Project Report

On

A COMPARATIVE STUDY ON ONLINE V/S OFFLINE SHOPPING

Submitted

in partial fulfilment of the requirements for the degree of

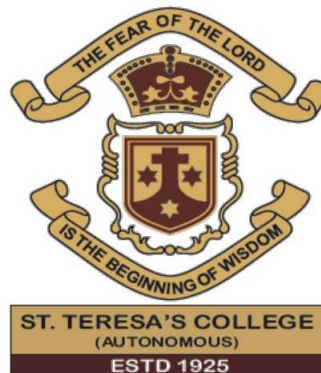BACHELOR OF SCIENCE

in

MATHEMATICS

by

RITI MARIA

(Register No. AB20BMAT021)

Under the Supervision of

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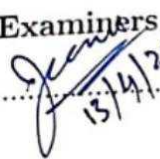
APRIL 2023

CERTIFICATE

This is to certify that the dissertation entitled, **A COMPARATIVE STUDY ON ONLINE V/S OFFLINE SHOPPING** is a bonafide record of the work done by Ms.**RITI MARIA** under my guidance as partial fulfillment of the award of the degree of **Bachelor of Science in Mathematics** at St. Teresa's College (Autonomous), Ernakulam affiliated to Mahatma Gandhi University, Kottayam. No part of this work has been submitted for any other degree elsewhere.

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Place: Ernakulam

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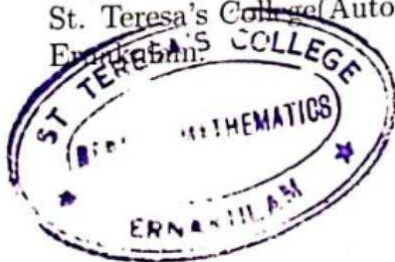
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DECLARATION

I hereby declare that the work presented in this project is based on the original work done by me under the guidance of **Ms.ARUNIMA P S**, Assistant Professor, Department of Mathematics, St. Teresa's College(Autonomous), Ernakulam and has not been included in any other project submitted previously for the award of any degree.

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ACKNOWLEDGEMENT

Contents

Chapter 1

INTRODUCTION

Everyday shopping is a part of life. Some people receive what they need from shopping, while others get something more. Shopping is arguably one of the oldest expressions for discussing what we have all been doing for several years.

Online shopping, sometimes known as e-shopping, is a type of ecommerce in which customers use a web browser to buy products or services directly from a vendor via the internet. Other names for an e-web-store include e-shop, estore, internet shop, web-shop, web-store, online sort, virtual store, and so on. Simply, it is any type of sale conducted through the internet. Since the advent of the internet, shopping has taken on a whole new meaning because of what the internet has to offer, that is, any individual or organization from any area of the world who is able to publish and sell items on the internet using a website. Furthermore, the customer does not have to worry about having to discover a way to trade monetary paper since not only is online banking made available; the client is given the choice to pay using various payment methods. It Is now even easier to locate the most difficult product, by just entering in the product or item that a buyer is looking for.

Offline shopping advantages from the opportunity to physically choose and inspect what an item or thing is like, would look like, and its attributes. This is why some people still prefer conventional buying over internet purchasing since, for one thing, it allows them to thoroughly inspect an item. Ecommerce platform is a popular location where buyers and sellers do not interact, resulting in a lack of product awareness. Despite the fact that the consumer visits the online buying site, he or she does not exhibit any interest in acquiring the product. Among the causes include a lack of trust, a loss of tactile touch and feel, security concerns,etc.

The customer of online shopping should have internet and a valid method of payment in order to purchase the products from the internet. Amazon, Myntra, flipkart are some of the examples of the successful online shopping sites that use less price of the items and large stocks to attract the consumer.

In general the population from high level of income and high level of learning are more favourable to do online shopping. The population who are more knowledgeable and more explored to the internet are more into online shopping. The increase in technology increases the online shopping by the consumer. The increase in technology creates a favourable attitude towards the consumer for online shopping. In this contemporary world customer's loyalty depends upon the consistent ability to deliver quality, value and satisfaction. Some go for offline shopping, some for online and many go for both kind of shopping.

