"A STATISTICAL STUDY FOR MEASURING HOW LIFE FACTORS AFFECT HAPPINESS OF STUDENTS IN SAURASHTRA UNIVERSITY CAMPUS"

PROJECT BY

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CERTIFICATE

This is to certify that **Mehta Hardi J. & Pooja P. Pandya** Students of M.Sc.Semester-4, Department of Statistics, Saurashtra University has satisfactorily completed their project work entitled.

"A STATISTICAL STUDY FOR MEASURING HOW LIFE FACTORS AFFECT HAPPINESS OF STUDENTS IN SAURASHTRA UNIVERSITY CAMPUS"

Date:

ProjectGuide **Head ofDepartment**

ACKNOWLEDGEMENT

We would like to express our special thanks of gratitude to our professor and guide **Dr. G.C. Bhimani , P.G. Department of statistics, Saurashtra University, Rajkot,** who gave us their valuable suggestions and ideas when we need of them. Also he encouraged us to work on this project.

We also grateful to, **Prof. Kishor Atkotiya** Head Department of Statistics for giving us the opportunity to work with them and providing me the necessary resources for the project.

We would also like to thank our parents and friends who helped us a lot in finalizing this project within the limited time frame.

We would also thank to all of them who helped us to complete this project.

DECLARATION

We hereby declare that the project entitled "**A STATISTICAL STUDY FOR MEASURING HOW LIFE FACTORS AFFECT HAPPINESS OF STUDENTS IN SAURASHTRA UNIVERSITY CAMPUS**"is being submitted by us to Department of Statistics, Saurashtra University, Rajkot. This project is our original work and it has not been presented earlier in this manner.

_____

Mehta Hardi J.

_____

Pooja P. Pandya

Date :

Place :

:: INDEX ::

SR NO.	PARTICULAR	PAGE NO.
1	INTRODUCTION	1
2	OBJECTIVES	6
3	DATA COLLECTION	7
4	METHODOLOGY	14
5	DATA ANALYSIS	22
6	CONCLUSION	60
7	QUESTIONNAIRE	62
8	REFRENCE	64

✓ INTRODUCTION :

In our today's fast developing society people are having everything in their life with all confert and luxuries but still are stressed ,confused and depressed feeling regarding life.

So, to identify the real picture about our growing society we decided to take a sample survey to measure the happiness and the factors that are affecting the happiness of human life in our city.

History

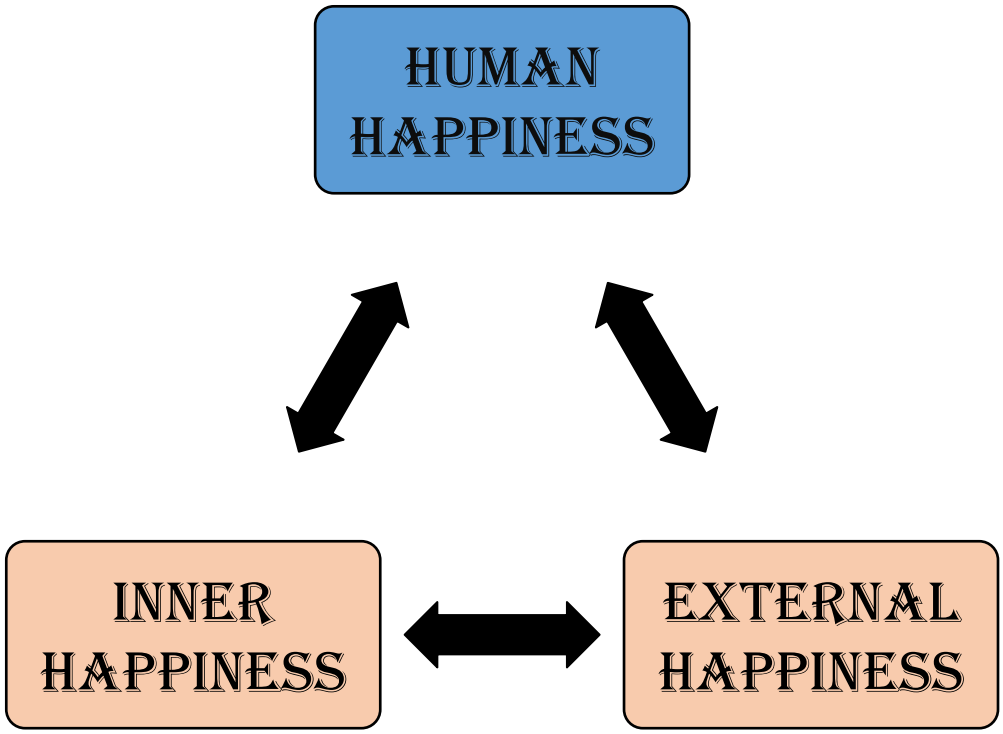
In July 2011, the UN General Assembly adopted resolution 65/309 *Happiness: Towards a Holistic Definition of Development*[5] inviting member countries to measure the happiness of their people and to use the data to help guide public policy. On April 2, 2012, this was followed by the first UN High Level Meeting called *Wellbeing and Happiness: Defining a New Economic Paradigm*,[6] which was chaired by UN Secretary General Ban Ki-moon and Prime Minister JigmeThinley of Bhutan, a nation that adopted gross national happiness instead of gross domestic product as their main development indicator.[7]

The first World Happiness Report was released on April 1, 2012 as a foundational text for the UN *High Level Meeting: Well-being and Happiness: Defining a New Economic Paradigm*,[8] drawing international attention.[9] The report outlined the state of world happiness, causes of happiness and misery, and policy implications highlighted by case studies. In 2013, the second World Happiness Report was issued, and since then has been issued on an annual basis with the exception of 2014.[10] The report primarily uses data from the Gallup World Poll. Each annual report is available to the public to download on the World Happiness Report website.[11]

• THE BENEFITS OF HAPPINESS : AN OVERVIEW

Here's an overview of some of the secondary benefits happiness :

- ✓ Happy people make more money and are more productive at work.
- ✓ Happiness is good for our health; happy people are less likely to get sick, and they live longer.
- ✓ Happiness is good for our relationships. Happy people are more likely to get married and to have fulfilling marriages, and they have more friends.
- ✓ Happy people are more generous.
- ✓ Happy people cope better with stress and trauma.
- ✓ Happy people are more creative and are better able to see the big picture.



● THE FACTORS AFFECTING HAPPINESS OF LIFE :

- ✓ Psychological wellbeing
- ✓ Life happiness
- ✓ Family harmony
- ✓ Spare time
- ✓ Home with assets

Measuring are based on above factors affecting happiness of human being in his/her life personally from all above factors we have only takes some variables showing some of the above dolmens of life.

● LIST OF VARIABLES TAKEN TO MEASURE HAPINESS

- ✓ Psychological wellbeing
- ✓ Health
- ✓ Living standard
- ✓ Education
- ✓ Time happiness
- ✓ Community / religious vitality
- ✓ Good governance

Now , we defined all list of variables taken to measure how life factors affect happiness of student life for this study.

1. Psychological wellbeing

Psychological weeling is importance of mental health as apredictor of student behaviours. However scientifically ,educationally ,family anveirnment or all over effect how much on student this research fits well with thecurrent mood swings of student and actual reason of their mental health .

2.Life happiness

Quality of life is a more subjective and intangible term than standard of living. As such, it can often be hard to quantify. The factors of student life affect the overall quality of life vary by people's lifestyles and their personal preferences. Regardless of these factors, this measure plays an important part in the financial decisions in everyone's lives.

Some of the factors that can affect a person's quality of life can include conditions in the workplace, healthcare, education and material living conditions

3.Spare time

Happiness could be related positively to motivational variables that promote academic performance and happy students may have higher commitment to their educational institution which makes them strongly committed to obtain an educational degree and to succeed in courses. Students with good

academic performance may do so in part because they are happy, and performing well may make students happier. However, these explanations should be supported by further studies.

4. Family harmony

One of the human society's difficulties is insufficient social mobility and the weakness in social relations that is against the essence and nature of human beings. To become sociable is one of the most important development components and the most significant factors in personality development. This process is against to egoism that through it, the individual prefers group values to his own and eventually, makes these values altruism. Social development refers to a well-balanced group of learned social skills and adaptive behaviors that enables the person to have optimized interactions, have positive reactions and avoid behaviors that have negative consequences.

5.Home with assets

Quality of life is a more subjective and intangible term than standard of living. As such, it can often be hard to quantify. The factors of student life affect the overall quality of life vary by people's lifestyles and their personal preferences. Regardless of these factors, this measure plays an important part in the financial decisions in everyone's lives

✓ OBJECTIVE :

The following are major objective of the study.

- To find the relationship between happiness and life factor affecting it.
- To study gender wise education of saurashtra university campus students.
- To study gender wise category of saurashtra university campus students.
- To study gender wise status of saurashtra university campus students

CHOICE OF AREA :

According to aim for the survey .we have chosen different students from all department of Saurashtra University campus , Rajkot.

DURATION OF SURVEY:

We have started in January 2019-2020 and it took 1-2 week for collection of the data.

QUESTIONNAIRE:

Questionnaire is the first step of the project-work. First of all we have to think about the questions of questionnaire because our purpose is to get proper information to solve the purpose of survey ,so the questionnaire has its own importance.

✓ DATA COLLECTION:

- The data was collected on the basis of the questionnaire which was answered by different students of Saurashtrauniversity Rajkot.

- To collect this data we visited in different department of Saurashtra University campus. We have collected data of 203 students from 29 department each of 7 student.

- Sufficient time has given to the respondents for fill the information in questionnaires.

LIST OF DEPARTMENT OF SAURASHTRA UNIVERSITY

SR NO.	*DEPARTMENT NAME*	*SR NO.*	*DEPARTMENT NAME*
1	BIO SCIENCE	**16**	LAW
2	BIOCHEMISTRY	**17**	LIBRARY & INFORMATION SCI
3	CHEMISTRY	**18**	MATHEMATICS
4	COMMERCE	**19**	NANO SCIENCE
5	COMPUTER SCIENCE	**20**	PHARMACEUTICAL SCI
6	ECONOMICS	**21**	PHILOSOPHY
7	EDUCATION	**22**	PHYSICAL EDUCATION
8	ELECTRONICS	**23**	PHYSICS
9	ENGLISH	**24**	PSYCHOLOGY
10	GUJARATI	**25**	SANSKRIT
11	HINDI	**26**	SOCIAL WORK
12	HISTORY	**27**	SOCIOLOGY
13	HOME SCIENCE	**28**	STATISTICS
14	HUMAN RIGHTS	**29**	BUSINESS MANAGEMENT
15	JOURNALISM		

COMPILE DATA FOR ANALYSIS :

TABLE - A (Question wise Factor table)

SR NO.	FACTOR NAME	QUESTION NO.	R_4	R_3	R_2	R_1	TOTAL
1	PSYCHOLOGICAL WELLBEING	1	97	89	12	5	203
		2	101	90	11	1	203
		10	80	97	25	1	203
2	HEALTH	3	86	106	11	0	203
		4	108	77	16	2	203
		5	77	99	25	2	203
3	LIVING STANDARD	7	98	88	15	2	203
		11	74	103	25	1	203
		15	91	85	22	5	203
4	EDUCATION	8	68	106	24	5	203
		6	119	67	13	4	203
		9	47	95	52	9	203
5	TIME USE	17	57	114	29	3	203
		16	113	72	13	5	203
		18	123	54	23	3	203
6	COMMUNITY VITALITY	12	67	86	45	5	203
		14	71	92	30	10	203
		13	71	82	39	11	203
7	GOOD GOVERNANCE	19	66	102	26	9	203
		20	47	103	45	8	203
		21	53	82	52	16	203
TOTAL			**1714**	**1889**	**553**	**107**	**4263**

