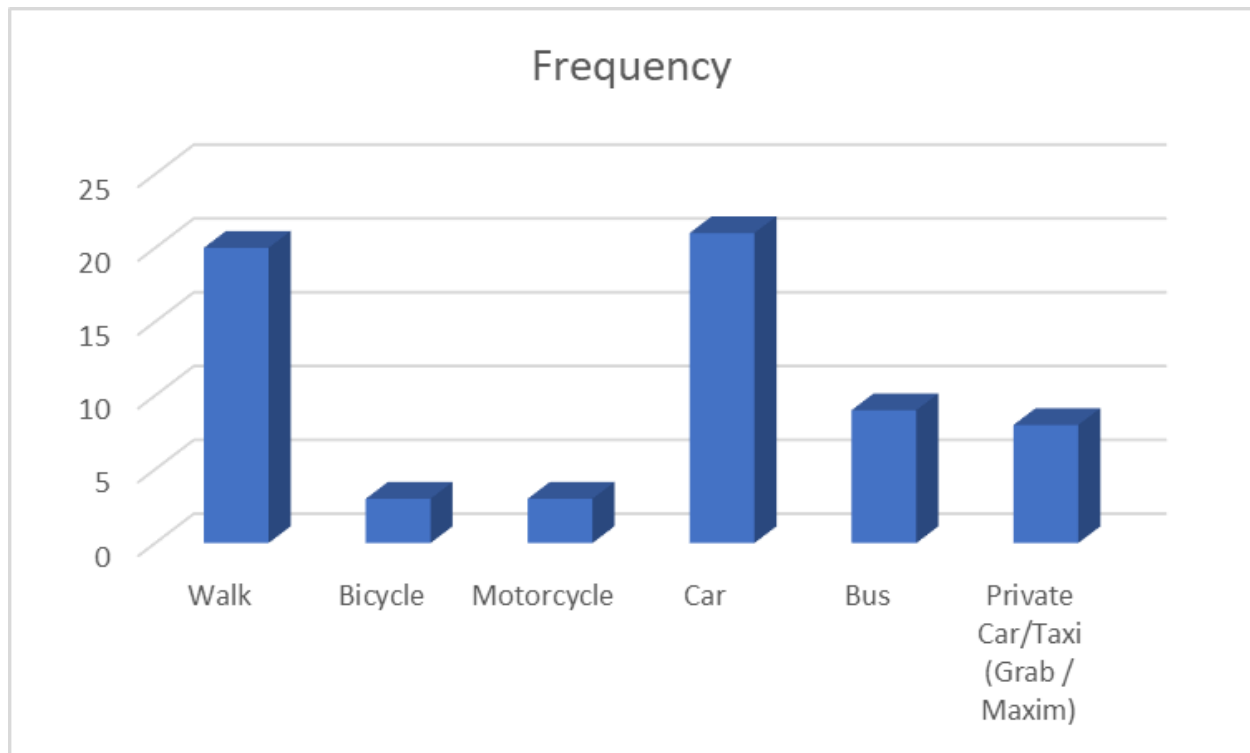
The survey consisted of two sections, with section two focusing on short answers or multiple-choice questions for easy collection of data. Questions asked ranged from time and money spent on transportation, to types of transportation used by students. Although we expected the use of buses to be more frequent, the vast majority of students either own a car or walk to their destination in UTM.

Later in this report, all data collected from the respondents is analysed and represented appropriately.

2.0 Data Collection

Population = All UTM Students				
Sample = 64 UTM Students				
No	Variables	Quantitative & Qualitative	Levels of Measurement	Graph Representation
1	Gender	Qualitative	Nominal	Pie chart
2	Age	Quantitative	Rational	Stem and Leaf
3	Type of transportation	Qualitative	Nominal	Bar chart
4	Owned a car in UTM	Qualitative	Nominal	Pie chart
5	Frequency of using private car	Quantitative	Ordinal	Bar Chart
6	Frequency of using public transportation	Quantitative	Ordinal	Bar Chart
7	Satisfaction when using public transportation	Quantitative	Ordinal	Pie Chart
8	Time spent to school by public transportation	Quantitative	Rational	Histogram with Frequency Distribution
9	Consumption of transportation	Quantitative	Rational	Box Plot
10	Frequency of going out	Quantitative	Ordinal	Bar Chart
11	Time to go out a destination	Quantitative	Interval	Scatter Plot