1.1 SIGNIFICANCE OF STUDY

The statistical study is relevant as it tries to identify which shopping would be better for the consumer's perspective. We also get an insight about the consumer's choice for shopping online or offline. This study will give us a clear idea about the factors influencing online and offline shopping.

1.2 OBJECTIVES

1. To find out how different factors affect the consumers to shop online and offline.

2. To find out whether there is any relation between age of the consumers and shopping preference.

3. To examine whether gender and income have any relation on shopping preference and frequency respectively.

4. To analyse relationship between family size and satisfaction on online shopping.

5. To crosscheck whether the average willingness to spend online is more than Rs.1000 and that of offline is more than Rs.2000.

1.3   STATISTICAL SOFTWARE USED

MICROSOFT EXCEL

Microsoft Excel is a spreadsheet developed by Microsoft for Windows, macOS, Android and iOS. It features calculation or computation capabilities, graphing tools, pivot tables, and a macro programming language called Visual Basic for Applications. Excel forms part of the Microsoft Office suite of software.

Excel is a spreadsheet program from Microsoft and a component of its Office product group for business applications. Microsoft Excel enables users to format, organize and calculate data in a spreadsheet. By organizing data using software like Excel, data analysts and other users can make information easier to view as data is added or changed. Excel contains a large number of boxes called cells that are ordered in rows and columns. Data is placed in these cells.

Excel can help you by recommending, and then, automatically creating PivotTables, which are a great way to summarize, analyze, explore, and present your data. A pivot table may be used as an interactive data summarization tool to automatically condense large datasets into a separate, concise table. It includes functions like AVERAGE function, MEDIAN function, MODE function, STANDARD DEVIATION function, VARIANCE function, QUARTILES function, CORRELATION function.

1.4   P Value

The value expresses the probability of error. That is, the probability of rejecting the null hypothesis, when it is true. In other words, P value is defined as the probability that the value of the statistics fall in the critical region given the null hypothesis is true. Smaller the P value, smaller is the probability that we would be making mistakes by rejecting the null hypothesis. The cut-off value often used is 0.05, i.e., reject the hypothesis when P value is less than 0.05.

Chapter 2

DATA DESCRIPTION

The data used in this study is primary data collected directly from people of different age groups through an online form.

The variables under consideration are;

- Age groups

- Gender of consumers(male and female)

- Annual/monthly income(in rupees)

- Preferred shopping mode - online/offline/both

- Preference reason - reason for shopping online/offline

- Types of advertisements mostly attracts to purchase online

- Mode of payment using in online shopping

- Mostly purchased product(through online and offline shopping)

- Mostly purchasing online website

- Shopping frequency(regularly/weekly/monthly/seldom)

- Family size

- Amount spend on one time online/offline shopping

- Degree of satisfaction(very much/neutral/not satisfied)

- Factors checking before online shopping

- Security of online v/s offline shopping(yes/sometime/no)

Chapter 3

METHODOLOGY

The study is done with the help of primary data.

The primary data is collected through surveys. A well-structured questionnaire was formed and circulated among different age groups using google sheet. The study collects information related to online and offline shopping from 256 people of different ages, occupation and genders. Out of which 5 responses were found inappropriate and were excluded further.

Collected data was interpreted using bar charts and tables and analysed using t test and Chi-square test.

3.1 CHI-SQUARE TEST

3.1.1 DEFINITION

The test we use to measure the difference between what is observed and what is expected based on an assumed hypothesis is called the Chi square test.

3.1.2 ASSUMPTIONS

Both variables are catagorical:

It is assumed that both variables are categorical. That is, both variables take on value that are names or labels.

3.1.3 PROCEDURE

Step 1: First of all set the hypothesis that the variables are independent as null hypothesis,H_0 and that there is a relationship between the variables as alternative hypothesis,H_1.

Step 2: Tabulation of observed values and calculation of expected values is done by the formula:

$$E_{ij} = \frac{T_i \times T_j}{N}$$

where,

E_{ij} is the expected frequency for the ith row and j^{th} column

T_i is the total in the ith row

T_j is the total in the jth column

N is the table grand total

Step 3: Then test statistic for chi square test of independence is given by

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

where, O_i is the observed value and E_i is the expected value.