TABLE - B (Primary data set)

SR NO.	DEPARTMENT NAME	STUDENT NO.	GENDER	AGE	R_4	R_3	R_2	R_1	INCOME	STATUS	CATEGORY	EDU
		1	F	27	8	11	2	0	A	UN	OBC	MPhil/Ph.D
		2	F	23	12	6	3	0	A	UN	SC	MPhil/Ph.D
		3	F	22	13	6	2	0	D	UN	GEN	PG
1	BIO SCIENCE	4	F	22	11	8	2	0	B	UN	GEN	PG
		5	F	24	16	4	1	0	B	UN	GEN	PG
		6	M	24	19	0	2	0	B	UN	OBC	MPhil/Ph.D
		7	M	27	3	13	5	0	B	UN	ST	MPhil/Ph.D
		1	F	20	14	7	0	0	A	UN	GEN	PG
		2	F	21	10	8	3	0	C	UN	SC	PG
		3	F	21	16	3	1	1	A	UN	GEN	PG
2	BIOCHEMISTRY	4	F	22	6	14	1	0	B	UN	OBC	PG
		5	F	22	7	10	4	0	A	UN	GEN	PG
		6	M	21	9	9	2	1	C	UN	GEN	PG
		7	M	21	11	5	1	4	A	UN	GEN	PG
		1	F	22	13	5	2	1	C	UN	GEN	PG
		2	F	22	2	10	9	0	A	UN	OBC	PG
		3	F	22	12	9	0	0	B	UN	GEN	PG
3	CHEMISTRY	4	F	22	6	13	2	0	B	UN	OBC	PG
		5	M	22	10	10	1	0	B	UN	GEN	PG
		6	M	21	16	5	0	0	B	UN	OBC	PG
		7	M	23	5	11	5	0	B	UN	GEN	PG
		1	F	22	8	11	2	0	A	UN	OBC	PG
		2	F	21	13	7	1	0	B	UN	OBC	UG
		3	F	21	5	12	4	0	A	UN	SC	UG
4	COMMERCE	4	F	21	4	13	4	0	A	UN	OBC	UG
		5	F	21	6	13	2	0	A	UN	OBC	UG
		6	F	21	10	11	0	0	B	UN	OBC	PG
		7	F	22	5	7	6	3	B	UN	OBC	PG
		1	F	21	15	2	3	1	B	UN	GEN	UG
		2	F	22	11	7	3	0	A	UN	GEN	PG
		3	F	21	15	4	2	0	B	UN	GEN	UG
5	COMPUTER SCI	4	F	21	7	7	5	2	B	UN	GEN	PG
		5	M	23	15	2	3	1	B	UN	GEN	PG
		6	M	22	11	7	3	0	A	UN	SC	PG
		7	M	24	9	9	2	1	B	UN	OBC	PG

		1	F	23	8	10	3	0	B	UN	OBC	MPhil/Ph.D
		2	F	22	6	14	1	0	A	UN	OBC	MPhil/Ph.D
		3	F	22	6	14	1	0	B	UN	SC	MPhil/Ph.D
6	ECONOMICS	4	F	21	8	9	4	0	A	UN	GEN	PG
		5	F	24	16	4	1	0	B	UN	OBC	PG
		6	M	21	11	8	2	0	B	UN	GEN	PG
		7	M	22	8	12	1	0	A	UN	OBC	MPhil/Ph.D
		1	F	24	9	8	2	2	B	UN	GEN	PG
		2	F	19	8	10	3	0	A	UN	OBC	UG
		3	M	22	9	9	3	0	A	UN	GEN	PG
7	EDUCATION	4	M	18	8	8	5	0	A	UN	OBC	UG
		5	M	18	8	10	3	0	A	UN	OBC	UG
		6	M	18	8	10	3	0	A	UN	OBC	UG
		7	M	18	9	10	2	0	A	UN	GEN	UG
		1	F	22	6	11	3	1	A	UN	GEN	PG
		2	F	21	8	12	1	0	A	UN	GEN	PG
		3	F	21	12	4	5	0	B	UN	GEN	PG
8	ELECTRONICS	4	F	21	13	8	0	0	A	UN	GEN	PG
		5	M	24	5	13	3	0	B	UN	OBC	PG
		6	M	23	6	13	2	0	C	UN	GEN	PG
		7	M	21	12	9	0	0	B	UN	OBC	PG
		1	F	21	6	9	3	3	A	UN	OBC	PG
		2	F	21	10	8	3	0	A	UN	GEN	PG
		3	F	20	12	6	3	0	A	UN	GEN	PG
9	ENGLISH	4	F	20	15	6	0	0	A	UN	OBC	PG
		5	F	22	5	15	0	1	B	UN	SC	PG
		6	M	25	10	9	2	0	B	UN	OBC	PG
		7	M	21	6	14	1	0	A	UN	OBC	PG
		1	F	21	5	12	3	1	B	UN	GEN	PG
		2	F	22	11	10	0	0	B	UN	GEN	PG
		3	F	21	12	9	0	0	B	UN	OBC	PG
10	GUJARATI	4	F	22	11	10	0	0	B	UN	GEN	PG
		5	F	27	10	9	2	0	C	MA	GEN	MPhil/Ph.D
		6	M	22	9	6	5	1	A	UN	OBC	PG
		7	M	25	6	11	3	1	A	UN	OBC	PG
		1	F	23	11	8	2	0	B	UN	GEN	PG
		2	F	23	14	3	2	2	A	UN	GEN	MPhil/Ph.D
		3	M	24	15	6	0	0	A	UN	OBC	PG
11	HINDI	4	M	22	8	8	5	0	B	UN	ST	PG
		5	M	24	12	8	1	0	A	UN	OBC	PG
		6	M	23	4	14	3	0	B	UN	GEN	PG
		7	M	28	12	9	0	0	A	UN	ST	PG

		1	F	23	13	7	1	0	A	UN	OBC	PG
		2	M	26	9	12	0	0	A	UN	SC	PG
		3	M	24	15	6	0	0	A	UN	GEN	PG
12	HISTORY	4	M	25	10	8	3	0	A	UN	OBC	PG
		5	M	25	12	8	1	0	A	UN	OBC	PG
		6	M	24	10	9	2	0	C	UN	OBC	PG
		7	M	25	15	5	1	0	C	UN	OBC	PG
		1	F	20	9	10	2	0	A	UN	OBC	PG
		2	F	21	9	12	0	0	A	UN	GEN	PG
		3	F	23	11	8	2	0	B	UN	GEN	PG
13	HOME SCIENCE	4	F	18	0	21	0	0	B	UN	GEN	OTH
		5	F	21	12	9	0	0	B	UN	GEN	PG
		6	F	20	9	7	3	2	B	UN	GEN	UG
		7	F	18	8	12	1	0	B	UN	OBC	UG
		1	F	23	5	14	2	0	B	UN	GEN	PG
		2	F	21	7	7	5	2	A	UN	GEN	PG
		3	F	22	8	11	2	0	A	MA	GEN	PG
14	HUMAN RIGHTS	4	F	22	8	11	2	0	A	UN	OBC	PG
		5	F	21	8	9	4	0	B	UN	OBC	PG
		6	F	24	13	7	1	0	B	UN	OBC	PG
		7	M	24	8	8	5	0	C	UN	SC	MPhil/Ph.D
		1	F	23	8	10	2	1	B	UN	SC	PG
		2	F	22	11	5	5	0	B	UN	OBC	PG
		3	F	24	4	11	5	1	C	MA	SC	PG
15	JOURNALISM	4	F	21	8	9	3	1	A	UN	SC	PG
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		7	M	24	8	7	5	1	A	UN	GEN	PG
		1	F	21	13	8	0	0	C	UN	OBC	UG
		2	F	21	3	18	0	0	A	UN	GEN	UG
		3	F	21	5	15	1	0	C	UN	OBC	PG
16	LAW	4	F	22	7	10	4	0	A	UN	SC	PG
		5	F	21	3	12	6	0	B	UN	OBC	UG
		6	M	22	5	7	7	2	B	UN	GEN	PG
		7	M	18	5	8	7	1	A	UN	OBC	UG
		1	F	22	9	6	5	1	A	UN	OBC	PG
	LIBRARY	2	F	23	8	7	6	0	C	UN	OBC	PG
	&	3	F	25	13	7	0	1	C	UN	SC	PG
17	INFORMATION	4	M	26	11	1	8	1	C	UN	OBC	PG
	SCIENCE	5	M	19	7	11	2	1	C	UN	OBC	UG
		6	M	26	13	7	0	1	C	UN	OBC	PG
		7	M	22	11	8	2	0	B	UN	GEN	PG

		1	F	22	8	13	0	0	C	UN	SC	PG
		2	F	21	15	6	0	0	B	UN	OBC	PG
		3	F	22	4	17	0	0	B	UN	GEN	PG
18	MATHEMATICS	4	F	21	7	12	1	1	D	UN	GEN	PG
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		6	M	21	2	14	5	0	B	UN	OBC	PG
		7	M	22	4	12	4	1	B	UN	SC	PG
		1	F	20	6	9	5	1	A	UN	GEN	UG
		2	F	18	7	11	3	0	A	UN	OBC	UG
		3	M	20	9	6	5	1	B	UN	GEN	UG
19	NANO	4	M	18	10	9	2	0	B	UN	OBC	UG
	SCIENCE	5	M	18	4	13	3	1	A	UN	SC	UG
		6	M	18	2	15	3	1	A	UN	OBC	UG
		7	M	18	7	10	3	1	A	UN	GEN	UG
		1	F	23	3	11	5	2	B	UN	GEN	PG
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		3	F	23	3	13	5	0	D	UN	GEN	PG
20	PHARMACEUTICAL	4	F	22	12	9	0	0	B	UN	OBC	PG
	SCIENCE	5	M	23	15	5	1	0	C	UN	GEN	PG
		6	M	25	1	12	7	1	D	UN	ST	PG
		7	M	24	6	12	3	0	B	UN	GEN	PG
		1	F	24	7	5	8	1	B	UN	OBC	PG
		2	F	24	7	9	4	1	C	UN	SC	PG
		3	F	21	6	4	9	2	B	UN	ST	PG
21	PHILOSOPHY	4	F	23	2	3	15	1	C	UN	SC	PG
		5	M	23	3	2	15	1	B	UN	OBC	PG
		6	M	27	2	5	13	1	C	MA	OBC	MPhil/Ph.D
		7	M	25	6	8	6	1	B	UN	SC	PG
		1	F	23	4	7	2	8	A	UN	OBC	OTH
		2	F	20	13	6	2	0	A	UN	OBC	PG
		3	F	21	11	8	2	0	A	UN	OBC	PG
22	PHYSICAL	4	F	22	12	9	0	0	B	UN	GEN	PG
	EDUCATION	5	F	19	10	10	0	1	B	UN	GEN	UG
		6	F	26	6	5	2	8	B	MA	GEN	OTH
		7	F	30	7	4	7	3	B	MA	GEN	PG
		1	F	22	10	10	1	0	B	UN	GEN	PG
		2	F	22	8	12	1	0	B	UN	OBC	PG
		3	F	21	12	7	2	0	A	UN	OBC	PG
23	PHYSICS	4	F	21	7	12	2	0	A	UN	OBC	PG
		5	M	21	4	9	5	3	C	UN	SC	PG
		6	M	21	8	9	4	0	A	UN	OBC	PG
		7	M	22	7	7	7	0	C	UN	OBC	PG