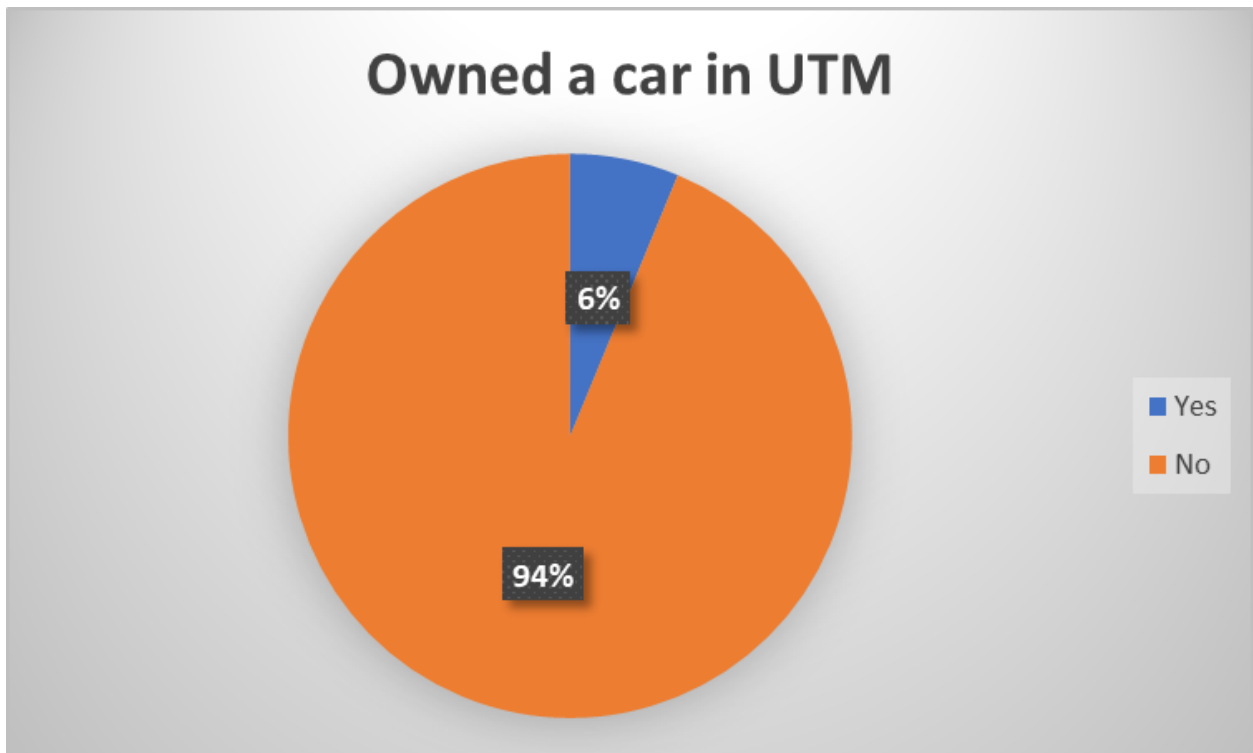
3.3 Type of transportation



Type of transportation	Frequency	Percentage(%)
Walk	20	31.3
Bicycle	3	4.7
Motorcycle	3	4.7
Car	21	32.8
Bus	9	14.1
Private Car/Taxi (Grab / Maxim)	8	12.5