Step 4: Finally the calculated value of χ^2 is compared to the critical value from the χ^2 distribution table with degrees of freedom, $df = (R-1)(C-1)$, (where R is the number of rows and C is the number of columns) and chosen confidence level. If the calculated χ^2 value is greater than the critical χ^2 value, then we reject the null hypothesis.

3.1.4 APPLICATIONS

1. To test the goodness of fit of distributions.

2. To test the independence of attributes.

3. Test of Homogeneity.

3.2 ONE SAMPLE T-TEST

3.2.1 DEFINITION

The t-test is one of the most common hypothesis tests in statistics. The t-test determines either whether the sample mean and the mean of the population differ or if two sample means differ statistically. One sample t-test determines whether the sample mean is statistically different from a known or hypothesized population mean.

3.2.2 ASSUMPTIONS

1. Random sampling from a defined population.

2. Interval or ratio scale of measurement.

3. Continuous and independent variables.

4. Population is normally distributed.

3.2.3 PROCEDURE

Step 1: Define the Null Hypothesis(H0) and Alternate Hypothesis(H1).

One sample t test can be used to look for a difference in only one direction from the standard value(One-tailed t test).

Null hypothesis(H0): The mean value of the population is equal to or greater than (or less than) that of the specified value.

Alternative hypothesis(H1): The mean value of the population is smaller (or larger) than the specified value.
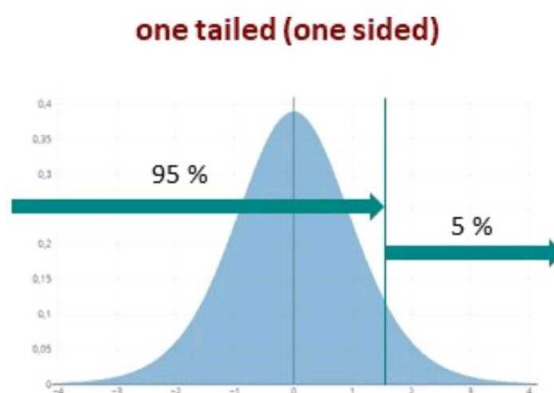
This test can also be used to look for a difference in either direction from the standard value(Two-tailed t test).

Null hypothesis(H0): The mean value of the population is equal to the specified value.

Alternative hypothesis(H1): The mean value of the population is not equal to the specified value.

Two tailed (two sided)
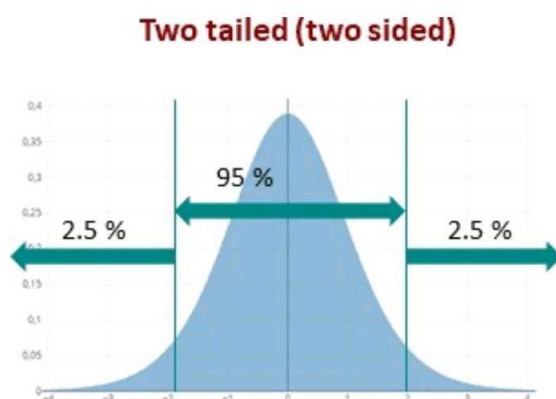
Step 2: Compute the test statistic(t) for t test,

$$t = \frac{\overline{X} - \mu}{\frac{s}{\sqrt{n}}}$$

where,

$\overline{x}$ is the sample mean

μ is the population mean

s is the sample standard deviation

n is the sample size

Step 3: Find the critical value from t table with degrees of freedom, $df = n - 1$ and chosen confidence level.

Step 4: Determine if the computed test statistic falls in the rejection region. Alternately, simply compute the P-value. If it is less than the confidence level(0.05),then reject the null hypothesis.

3.2.4 APPLICATIONS

1. To determine if the difference between a single sample mean and a known or estimated population mean(μ) is statistically significant.