		1	F	22	6	14	1	0	A	UN	GEN	PG
		2	F	22	4	15	2	0	A	UN	GEN	PG
		3	F	21	12	9	0	0	B	UN	GEN	PG
24	PSYCHOLOGY	4	F	21	2	18	1	0	A	UN	GEN	PG
		5	F	22	5	16	0	0	B	UN	ST	PG
		6	F	22	1	13	7	0	A	UN	GEN	PG
		7	F	22	7	14	0	0	B	UN	GEN	PG
		1	F	21	6	12	3	0	A	UN	OBC	PG
		2	F	22	5	10	5	1	A	UN	OBC	MPhil/Ph.D
		3	F	26	9	9	3	0	A	UN	OBC	MPhil/Ph.D
25	SANSKRIT	4	M	23	9	12	0	0	B	UN	OBC	MPhil/Ph.D
		5	M	22	6	12	3	0	B	UN	OBC	MPhil/Ph.D
		6	M	21	15	6	0	0	B	UN	OBC	PG
		7	M	27	5	7	5	4	A	UN	ST	MPhil/Ph.D
		1	F	21	7	12	2	0	A	UN	OBC	PG
		2	F	22	5	14	2	0	B	UN	OBC	PG
		3	F	28	3	11	4	3	B	UN	SC	PG
26	SOCIAL	4	F	26	3	12	5	1	B	UN	OBC	PG
	WORK	5	F	21	10	11	0	0	A	UN	OBC	PG
		6	M	23	5	15	1	0	B	UN	OBC	PG
		7	M	24	4	15	2	0	B	MA	GEN	PG
		1	F	29	6	14	1	0	C	UN	OBC	MPhil/Ph.D
		2	F	21	3	13	4	1	B	UN	GEN	PG
		3	F	23	9	9	3	0	A	UN	OBC	PG
27	SOCIOLOGY	4	F	24	8	10	3	0	A	UN	SC	PG
		5	M	22	6	7	7	1	A	UN	SC	PG
		6	M	21	9	8	4	0	A	UN	OBC	PG
		7	M	22	10	5	5	1	C	UN	GEN	PG
		1	F	21	8	10	3	0	B	UN	GEN	PG
		2	F	22	8	9	4	0	A	UN	GEN	PG
		3	F	25	14	7	0	0	C	UN	GEN	MPhil/Ph.D
28	STATISTICS	4	F	24	13	8	0	0	C	UN	GEN	MPhil/Ph.D
		5	M	21	15	3	1	2	B	UN	OBC	PG
		6	M	23	6	14	1	0	B	UN	GEN	PG
		7	M	23	7	14	0	0	B	UN	OBC	MPhil/Ph.D
		1	F	22	7	12	2	0	C	UN	GEN	PG
		2	F	22	11	4	5	1	A	UN	OBC	PG
		3	F	21	12	8	0	1	A	UN	OBC	PG
29	BUSINESS	4	F	21	5	12	3	1	B	UN	ST	PG
	MANAGEMENT	5	F	21	5	12	3	1	A	UN	OBC	PG
		6	F	22	9	11	1	0	B	UN	OBC	OTH
		7	M	21	9	6	5	1	B	UN	GEN	PG
	TOTAL				**1714**	**1889**	**553**	**107**		**= 4263**		

✓ METHODOLOGY:

Factor Analysis

Factor analysis reduction technique and identifies correlation between and among variables to bind them into one underlying factor. There are two types of factor analysis as follow are :

A) Exploratory factor analysis
B) Confirmatory factor analysis

Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) is a multivariate statistical procedure that is used to test how well the measured variables represent the number of constructs. Confirmatory factor analysis (CFA) and exploratory factor analysis (EFA) are similar techniques, but in exploratory factor analysis (EFA), data is simply explored and provides information about the numbers of factors required to represent the data.

In exploratory factor analysis, all measured variables are related to every latent variable. But in confirmatory factor analysis (CFA), researchers can specify the number of factors required in the data and which measured variable is related to which latent variable. Confirmatory factor analysis (CFA) is a tool that is used to confirm or reject the measurement theory.

Questions a CFA answers

From my 20 question instrument, are the five factors clearly identifiable constructs as measured by the 4 questions that they are comprised of?

Do my four survey questions accurately measure one factor?

Assumptions

The assumptions of a CFA include multivariate normality, a sufficient sample size (*n* >200), the correct a priori model specification, and data must come from a random sample.

Exploratory Factor Analysis

Exploratory Factor Analysis Two major types of factor analysis Exploratory factor analysis (EFA) Confirmatory factor analysis (CFA) Major difference is that EFA seeks to discover the number of factors and does not specify which The researcher may discover there is one factor underlying the items or many factorsItems may be eliminated by the esearcher if they do not load highly Researchers choose items that load highly on one factor and low on other factors to achieve simple structure Composite scale scores often created base

EFA is available in most general statistical software, such as SPSS, R, SAS Involves several steps and decision points Deciding on the number of factors Extraction Rotation

A test is computed to investigate how well the hypothesized factor structure fits with the data The fit test seeks to ind a non-significant result, indicating good fit to the data

Correlation Definition

What is Correlation?

Correlation, in the finance and investment industries, is a statistic that measures the degree to which two securities move in relation to each other. Correlations are used in advanced portfolio management, computed as the correlation coefficient, which has a value that must fall between -1.0 and +1.0.

Explaining Correlation

A perfect positive correlation means that the correlation coefficient is exactly 1. This implies

that as one security moves, either up or down, the other security moves in lockstep, in the same direction. A perfect negative correlation means that two assets move in opposite irections, while a zero correlation implies no relationship at all.

For example, large-cap mutual funds generally have a high positive correlation to the Standard and Poor's (S&P) 500 Index - very close to 1. Small-cap stocks have a positive correlation to that same index, but it is not as high - generally around 0.8.

However, put option prices and their underlying stock prices will tend to have a negative correlation. As the stock price increases, the put option prices go down. This is a direct and high-magnitude negative correlation.

Regression Definition

What Is Regression?

Regression is a statistical method used in finance, investing, and other disciplines that attempts to determine the strength and character of the relationship between one dependent variable (usually denoted by Y) and a series of other variables (known as independent variables).

Regression helps investment and financial managers to value assets and understand the relationships between variables, such as commodity prices and the stocks of businesses dealing in those commodities.

Volume 75%

Regression Explained

The two basic types of regression are simple linear regression and multiple linear regression, although there are non-linear regression methods for more complicated data and analysis.

Simple linear regression uses one independent variable to explain or predict the outcome of the dependent variable Y, while multiple linear regression uses two or more independent variables to predict the outcome.

Regression can help finance and investment professionals as well as professionals in other businesses. Regression can also help predict sales for a company based on weather, previous sales, GDP growth, or other types of conditions. The capital asset pricing model (CAPM) is an often-used regression model in finance for pricing assets and discovering costs of capital.

The general form of each type of regression is:

- **Simple linear regression:** $Y = a + bX + u$
- **Multiple linear regression:** $Y = a + b_1X_1 + b_2X_2 + b_3X_3 + ... + b_tX_t + u$

Where:

- Y = the variable that you are trying to predict (dependent variable).
- X = the variable that you are using to predict Y (independent variable).
- a = the intercept.
- b = the slope.
- u = the regression residual.

ANOVA

what Does "One-Way" or "Two-Way Mean?

One-way or **two-way** refers to the number of independent variables (IVs) in your Analysis of Variance test.

- One-way has one independent variable (with 2 levels). For example: *brand of cereal*,

- Two-way has two independent variables (it can have multiple levels). For example: *brand of*
- *cereal, calories*.
-

What are "Groups" or "Levels"?

Groups or levels are different groups within the same independent variable. In the above example, your levels for
"brand of cereal" might be Lucky Charms, Raisin Bran, Cornflakes — a total of three levels. Your levels for "Calories"
might be: sweetened, unsweetened — a total of two levels.
Let's say you are studying if an alcoholic support group and individual counseling combined is the

most effective treatment for lowering alcohol consumption. You might split the study participants

into three groups or levels:

- Medication only,
- Medication and counseling,
- Counseling only.

Your dependent variable would be the number of alcoholic beverages consumed per day.
If your groups or levels have a hierarchical structure (each level has unique subgroups), then use a nested ANOVA for the analysis.

What Does "Replication" Mean?

It's whether you are replicating (i.e. duplicating) your test(s) with multiple groups. With a two way ANOVA *with replication* ,
you have two groups and individuals within that group are doing more than one thing (i.e. two groups of students from
two colleges taking two tests). If you only have one group taking two tests, you would use **without replication.**

Types of Tests.

There are two main types: one-way and two-way. Two-way tests can be with or without replication.

- One-way ANOVA between groups: used when you want to test **two groups** to see if there's a difference between them.

- Two way ANOVA without replication: used when you have **one group** and you're
- **double-testing** that same group.
- For example, you're testing one set of individuals before and after they take a medication to
- see if it works or not.
- Two way ANOVA with replication: **Two groups**, and the members of those groups are **doing**
- **more than one thing**.
- For example, two groups of patients from different hospitals trying two different therapies.

Back to Top

One Way ANOVA

A one way ANOVA is used to compare two means from two independent (unrelated) groups using the F-distribution.

The null hypothesis for the test is that the two means are equal. Therefore, a significant result means that the two means
are unequal.

Examples of when to use a one way ANOVA

Situation 1: You have a group of individuals randomly split into smaller groups and completing different tasks.

For example, you might be studying the effects of tea on weight loss and form three groups: green tea, black tea, and
no tea.

Situation 2: Similar to situation 1, but in this case the individuals are split into groups based on an attribute they possess.

For example, you might be studying leg strength of people according to weight. You could split participants into weight categories (obese, overweight and normal) and measure their leg strength on a weight machine.

Limitations of the One Way ANOVA

A one way ANOVA will tell you that at least two groups were different from each other. But **it won't tell you which groups**
ere different. If your test returns a significant f-statistic, you may need to run an ad hoc test (like the Least Significant Difference test) to tell you exactly which groups had a difference in means.

Back to Top

Two Way ANOVA

A Two Way ANOVA is an extension of the One Way ANOVA. With a One Way, you have one independent variable affecting a dependent variable. With a Two Way ANOVA, there are two independents. Use a two way ANOVA when you have one measurement variable (i.e. a quantitative variable) and two nominal variables. In other words, if your experiment as a quantitative outcome and you have two categorical explanatory variables, a two way ANOVA is appropriate.

For example, you might want to find out if there is an interaction between income and gender for anxiety level at job interviews. The anxiety level is the outcome, or the variable that can be measured. Gender and Income are the two categorical variables. These categorical variables are also the independent variables, which are called **factors** in a Two Way ANOVA.