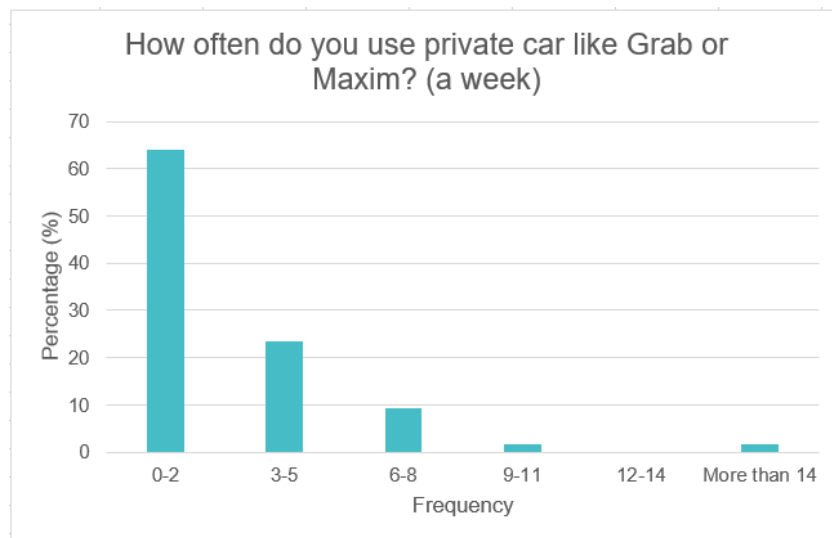
Explanation: In this section, all the respondents need to choose the type of transportation. From this graph, we can see that most of the respondents choose cars as their transportation which is 32.8%. Next, 31.3% of the respondents choose to walk on campus. The bus is the third-highest selection by the respondents which is 14.1%, and the fourth-highest is the private car which is 12.5%. There are two lowest modes of transportation that respondents choose which are bicycles and motorcycles, the percentages are both 4.7%.

3.4 Owned a car in UTM



Explanation: There are 6% of respondents who own a car and 94% of them did not own a car in UTM.

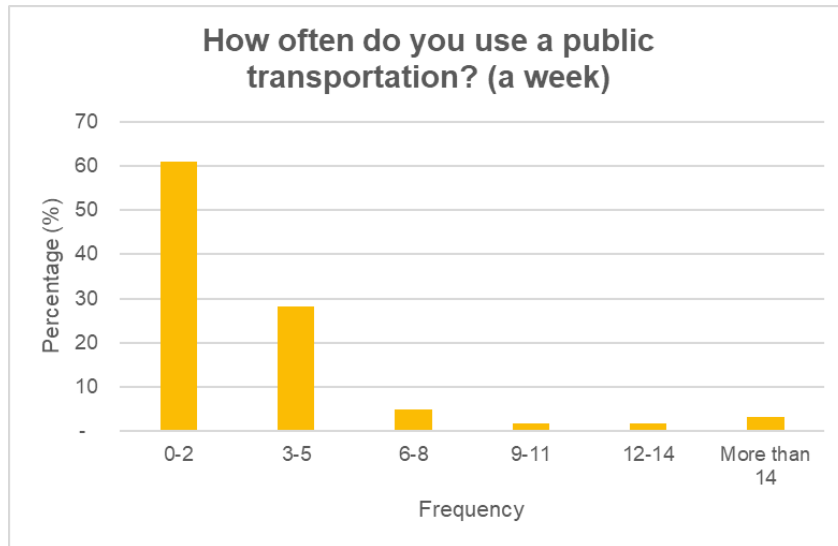
3.5 Frequency of using private cars



Frequency of using private cars	Frequency	Percentage (%)
0-2	41	64.06
3-5	15	23.44
6-8	6	9.38
9-11	1	1.56
12-14	0	0.00
> 14	1	1.56

Explanation: In this survey, there were six level of frequency can choose by respondents which are 0-2, 3-5, 6-8, 9-11, 12-14, and more than 14. We can see that 64.06% of UTM students use only zero to two times of the private car a week while the percentages of UTM students use three to five times and six to eight times of the private car to a destination a week were 23.44% and 9.38% of UTM student respectively. It was followed by 9-11, 12-14, and more than 14 which were 1.56%, 0.00%, and 1.56% respectively. This shows that most UTM students rarely use a private car like Grab or Maxim as their transportation to a place.