2. It is used when the population SD(σ) is unknown.

3. It is used when the data are of at least interval or ratio scales.

Chapter 4

DATA ANALYSIS

4.1 STATISTICAL ANALYSIS

4.1.1 Chi-square test

Relation between Age and Shopping preference

H0 : There is no relationship between age and preference

H1 : There is relationship between age and preference

OBSERVED VALUES(O_i)				
Age/Preference	Both	Offline shopping	Online shopping	Grand Total
15-24	95	19	11	125
25-34	37	11	5	53
35-44	17	5	3	25
45-54	24	11	2	37
55-64	0	5	1	6
Grand Total	173	51	22	246

EXPECTED VALUES(E_i)				
Age/Preference	Both	Offline shopping	Online shopping	Grand Total
15-24	87.90650407	25.91463415	11.17886179	125
25-34	37.27235772	10.98780488	4.739837398	53
35-44	17.58130081	5.182926829	2.235772358	25
45-54	26.0203252	7.670731707	3.308943089	37
55-64	4.219512195	1.243902439	0.536585366	6
Grand Total	173	51	22	246

$\frac{(O_i-E_i)^2}{E_i}$ values			
Age/Preference	Both	Offline shopping	Online shopping
15-24	0.572400019	1.844987088	0.002861789
25-34	0.001990181	1.35351E-05	0.014279937
35-44	0.019219888	0.006456241	0.261226903
45-54	0.156866369	1.44497654	0.517788298
55-64	4.219512195	11.34194165	0.400221729

$\chi^2 = 20.80474237$, df $= 8$, $\alpha = 0.05$

P value $= 0.007684603 < 0.05$

Also, Critical value $= 15.50731306 < \chi^2$ value

Therefore, reject H0.

Thus, there is a relation between age of consumers and preference for shopping online and offline.

Relation between Gender and Shopping preference

H0 : There is no association between gender of consumers and preference.

H1 : There is association between gender of consumers and preference.

OBSERVED VALUES(O_i)				
Gender/Prefernce	Both	Offline shopping	Online shopping	Grand Total
Female	132	30	15	177
Male	42	20	7	69
Grand Total	174	50	22	246

EXPECTED VALUES(E_i)				
Gender/Preference	Both	Offline shopping	Online shopping	Grand Total
Female	125.195122	35.97560976	15.82926829	177
Male	48.80487805	14.02439024	6.170731707	69
Grand Total	174	50	22	246

$\frac{(O_i-E_i)^2}{E_i}$ values			
Gender/Preference	Both	Offline shopping	Online shopping
Female	0.369873558	0.992558909	0.043443948
Male	0.948806085	2.546129374	0.11144317

$\chi^2 = 5.012255044$, df $= 2$, $\alpha = 0.05$

P value $= 0.081583559 > 0.05$

Also, Critical value $= 5.991464547 > \chi^2$ value

Therefore accept H0.

Thus, there is no association between gender of consumers and shopping preference.

Relation between Income and Frequency of Onlne shopping

H0 : Frequency of Online shopping is independent of income of consumers.

H1 : Frequency of Online shopping is dependent of income of consumers.

OBSERVED VALUES(O_i)					
Income/Frequency	Monthly	Regularly	Seldom	Weekly	Grand Total
10000-159999	39	3	67	5	114
160000-309999	12	4	23	1	40
310000-459999	6	1	5	1	13
460000-609999	5	0	3	1	9
610000-759999	1	0	2	0	3
760000-909999	0	0	4	0	4
910000-1059999	1	1	1	0	3
Grand Total	64	9	105	8	186

EXPECTED VALUES(E_i)					
Income/Frequency	Monthly	Regularly	Seldom	Weekly	Grand Total
10000-159999	39.22580645	5.516129032	64.35483871	4.903225806	114
160000-309999	13.76344086	1.935483871	22.58064516	1.720430108	40
310000-459999	4.47311828	0.629032258	7.338709677	0.559139785	13
460000-609999	3.096774194	0.435483871	5.080645161	0.387096774	9
610000-759999	1.032258065	0.14516129	1.693548387	0.129032258	3
760000-909999	1.376344086	0.193548387	2.258064516	0.172043011	4
910000-1059999	1.032258065	0.14516129	1.693548387	0.129032258	3
Grand Total	64	9	105	8	186