The factors can be split into **levels**. In the above example, income level could be split into three levels: low, middle and high income. Gender could be split into three levels: male, female, and transgender. Treatment groups are all possible combinations of the factors. In this example there would be 3 x 3 = 9 treatment groups.

Main Effect and Interaction Effect

The results from a Two Way ANOVA will calculate a main effect and an interaction effect. The main effect is similar to a One Way ANOVA: each factor's effect is considered separately. With the interaction effect, all factors are considered at the same time. Interaction effects between factors are easier to test if there is more than one observation in each cell.

For the above example, multiple stress scores could be entered into cells. If you do enter multiple observations into cells, the number in each cell must be equal.

Two null hypotheses are tested if you are placing one observation in each cell. For this example, those hypotheses would
be:

H_{01}: All the income groups have equal mean stress.

H_{02}: All the gender groups have equal mean stress.

For multiple observations in cells, you would also be testing a third hypothesis:

H_{03}: The factors are independent *or* the interaction effect does not exist.

An F-statistic is computed for each hypothesis you are testing.

Assumptions for Two Way ANOVA

- The population must be close to a normal distribution.
- Samples must be independent.
- Population variances must be equal.
- Groups must have equal sample sizes.

✓ DATA ANALYSIS :

his study HAPPINESS of students is assumed to be dependent variable and have consider seven different factors are also assumed to be independent variables. We have given twenty one questions to Respondents to find which assumed variables from our seven factors of happiness are more reliable for further analysis. Every question of a factor are equally weighted and other are our basic information of students in questionnaire. Question about their opinion of own happiness is coded as follow:

(1)Strongly agree (2) Agree
(3) Disagree (4)Strongly disagree

Descriptive Statistics

TABLE 1.0

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
GENDER	203	0	1	.64	.481	.231
AGE	203	18	30	22.21	2.110	4.452
R4	203	0	19	8.44	3.680	13.545
R3	203	0	21	9.31	3.453	11.926
R2	203	0	15	2.72	2.500	6.250
R1	203	0	8	.53	1.078	1.161
INCOME	203	1	4	1.78	.761	.579
STATUS	203	0	1	.97	.183	.033
CATEGORY	203	1	4	2.60	1.395	1.945
QUALIFICATION	203	1	4	2.01	.558	.312
Valid N (listwise)	203					

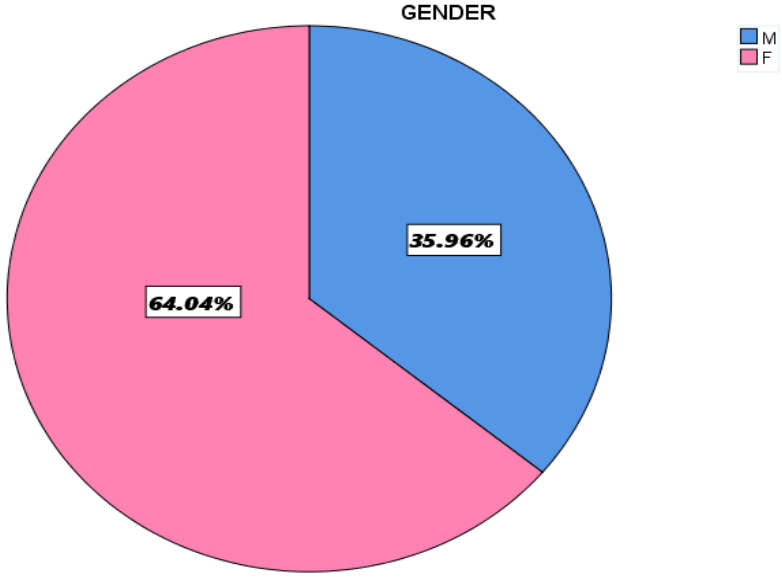
Frequency table

TABLE 1.1

GENDER					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	M	73	36.0	36.0	36.0
	F	130	64.0	64.0	100.0
	Total	203	100.0	100.0	

FIGURE-1

GENDER

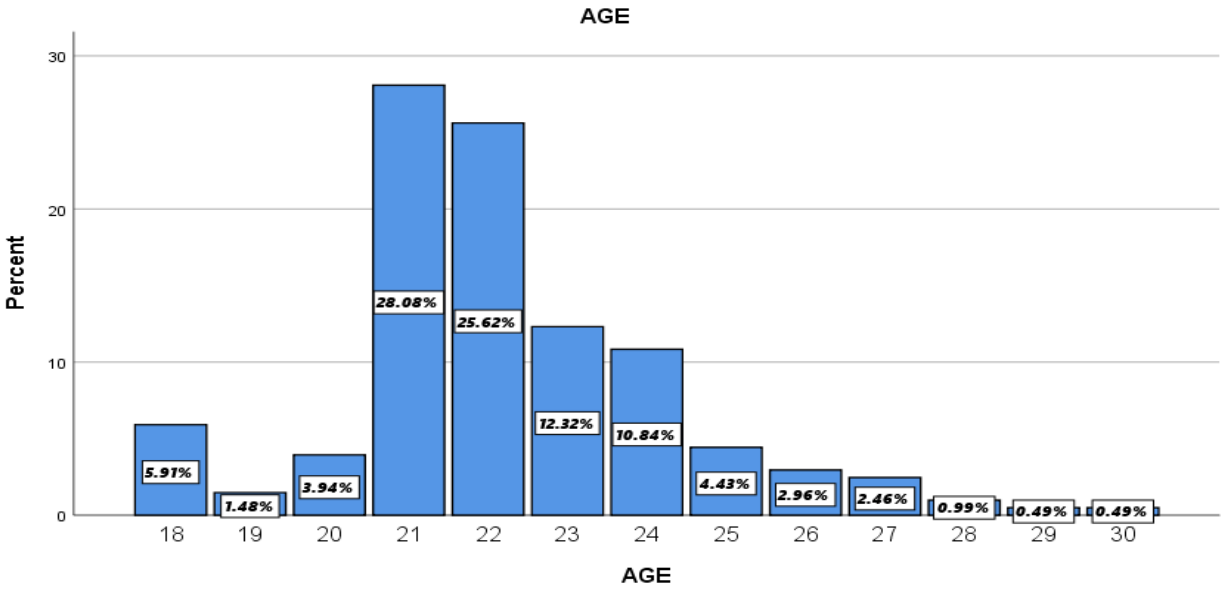


From table 1.1 Total no. of respondent were taken on basis of sample size of 203 and from total sample size there are 73 male and 130 female has participated in research study by filling questionnarie as shown in above figure 1 Pie chart that 64.04% of female and 35.96% of male studentshas answered questions in primary data collection of study.as you can see in pie chart number of girls are more than boys in education system.

TABLE 1.2

AGE					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18	12	5.9	5.9	5.9
	19	3	1.5	1.5	7.4
	20	8	3.9	3.9	11.3
	21	57	28.1	28.1	39.4
	22	52	25.6	25.6	65.0
	23	25	12.3	12.3	77.3
	24	22	10.8	10.8	88.2
	25	9	4.4	4.4	92.6
	26	6	3.0	3.0	95.6
	27	5	2.5	2.5	98.0
	28	2	1.0	1.0	99.0
	29	1	.5	.5	99.5
	30	1	.5	.5	100.0
	Total	203	100.0	100.0	

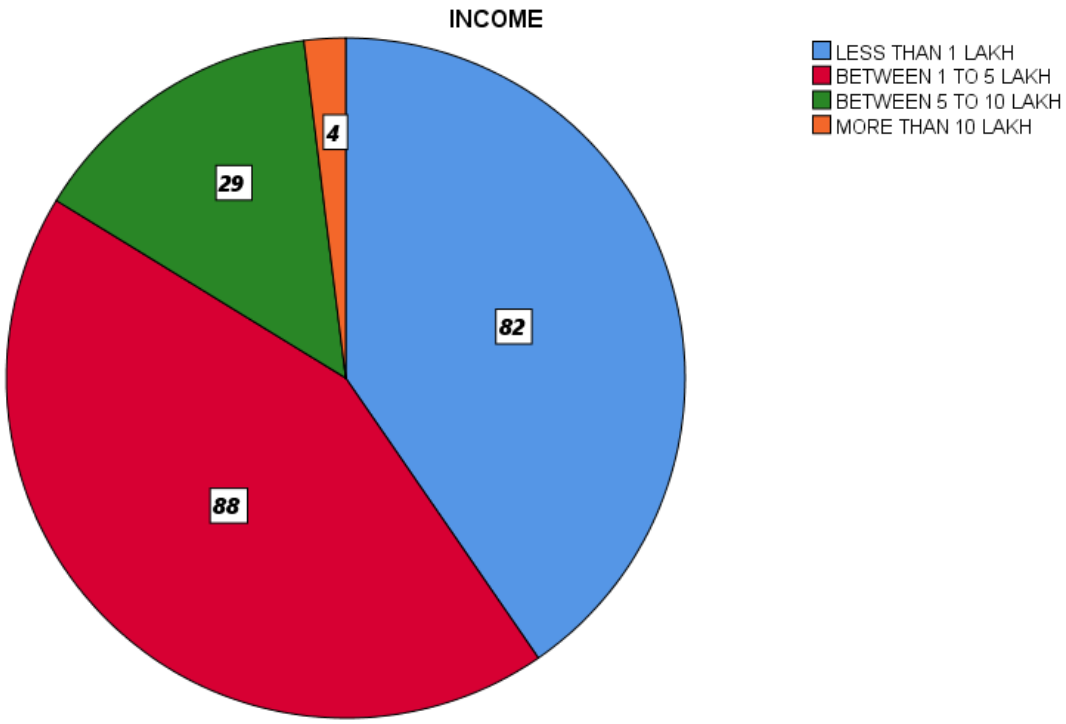
FIGURE-2



From 203 students participated belongs to age group 18-30 as shown in above frequency table 1.2 and in figure 2 shows us bar chart ,the age wise percentage of respondent participated in study. As we can say that 28.08% of participants belong to 21 year of age which is highest percent and 0.49% percentage of participants belong to age group of 29 and 30 which is lowest percent in overall sample analysis.