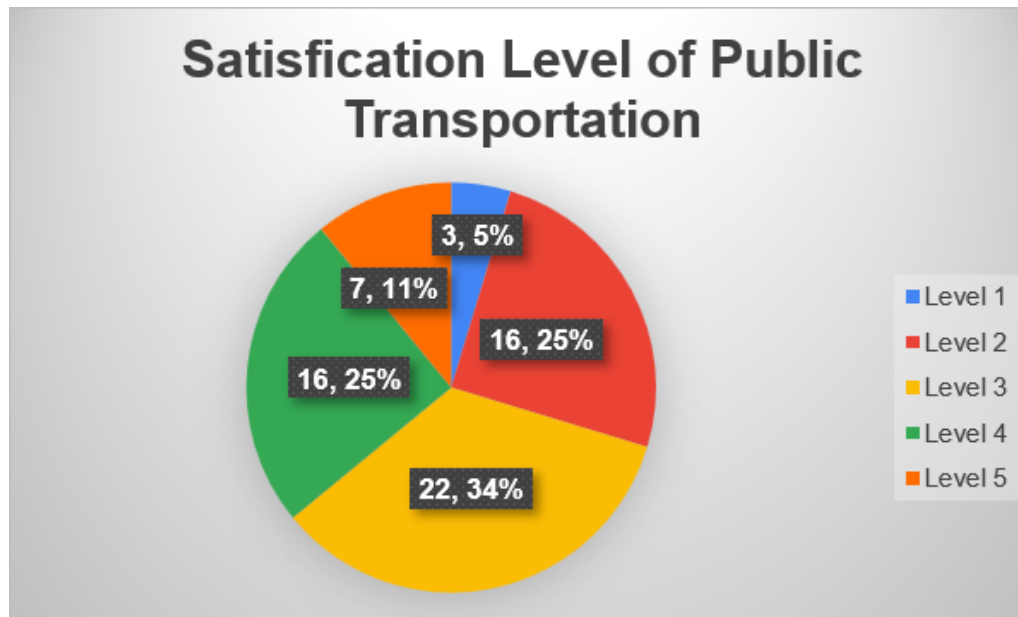
3.6 Frequency of using public transportation



Frequency of using public transportation	Frequency	Percentage (%)
0-2	39	60.94
3-5	18	28.13
6-8	3	4.69
9-11	1	1.56
12-14	1	1.56
> 14	2	3.13

Explanation: For public transportation, there were six level of frequency can choose by respondents which are 0-2, 3-5, 6-8, 9-11, 12-14, and more than 14. We can notice that 60.94% of UTM students use only zero to two times the public transportation a week. After that, the percentages of UTM students who used three to five times and six to eight times the public transportation to a destination a week were 28.13% and 4.69% of UTM students respectively. It was followed by 9-11, 12-14, and more than 14 which were 1.56%, 1.56%, and 3.13% respectively. This shows that UTM students also rarely use public transportation to a place.

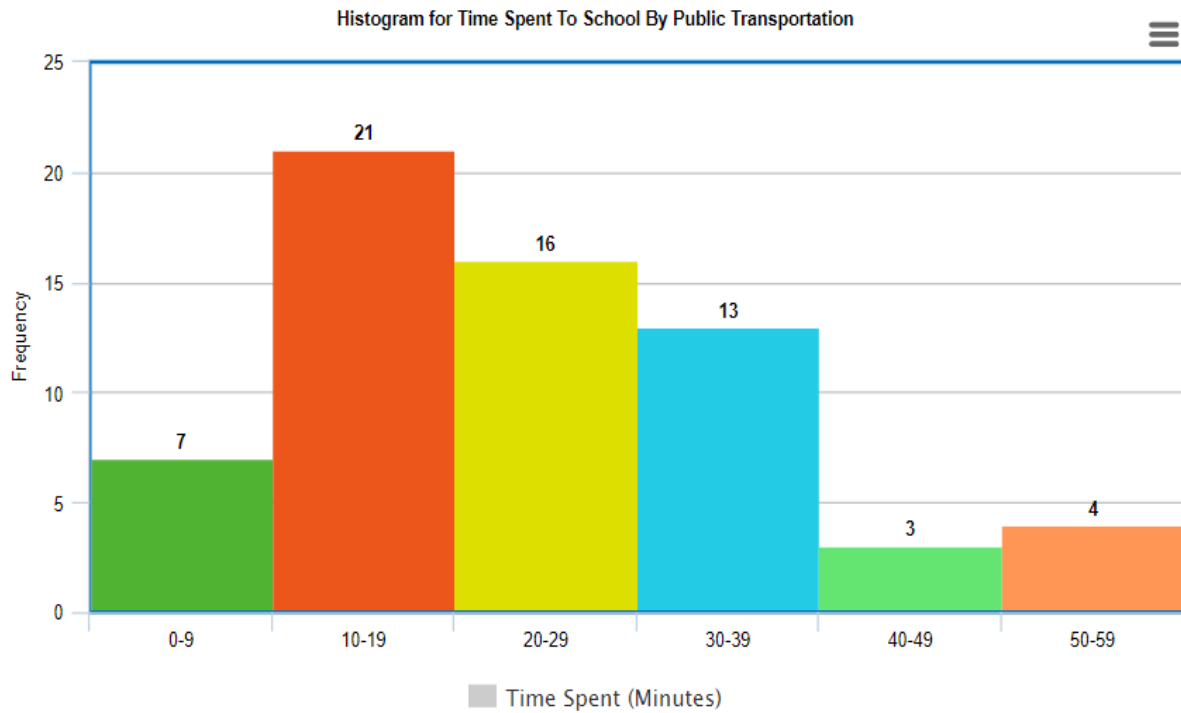
3.7 Satisfaction when using public transportation