$\frac{(O_i-E_i)^2}{E_i}$ values				
Income/Frequency	Monthly	Regularly	Seldom	Weekly
10000-159999	0.001299873	1.14770798	0.108723421	0.001910017
160000-309999	0.22594086	2.202150538	0.007788018	0.301680108
310000-459999	0.521195203	0.218775848	0.745303084	0.347601323
460000-609999	1.16969086	0.435483871	0.852073733	0.970430108
610000-759999	0.001008065	0.14516129	0.055453149	0.129032258
760000-909999	1.376344086	0.193548387	1.343778802	0.172043011
910000-1059999	0.001008065	5.034050179	0.284024578	0.129032258

$\chi^2 = 18.12223897$, df $= 18$, $\alpha = 0.05$

P value $= 0.44762754 > 0.05$

Also, Critical value $= 28.86929943 > \chi^2$ value

Therefore accept H0.

Thus, frequency of online shopping does not depend on income of consumers.

Relation between Family size and Satisfaction on online shopping

H0 : There is no association between family size and satisfaction of family of consumers on online purchase.

H1 : There is association between family size and satisfaction of family of consumers on online purchase.

OBSERVED VALUES(O_i)

Satisfaction/Family size	1-3	4-6	7-9	10-12	Grand Total
Neutral	32	150	6	2	190
Not Satisfied	6	15	1	0	22
Very much Satisfied	6	26	2	0	34
Grand Total	44	191	9	2	246

EXPECTED VALUES(E_i)

Satisfaction/Family size	1-3	4-6	7-9	10-12	Grand Total
Neutral	33.98373984	147.5203252	6.951219512	1.544715447	190
Not Satisfied	3.93495935	17.08130081	0.804878049	0.178861789	22
Very much Satisfied	6.081300813	26.39837398	1.243902439	0.276422764	34
Grand Total	44	191	9	2	246

$\frac{(O_i - E_i)^2}{E_i}$ values

Satisfaction/Family size	1-3	4-6	7-9	10-12
Neutral	0.115797254	0.041680949	0.130166881	0.134189131
Not Satisfied	1.08371968	0.253599718	0.047302291	0.178861789
Very much Satisfied	0.001086909	0.006011803	0.459588714	0.276422764

$\chi^2 = 2.728427883$, df = 6, $\alpha = 0.05$

P value = 0.84207811 > 0.05

Also, Critical value = 12.59158724 > χ^2 value

Therefore accept H0. Thus, there is no relation between family size of consumers and their satisfaction on online purchase.

4.1.2 One sample t-test

- H0 : Average amount spend on one time online shopping is less than or equal to 1000 rupees($\mu \leq 1000$).

  H1 : Average amount spend on one time online shopping is greater than 1000 rupees($\mu > 1000$).

Mean($\overline{x}$)	1644.897959
Standard deviation(s)	896.5007622
Count(n)	245
Standard error of mean	57.27533275
Degrees of freedom	244
Hypothesized mean(μ)	1000
t-statistic,t	11.25961087
P-value	2.9242×10^{-24}
t Critical (one-tail)	1.651122505

t statistic > critical value.

Also, P value $< \alpha = 0.05$.

Therefore, we reject H0.

Thus, average amount spend on one time online shopping is greater than 1000 rupees.

- H0 : Average amount spend on one time offline shopping is less than or equal to 2000 rupees($\mu \leq 2000$).

  H1 : Average amount spend on one time offline shopping is greater than 2000 rupees($\mu > 2000$).

Mean($\overline{x}$)	2400
Standard deviation(s)	1065.09447
Count(n)	245
Standard error of mean	68.04638962
Degrees of freedom	244
Hypothesized mean(μ)	2000
t-statistic,t	5.8783
P-value	6.77213×10^{-9}
t Critical (one-tail)	1.651122505

t statistic > critical value.

Also, P value $< \alpha = 0.05$.