TABLE 1.3

INCOME					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	A	82	40.4	40.4	40.4
	B	88	43.3	43.3	83.7
	C	29	14.3	14.3	98.0
	D	4	2.0	2.0	100.0
	Total	203	100.0	100.0	



Here , we have consider different family annual income as follow:

A) Less than 1 lakh

B) Between 1 to 5 lakh

C) Between 5 to 10 lakh

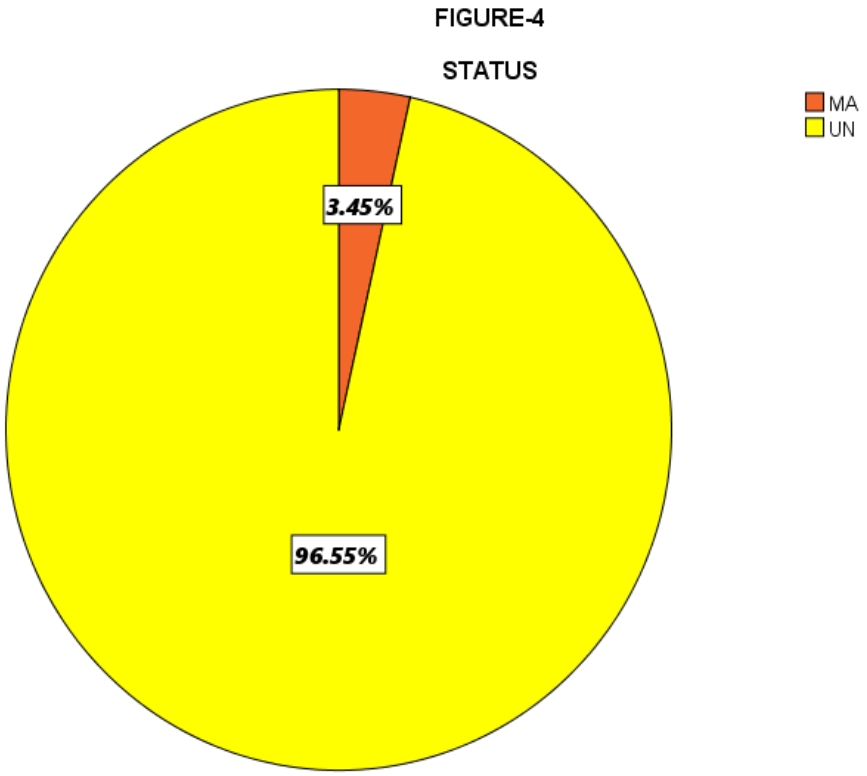
D) More than 10 lakh

Therefore from table 1.3 we can see different frequencies according to their income and in above Figure 3 Pie chart shows percentage of different family income student participated in study from which highest one is 43.35% is between 1 to 5 lakh and lowest is 1.97% is more then 10 lakh .

TABLE 1.4

STATUS					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MA	7	3.4	3.4	3.4
	UN	196	96.6	96.6	100.0
	Total	203	100.0	100.0	

FIGURE-4

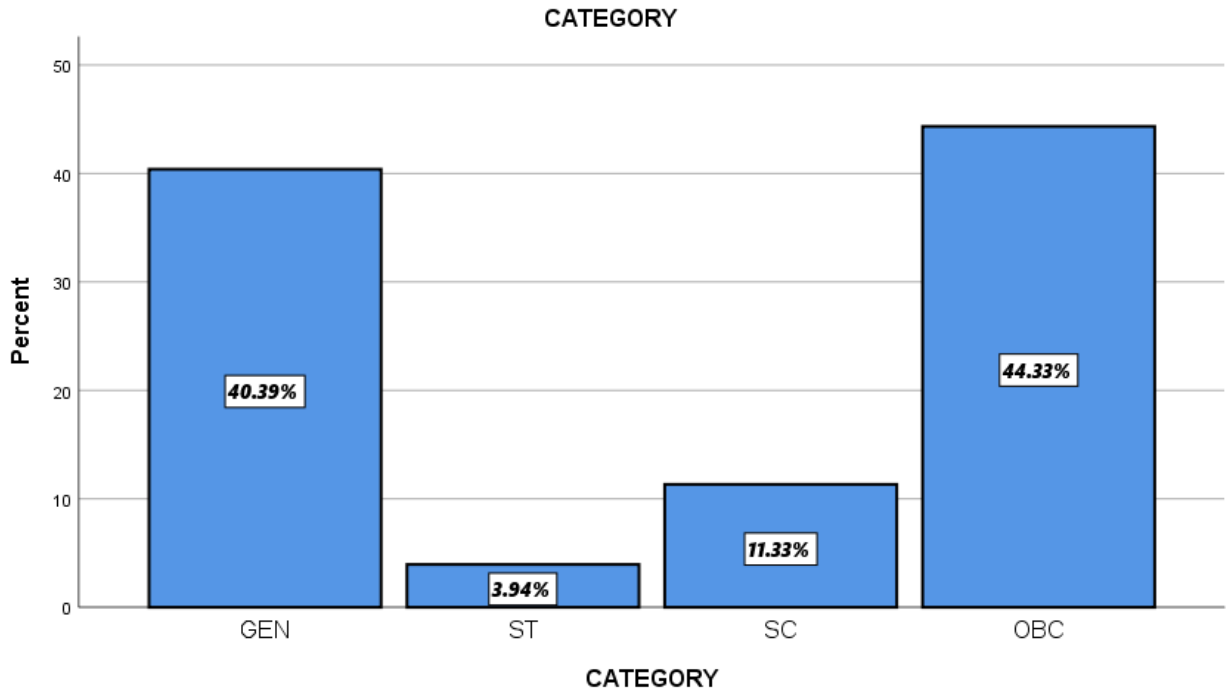


In table 1.4 we can clearly see two different frequencies of students which are married (MA) and unmarried (UN) and from 203 students participated have different marital status in which 96.55% 0f students are unmarried and only 3.45% of student are married as shown in figure 4 Pie chart .

TABLE 1.5

CATEGORY					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	GEN	82	40.4	40.4	40.4
	ST	8	3.9	3.9	44.3
	SC	23	11.3	11.3	55.7
	OBC	90	44.3	44.3	100.0
	Total	203	100.0	100.0	

FIGURE-5

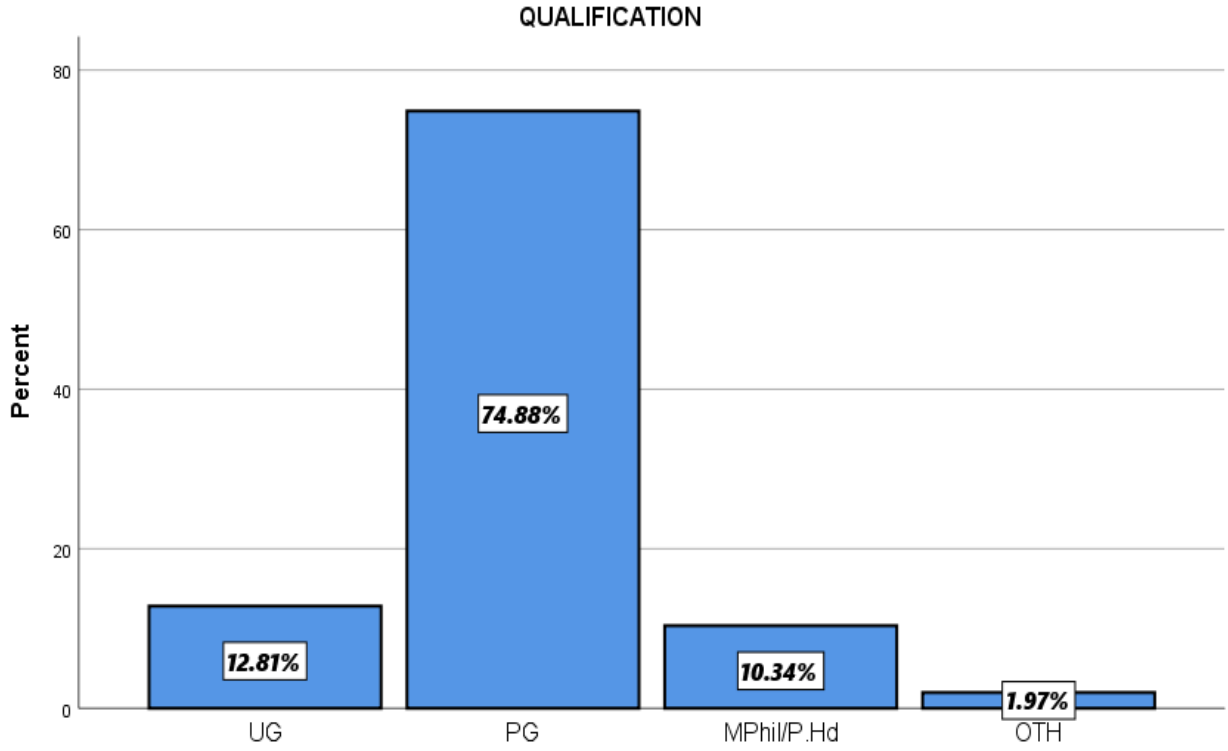


In category wise frequency distribution of students participated in responding questions is mainly here divided into four category General (GEN) , ST, SC and OBC shown in table 1.5. In figure 5 Bar chart , tells us there are 44.33% of OBC students which is highest percent and 3.94% of ST students which is lowest percent that has participated.

TABLE 1.6

QUALIFICATION					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	UG	26	12.8	12.8	12.8
	PG	152	74.9	74.9	87.7
	MPhil/P.Hd	21	10.3	10.3	98.0
	OTH	4	2.0	2.0	100.0
	Total	203	100.0	100.0	

FIGURE-6



Students study various courses in education at university campus in which include Under graduation (UG) , Post graduation (PG), MPhil/Ph.D. and Other (OTH) is considered above in table 1.6 which shows the frequencies of all courses. Moreover, in figure 6 Bar chart , students of PG course is about highest at 74.88% and from other course is 1.97% which is lowest here.

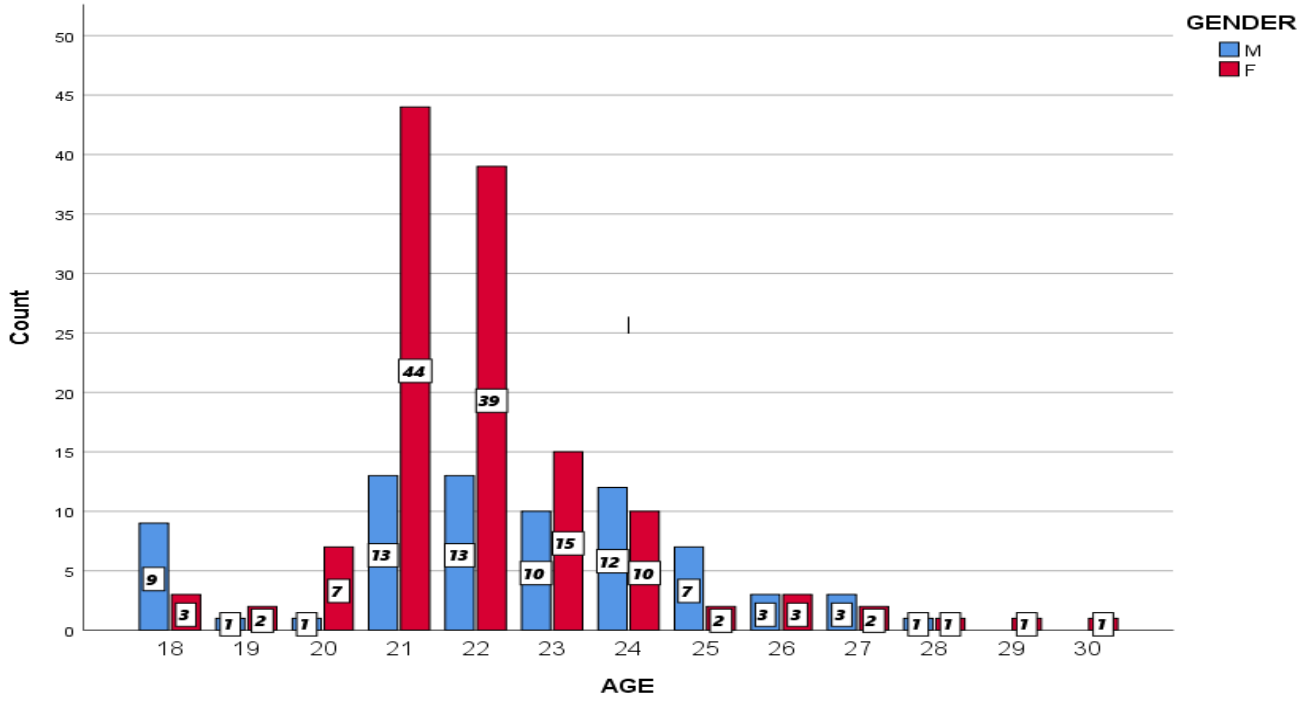
Cross table

TABLE 2.1

AGE * GENDER Crosstabulation				
Count				
		GENDER		
		M	F	Total
AGE	18	9	3	12
	19	1	2	3
	20	1	7	8
	21	13	44	57
	22	13	39	52
	23	10	15	25
	24	12	10	22
	25	7	2	9
	26	3	3	6
	27	3	2	5
	28	1	1	2
	29	0	1	1
	30	0	1	1
Total		73	130	203