Satisfaction Level	Frequency	Percentage (%)
Level 1	3	4.69
Level 2	16	25.00
Level 3	22	34.38
Level 4	16	25.00
Level 5	7	10.94

Explanation: From this pie chart, we can see that 4.69% of UTM students were very dissatisfied with public transportations and 25.00% of UTM students were dissatisfied with public transportation. After that, the percentage of students who were moderately satisfied with public transportations is 34.38% while the percentage of students who were satisfied with public transportations was 25%. Lastly, 7 UTM students were very satisfied with public transportation which is 10.94%. In general, UTM students are quite satisfied with public transportation.

3.8 Time spent to school by public transportation



Class Interval (minutes)	Class Midpoint, x	Frequency	Cumulative Frequency	fx	$f(x-\text{mean})^2$
0-9	4.5	7	7	31.5	2627.73
10-19	14.5	21	28	304.5	1845.70
20-29	24.5	16	44	392.0	6.25
30-39	34.5	13	57	448.5	1467.58
40-49	44.5	3	60	133.5	1276.17
50-59	54.5	4	64	218.0	3751.56
			Total	1528.0	10974.99

$$\text{Mean} = 23.875$$

$$\text{Median} = 22.00$$

$$\text{Mode} = 16.87$$

$$\text{Variance} = 158.89$$

$$\text{Standard Deviation} = 12.61$$

Calculation:

$$\text{Mean} = 1528/64$$

$$= 23.875$$

$$\text{Median} = 19.5 + ((32-28)/16)(10)$$

$$= 22.00$$

$$\text{Mode} = 9.5 + (10)((21-7)/((2*21)-7-16))$$

$$= 16.87$$

$$\text{Variance} = 10974.99/(64-1)$$

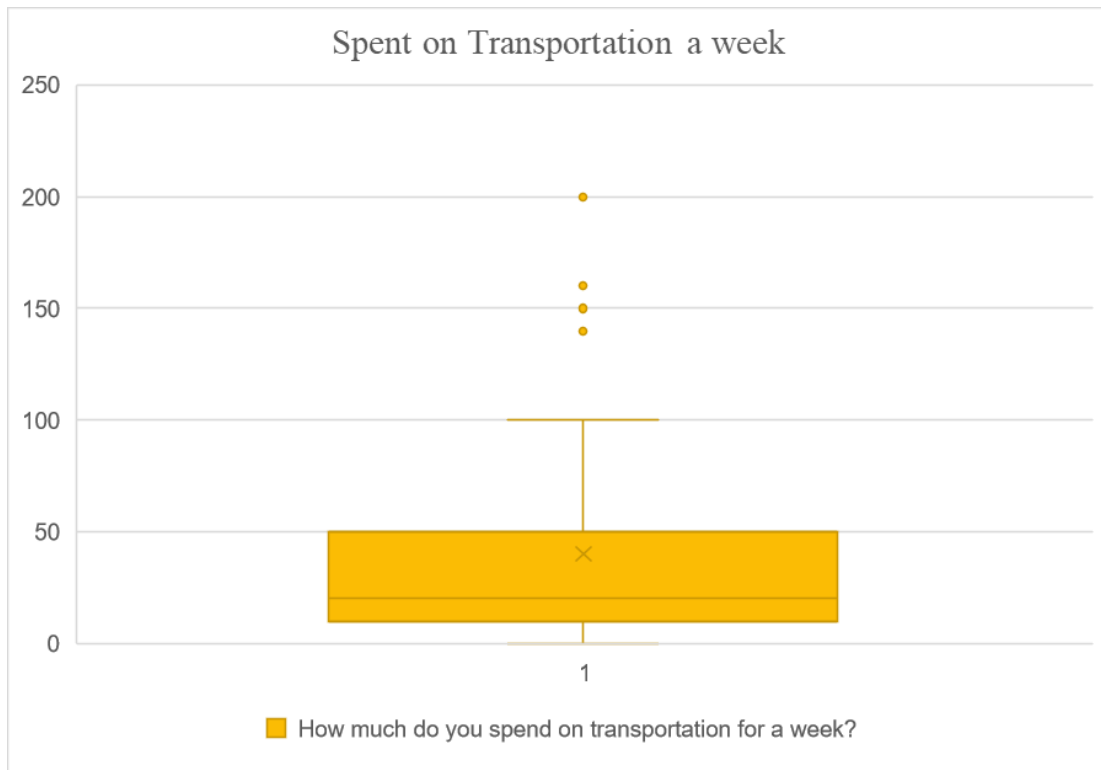
$$= 174.21$$

$$\text{Standard Deviation} = \sqrt{174.21}$$

$$= 13.20$$

Explanation: From the data, we find that most of the UTM students used 10-19 minutes to their school which is 32.81%. The second-highest percentage of the time spent by UTM students to school is 25.00%, which is 20-29 minutes, and the lowest percentage of the time spent by UTM students to school is 4.69%, which is 40-49 minutes. We use the histogram to represent the time spent to school among UTM students. We group the data and calculate the mean, mode, median, variance and standard deviation to analyse the data. Based on the mean, mode and median calculations, this histogram is positively skewed since the mean > median > mode. Moreover, we determine the variance and standard deviation of the data to get more information on this data.

3.9 Consumption of transportation



Sample size : 64 UTM students

Median : 20

Minimum : 0

Maximum : 100

First Quartile : 10

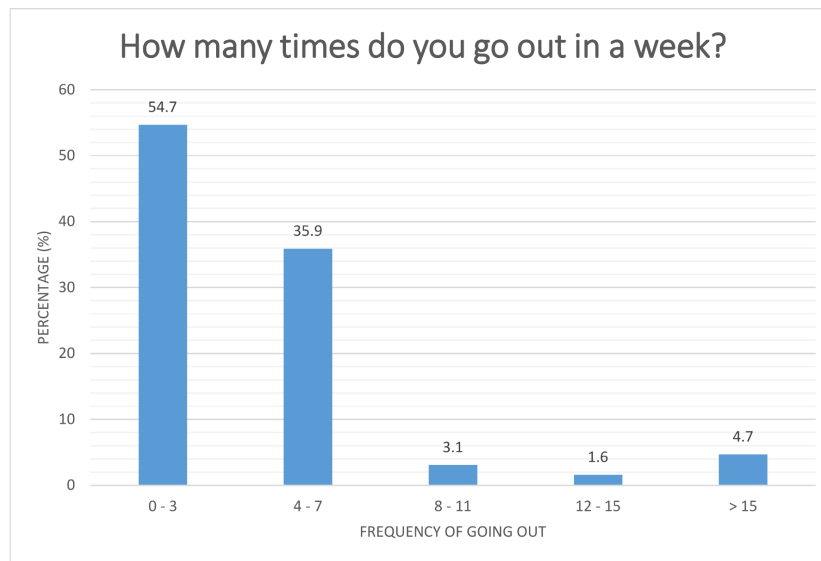
Third Quartile : 50

Interquartile Range : $50 - 10 = 40$

Outliers: 200, 160, 160, 150, 140

Explanation: From this box plot, we can see that the range of consumption of transportation is RM0 - RM200. Some UTM students do not use transportation and walk, so their transportation consumption is RM 0. Besides, we can know that the average transportation consumption for UTM students is RM 40. After that, there are five outliers in this box plot. This means 5 UTM students had a very high consumption of transportation. In conclusion, transportation will not be too burdensome for students.