Therefore, we reject H0.
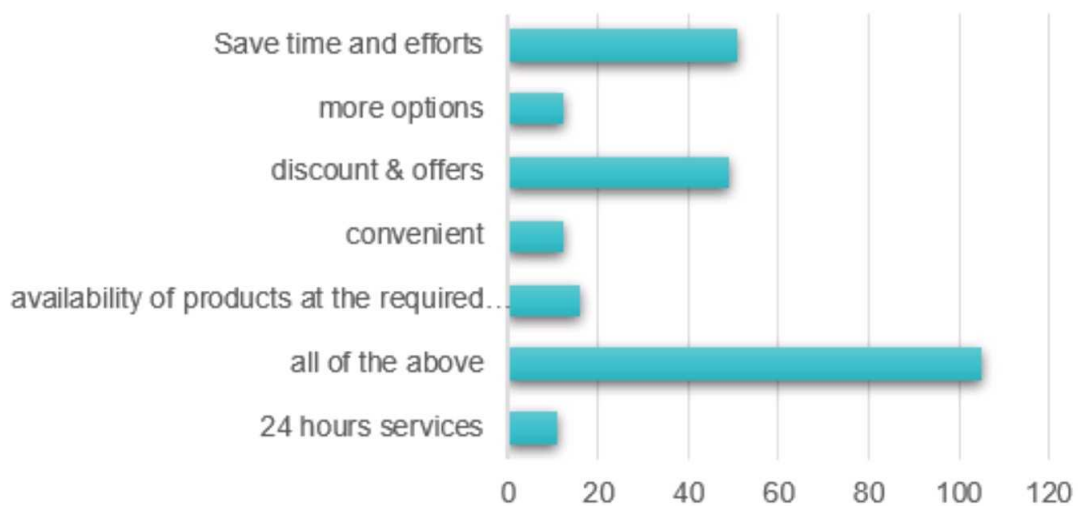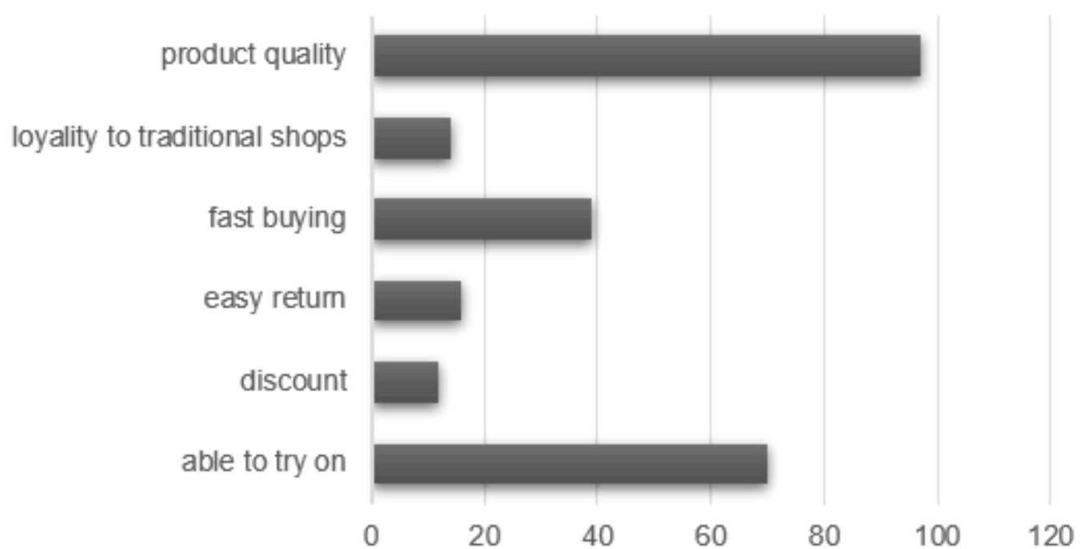
Thus, average amount spend on one time offline shopping is greater than 2000 rupees.