FIGURE-1

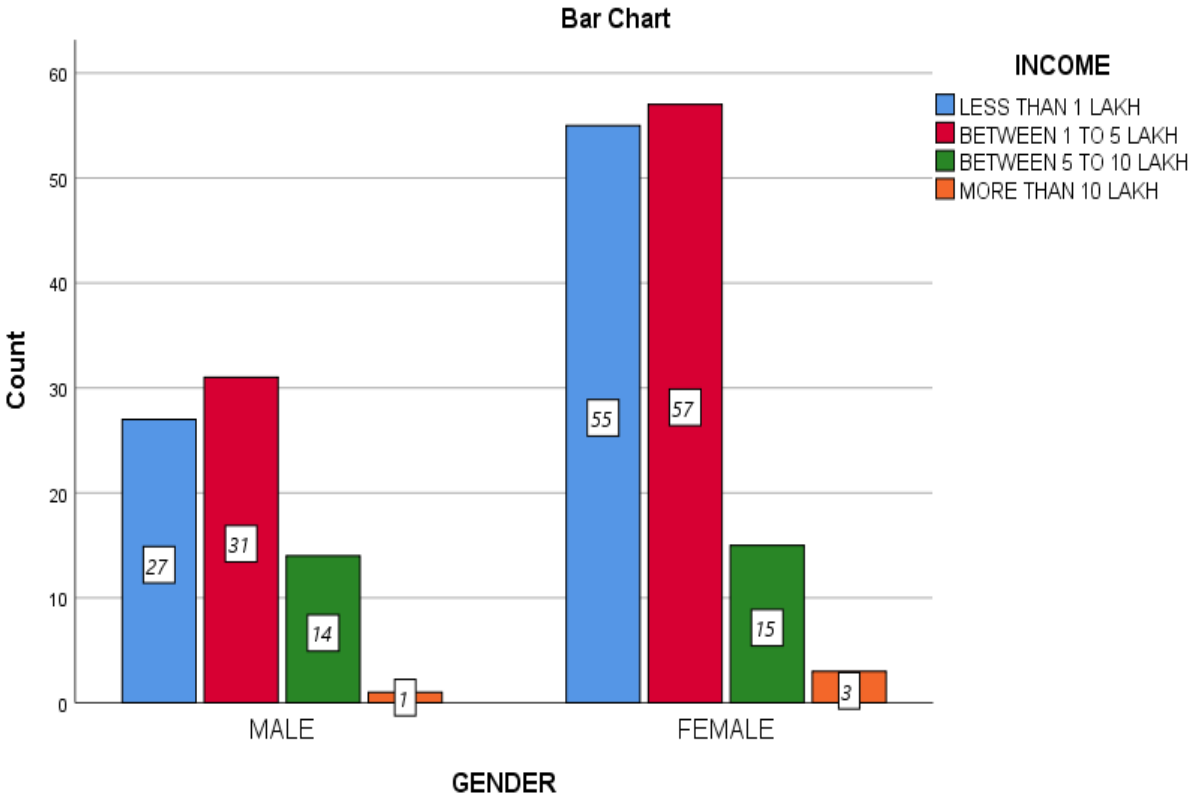
Bar Chart



From 203 students participated belongs to age group 18-30 as shown in above frequency table 2.1 and in figure 2 shows us bar chart .

TABLE 2.2

GENDER * INCOME Crosstabulation						
Count						
		INCOME				
		A	B	C	D	Total
GENDER	M	27	31	14	1	73
	F	55	57	15	3	130
Total		82	88	29	4	203



Here , we have consider different family annual income as follow:

A) Less than 1 lakh

B) Between 1 to 5 lakh

C) Between 5 to 10 lakh

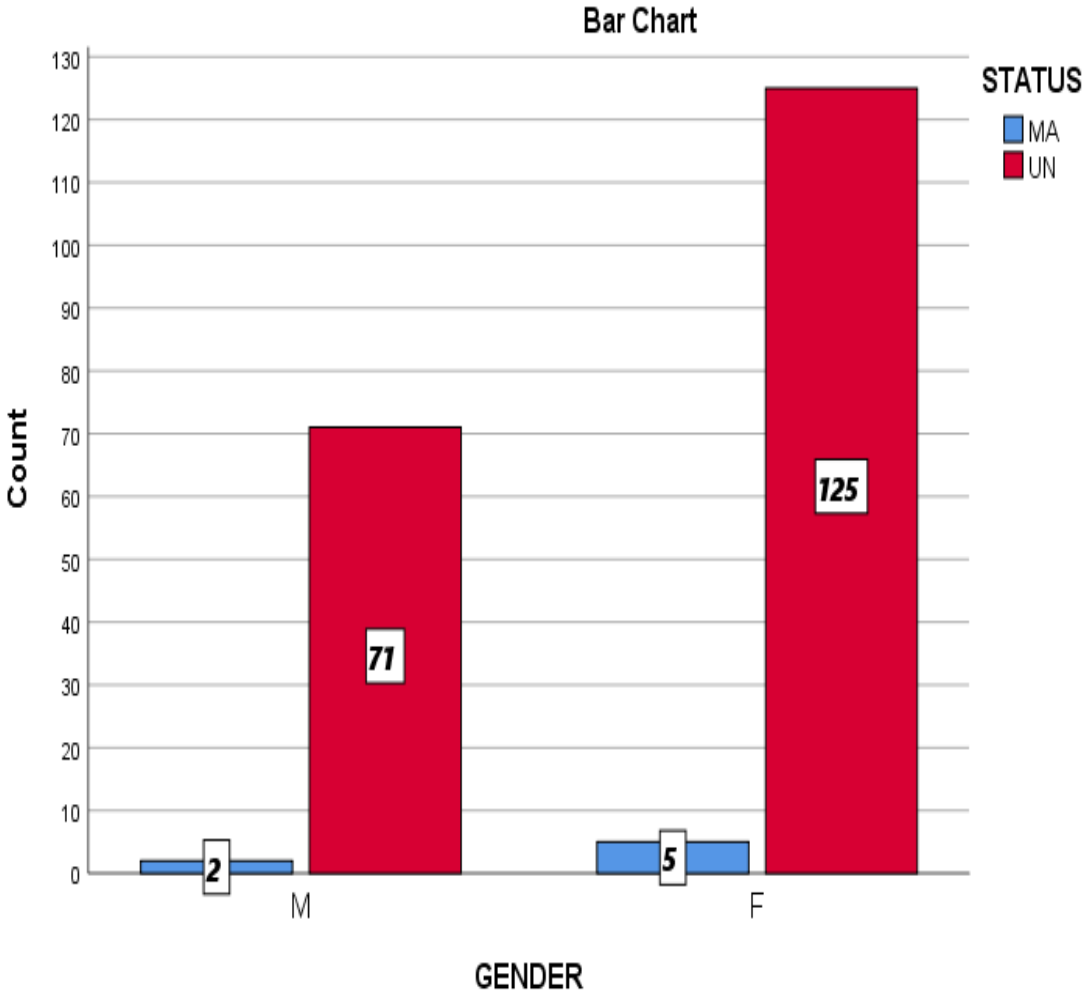
D) More than 10 lakh

Therefore from table 2.2 we can see different frequencies according to their income and in above Figure 2 Bar chart

TABLE 2.3

GENDER * STATUS Crosstabulation				
Count				
		STATUS		
		MA	UN	Total
GENDER	M	2	71	73
	F	5	125	130
Total		7	196	203

FIGURE-3

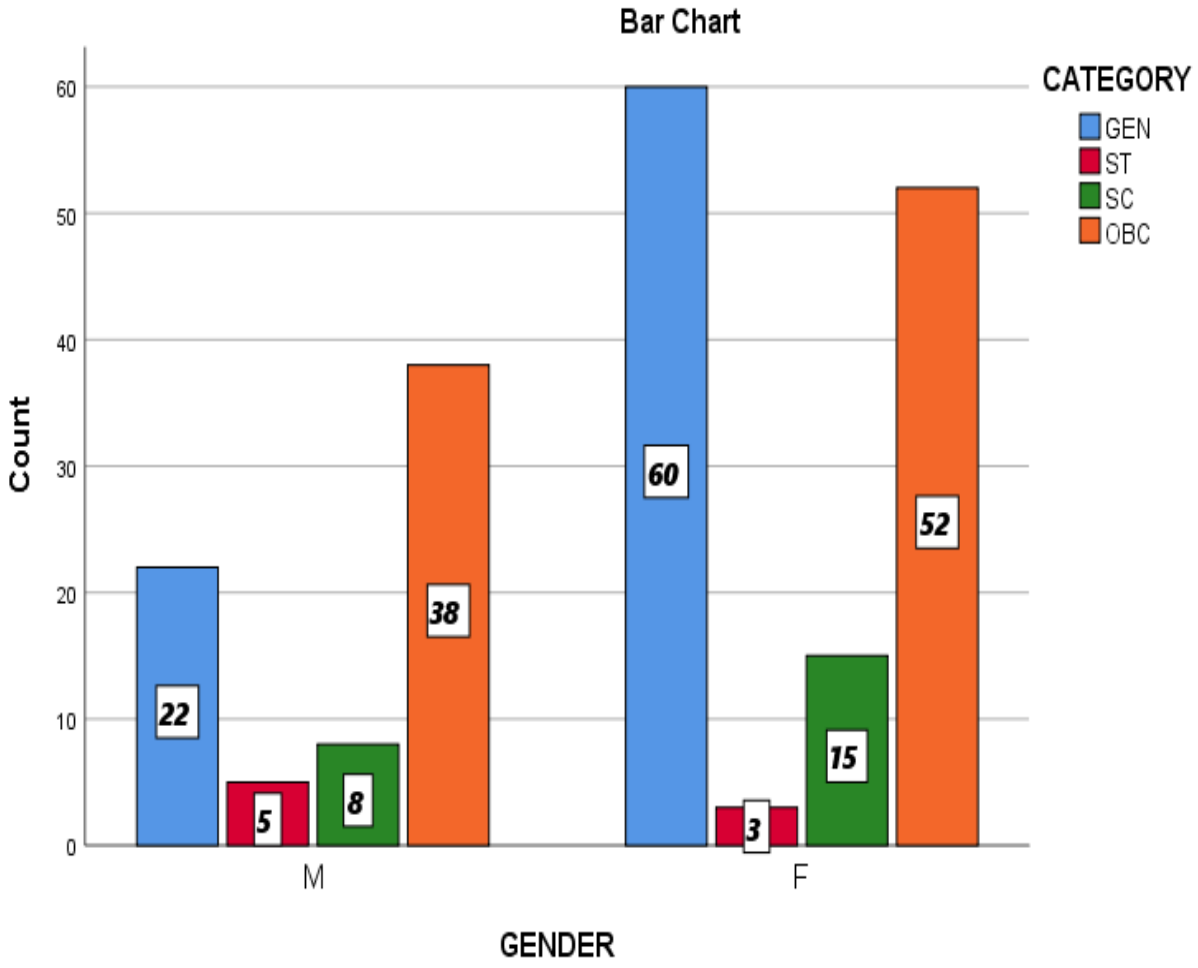


In table 2.3 we can clearly see two different frequencies of students which are married (MA) and unmarried (UN) and from 203 students participated have different marital status in figure 3 bar plot.