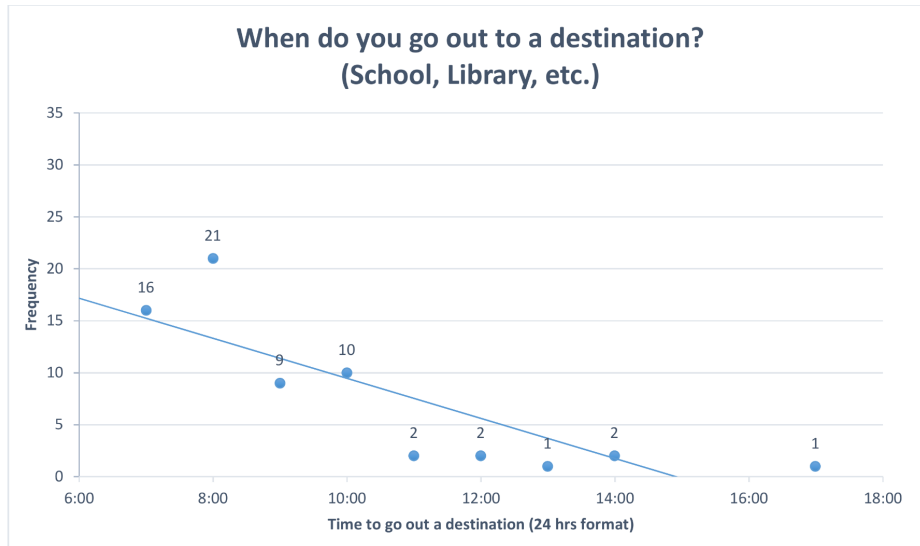
3.10 Frequency of going out



Frequency of going out	Frequency	Percentage (%)
0 - 3	35	54.7
4 - 7	23	35.9
8 - 11	2	3.1
12 - 15	1	1.6
> 15	3	4.7

Explanation: Based on the survey, we gave the respondents a range of frequency to choose from, to determine how often the students of UTM travel out in a week. The ranges are from 0-3, 4-7, 8-11, 12-15, and >15, and the sample size is 64. We can see from the survey that 54.7% of UTM students travel out 0 to 3 times per week, which is the highest percentage. After that, the percentages of UTM students who travel out 4 to 7 times and 8 to 11 times a week were 35.9% and 3.1%, respectively. The range of 12 to 15 times has the lowest percentage that was recorded in the survey, which is 1.6%. Then, the last 4.7% of UTM students who travel out more than 15 times showed a slight increase compared to 12 to 15 times and 8 to 11 times. This shows that UTM students prefer to travel out less. Only a small percentage of UTM students are willing to travel out more than eight times.

3.11 Time to go to a destination



Time to go to a destination	Frequency
07:00	16
08:00	21
09:00	9
10:00	10
11:00	2
12:00	2
13:00	1
14:00	2
17:00	1

Explanation: According to the scatter plot graph, we can see the range starts from 07:00 to 17:00, and the sample size is 64. The most frequent time for UTM students to travel to their destination is 08:00. It has 21 UTM students. After that, 16 UTM students prefer 07:00 as their time for travel out, followed by 10:00, which has 10 UTM students. Moreover, at 09:00 there are nine UTM students, which is less than 10:00. Then, the least preferred times are 13:00 and 17:00, with 1 UTM student respectively. Meanwhile, there are 2 UTM students who each prefer to travel out at 11:00, 12:00, and 14:00. The slope of the graph is directly proportional. This shows that UTM students prefer to travel out in the early morning and fewer travel out after 11:00.

4.0 Conclusion

In conclusion, most of the respondents were male students from UTM. Their mean age is 20.25 years old. Next, they are likely to prefer riding in their own cars or walking as their ways to reach a destination; both are 32.8% and 31.3%. UTM students do not own a car inside UTM (94%), probably due to the policy of the UTM. Meanwhile, they take a ride in private cars less frequently (64.06%). One of the reasons might be that fees are not affordable for most students. Moreover, most students prefer taking a ride on public transportation (60.94%). This is because the university provides bus services for students inside UTM to travel from one place to another. The satisfaction level when taking a ride on public transportation is Level 3, since public transportation stops are not well maintained or you sometimes need to wait longer when you miss a bus. Other than that, they are quite satisfied with public transportation. After that, most of the UTM students spend their time travelling to school by public transportation, which takes around 10 to 19 minutes since they might be near the faculty from their dorm. Transportation is not too burdensome for UTM students. The range of cost consumption for transportation is around RM0–RM200. Afterwards, UTM students do not like to travel out often, based on the survey. It is believed that they most likely travel whenever they are required to since there is no need to physically attend class during the COVID-19 pandemic phase. Lastly, they usually travel out between 07:00 and 08:00. UTM students who travel out at this time are usually going to have breakfast or going to the library for a quick study before attending an online class.