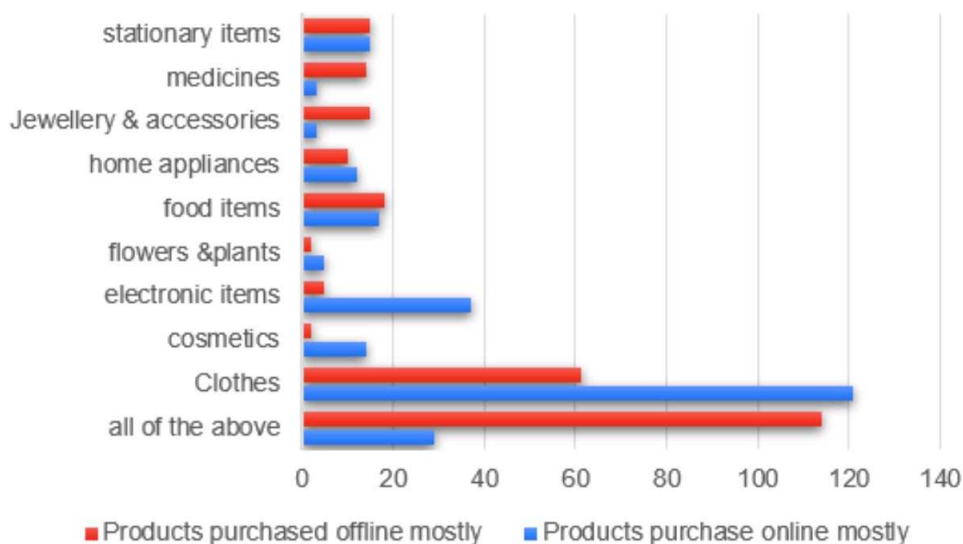## 4.2   GRAPHICAL ANALYSIS

REASONS TO PREFER ONLINE SHOPPING

Category	Value
Save time and efforts	~50
more options	~13
discount & offers	~48
convenient	~13
availability of products at the required...	~17
all of the above	~105
24 hours services	~12

REASONS TO PREFER OFFLINE SHOPPING

Category	Value
product quality	~96
loyality to traditional shops	~13
fast buying	~38
easy return	~16
discount	~12
able to try on	~70