TABLE 2.4

GENDER * CATEGORY Crosstabulation						
Count						
		CATEGORY				Total
		GEN	ST	SC	OBC	
GENDER	M	22	5	8	38	73
	F	60	3	15	52	130
Total		82	8	23	90	203

FIGURE-4

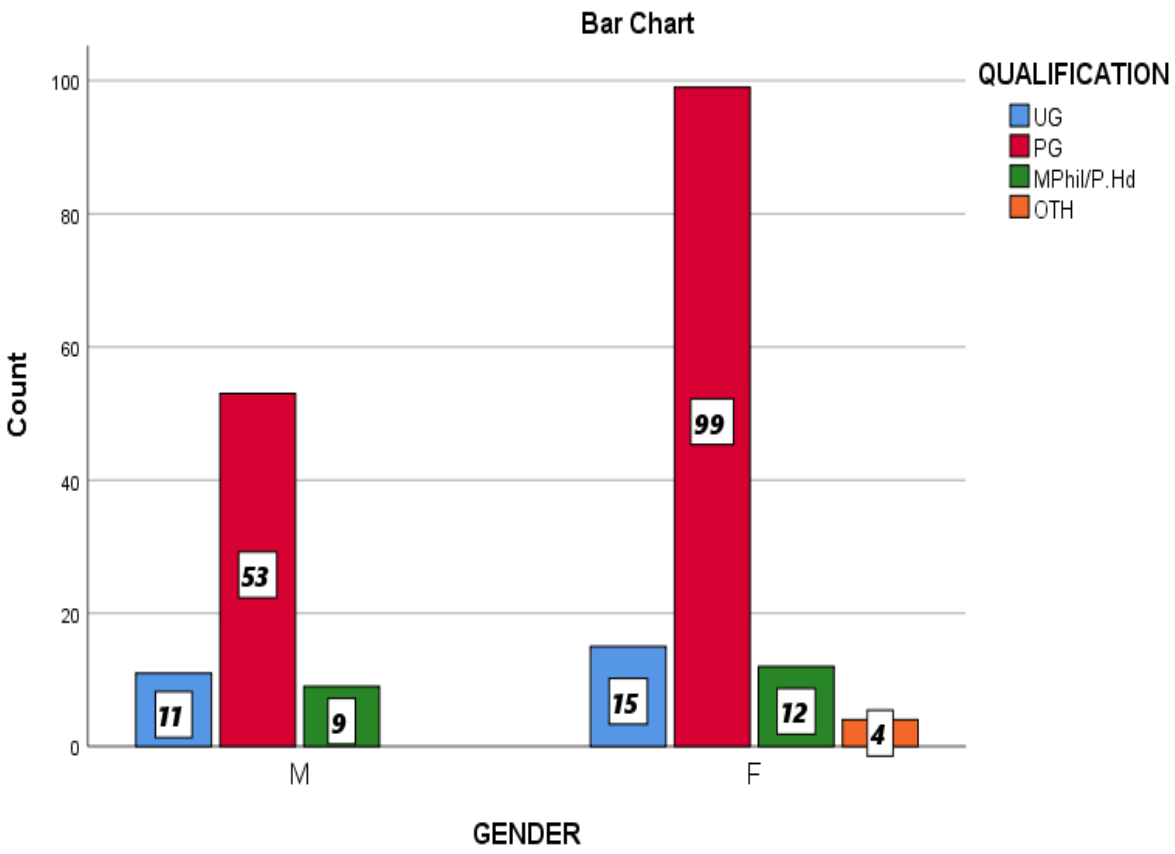


In category wise frequency distribution of students participated in responding questions is mainly here divided into four category General (GEN) , ST, SC and OBC shown in table 2.4 In figure 4 Bar chart ,

TABLE 2.5

GENDER * QUALIFICATION Crosstabulation						
Count						
		QUALIFICATION				
		UG	PG	MPhil/P.Hd	OTH	Total
GENDER	M	11	53	9	0	73
	F	15	99	12	4	130
Total		26	152	21	4	203

FIGURE-5



Students study various courses in education at university campus in which include Under graduation (UG) , Post graduation (PG), MPhil/Ph.D. and Other (OTH) is considered above in table 2.5 which shows the frequencies of all courses. Moreover, in figure 5 Bar chart.

Statistics

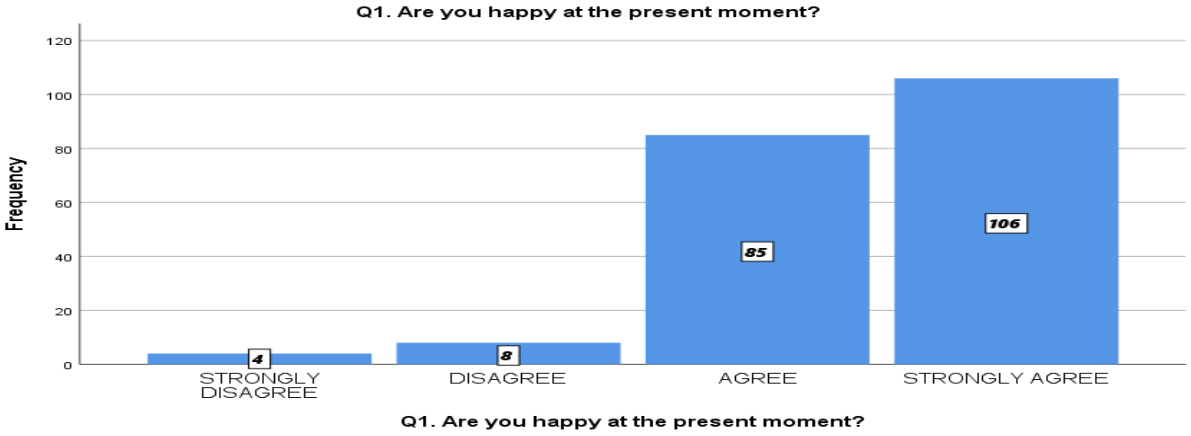
	N	
	Valid	Missing
Q1. Are you happy at the present moment?	203	0
Q2. Do you feel happiness is your own responsibility?	203	0
Q3. Do you feel physically fit in yourself ?	203	0
Q4. Do you think daily physical excrise increase productivity of human body?	203	0
Q5. Are you getting good hospital facilities in your city?	203	0
Q6. Do you feel education plays an important role in your life?	203	0
Q7. Are you happy with freedom of choice you have made in your life?	203	0
Q8. Do you feel committed and involved in your study?	203	0
Q9. Are you happy with the quality of teaching you are getting?	203	0
Q10. Are you happy with balance between student life and personal life?	203	0
Q11. Are you happy with your all basic facilities?	203	0
Q12. Are you happy the way people around you with all different mentality and throught?	203	0
Q13. Do you believe in participating in religious activities?	203	0
Q14. Do you feel happy tobe treated equally in general?	203	0
Q15. Do you satisfy with whatever you have in your life?	203	0

Q16. Role of dicipline with time is important in life?	203	0
Q17. Are you investing your time in proper way?	203	0
Q18. Do you think time is valuable in your life?	203	0
Q19. Do you feel safe and secured in your city?	203	0
Q20. Are you satisfied with law and order in your city?	203	0
Q21. Are you happy with work of government administration in general?	203	0

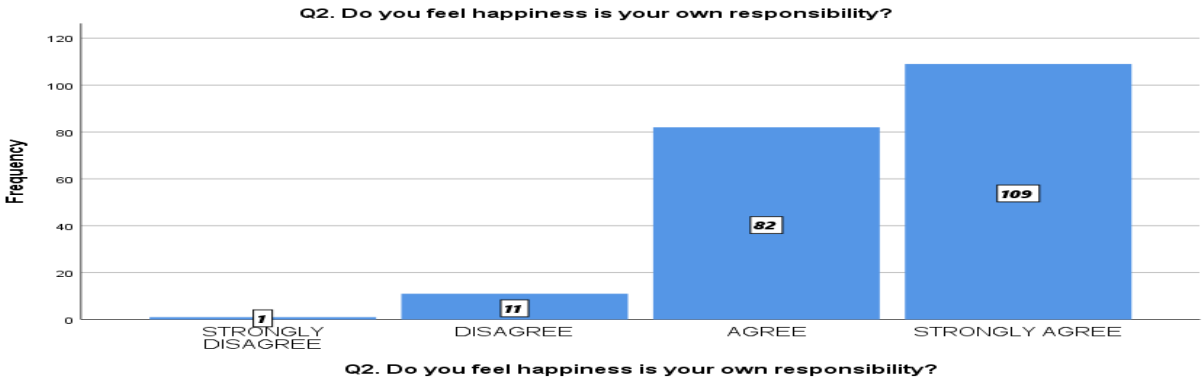
Table A : The above table is output of SPSS after data entry of primary data which shows that there is no missing value in data per question wise for sample

Frequency Table

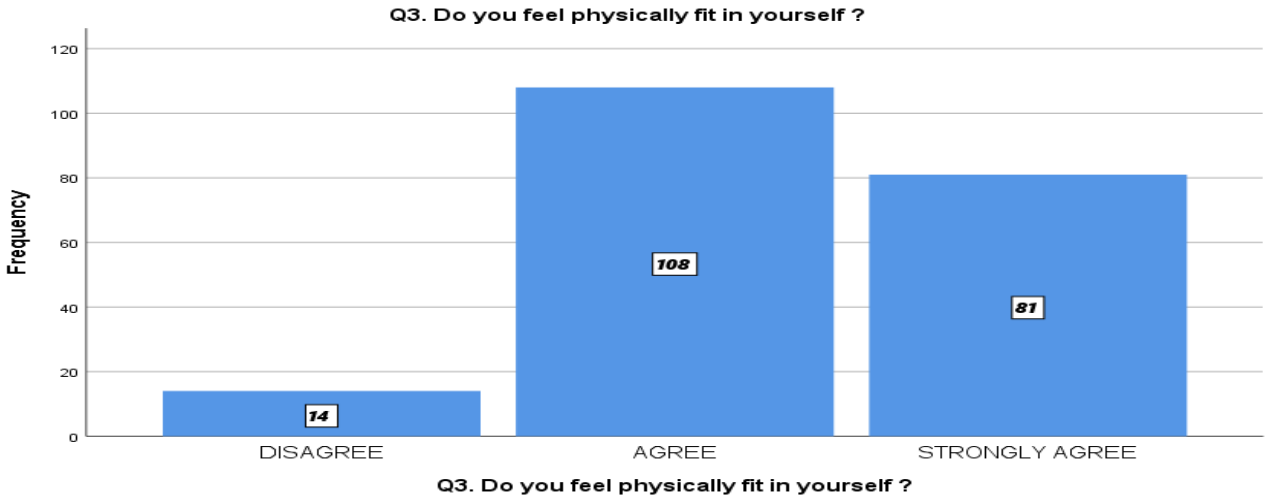
Q1. Are you happy at the present moment?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	4	8	85	106	203	1	204
Percent	2.0	3.9	41.7	52.0	99.5	.5	100.0
Cumulative Percent	2.0	5.9	47.8	100.0			