SHOPPING FREQUENCY

■ count of online purchase   ■ Count of offline shopping

MOSTLY PURCHASED PRODUCTS

■ Products purchased offline mostly   ■ Products purchase online mostly

MOSTLY PURCHASING WEBSITE
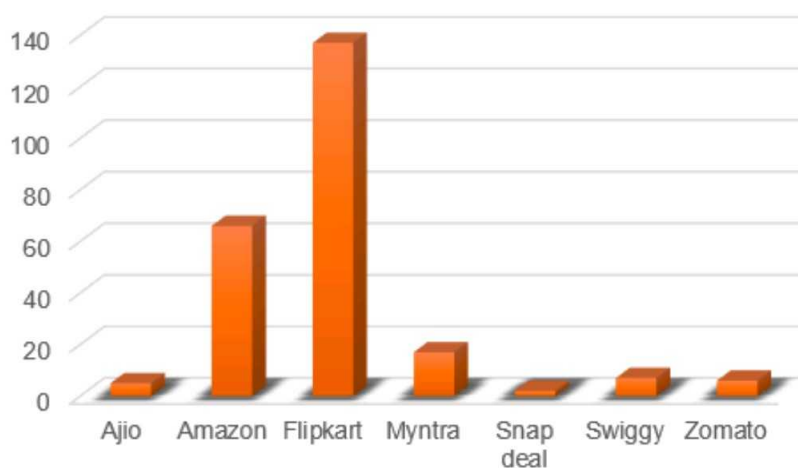
TIME SPEND ON ONE TIME ONLINE SHOPPING

MODE OF PAYMENT

- cash on delivery   - credit card   - Debit card   - online bank transfer
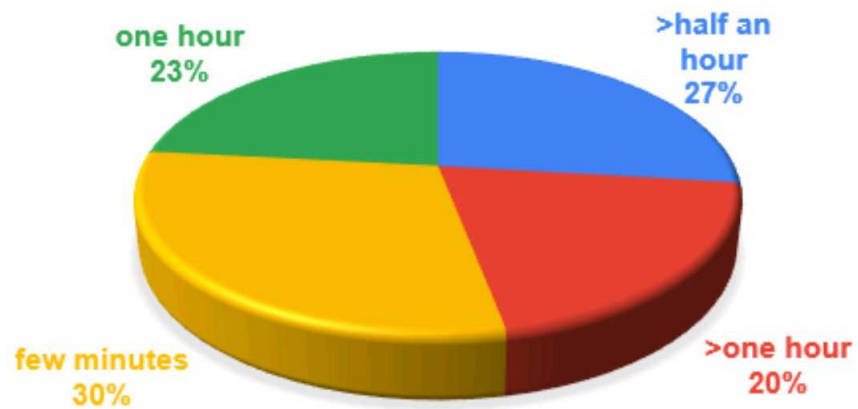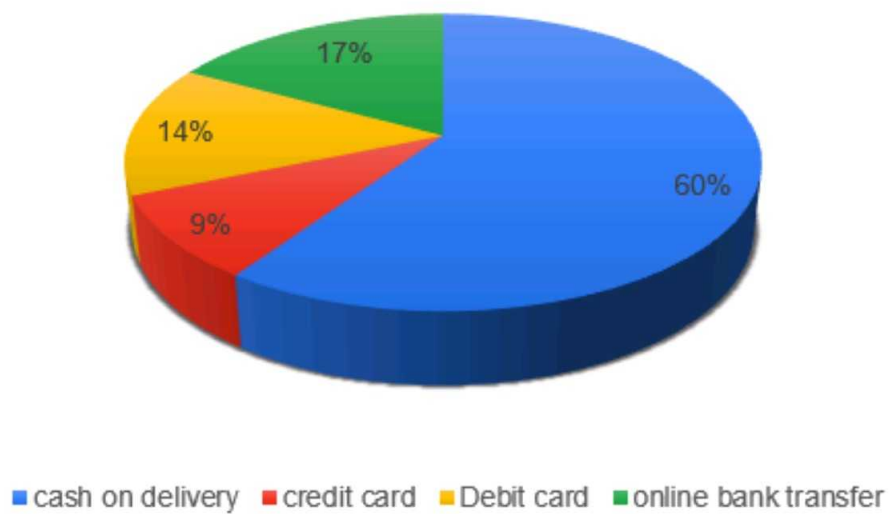
4.3 RANK TABLE

1. Mostly Attracted Advertisement

Types Of Advertisements that mostly attract people	Count	MEAN	RANK
1+1 ads	25	0.09765625	4
cash back offer ads	28	0.109375	3
discount ads	125	0.48828125	1
festive ads	53	0.20703125	2
free gifts ads	7	0.02734375	6
sale ads	18	0.0703125	5

It is clear from the table that discount and festive ads attract people mostly for shopping.

2. Factors considering before online shopping

Factors to consider before shopping online	Count	Mean	Rank
Comparison of price	46	0.182539683	3
Product rating	54	0.214285714	2
Product review	133	0.527777778	1
Reference from friends	19	0.075396825	4

The main factors consumers checking before shopping online are product review and rating.

Chapter 5

CONCLUSION

Taking all age groups in consideration online and offline shopping both has equal importance based on the consumers need. But factors like save time and effort, discount, convenience, availability make online shopping more preferable. Age group of consumers has been a major factor in shopping preferences.

Factors like consumer's family size and their satisfaction have no relation on online shopping.Shopping preference of consumers does not posses any relationship with gender of the consumers.The income of the consumers does not affect their online shopping frequency.

The cross check on the average willingness of consumers to spend on online shopping is more than Rs.1000.The consumers spend more than Rs.2000 on online shopping.Comparison of price is the most considerable factor while shopping online.

The factors which make the consumers still shop offline is the product quality and ability to try on.From the graph, it is clear that mostly preffered online shopping sites are flipkart ang amazon.Most of the people go for cash on deliverey compared to other modes of payment.The main factors checking before shopping online are product review and rating.Discount and festive advertisements influence more the consumers for shopping.

The overall results prove that the respondents have proceed online shopping in a positive manner in the same way they consider offline shopping.

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