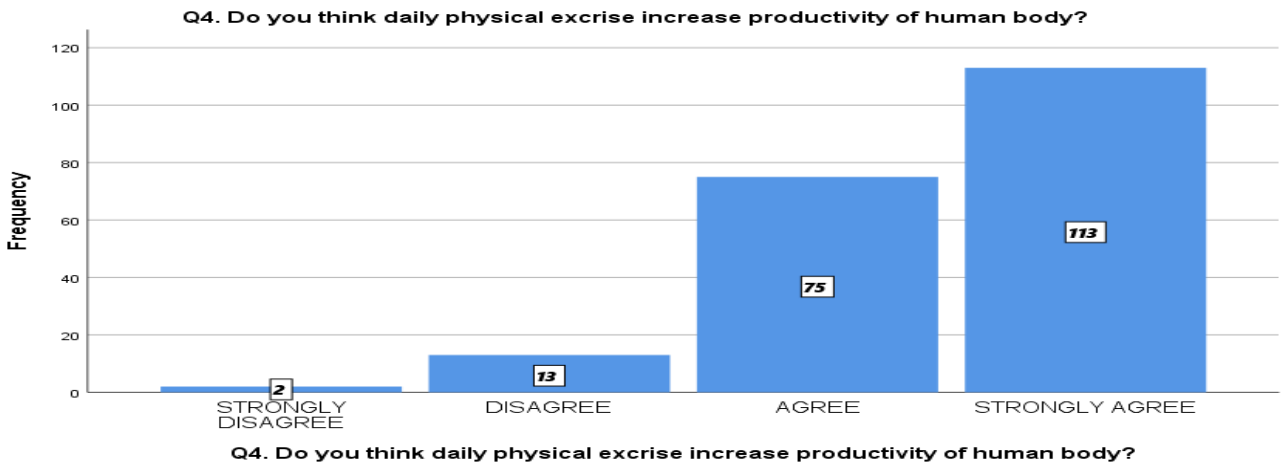
Q2. Do you feel happiness is your own responsibility?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	1	11	82	109	203	1	204
Percent	.5	5.4	40.2	53.4	99.5	.5	100.0
Cumulative Percent	.5	5.9	46.3	100.0			



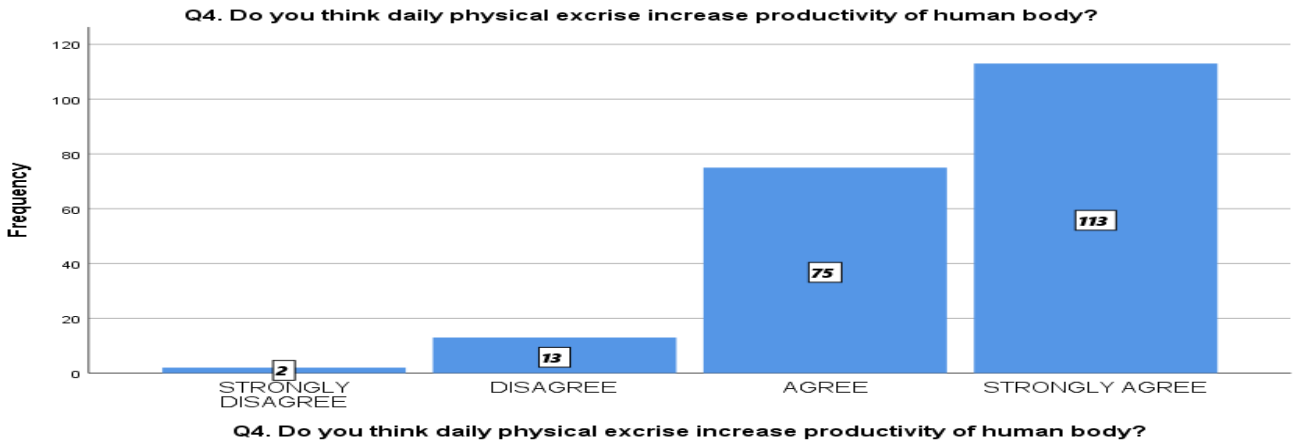
Q3. Do you feel physically fit in yourself ?						
	Valid				Missing	
	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	14	108	81	203	1	204
Percent	6.9	52.9	39.7	99.5	.5	100.0
Cumulative Percent	6.9	60.1	100.0			



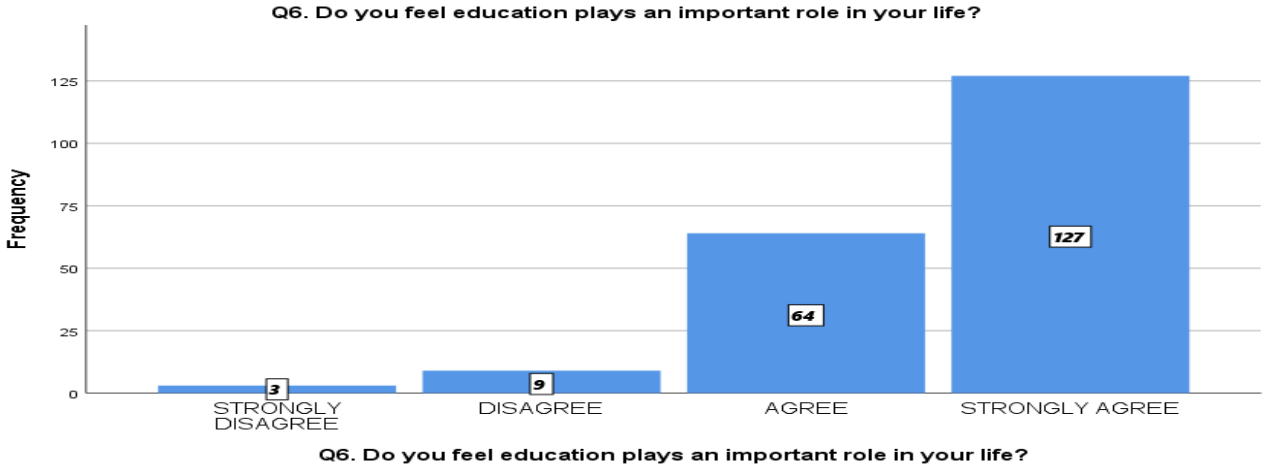
Q4. Do you think daily physical excrise increase productivity of human body?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	2	13	75	113	203	1	204
Percent	1.0	6.4	36.8	55.4	99.5	.5	100.0
Cumulative Percent	1.0	7.4	44.3	100.0			



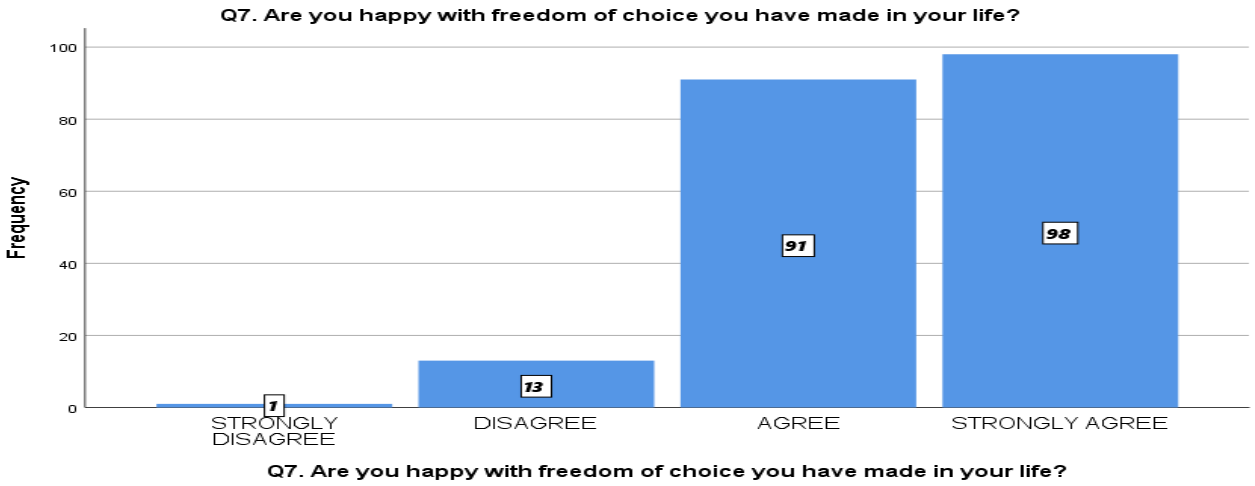
Q5. Are you getting good hospital facilities in your city?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	2	27	100	74	203	1	204
Percent	1.0	13.2	49.0	36.3	99.5	.5	100.0
Cumulative Percent	1.0	14.3	63.5	100.0			



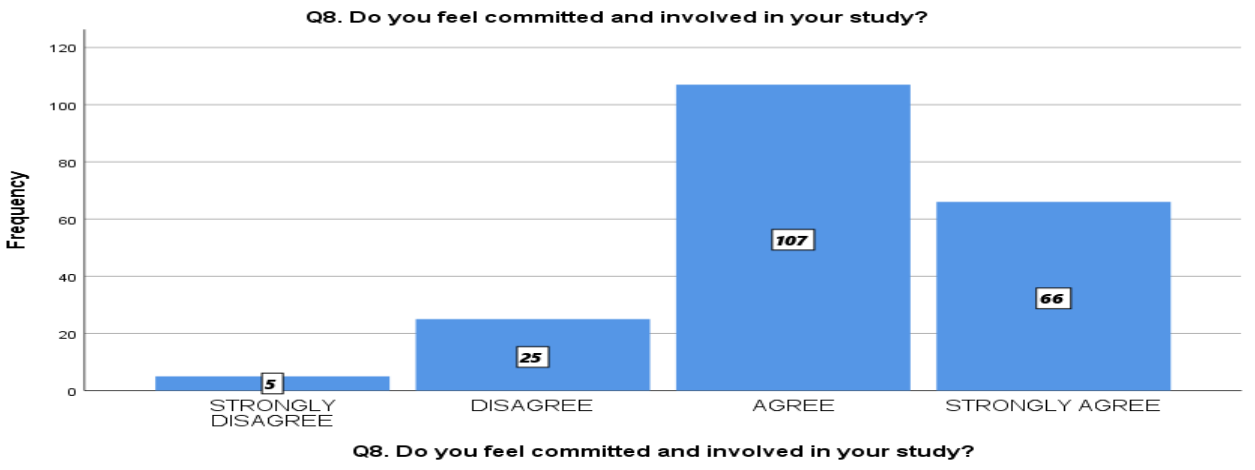
Q6. Do you feel education plays an important role in your life?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	3	9	64	127	203	1	204
Percent	1.5	4.4	31.4	62.3	99.5	.5	100.0
Cumulative Percent	1.5	5.9	37.4	100.0			



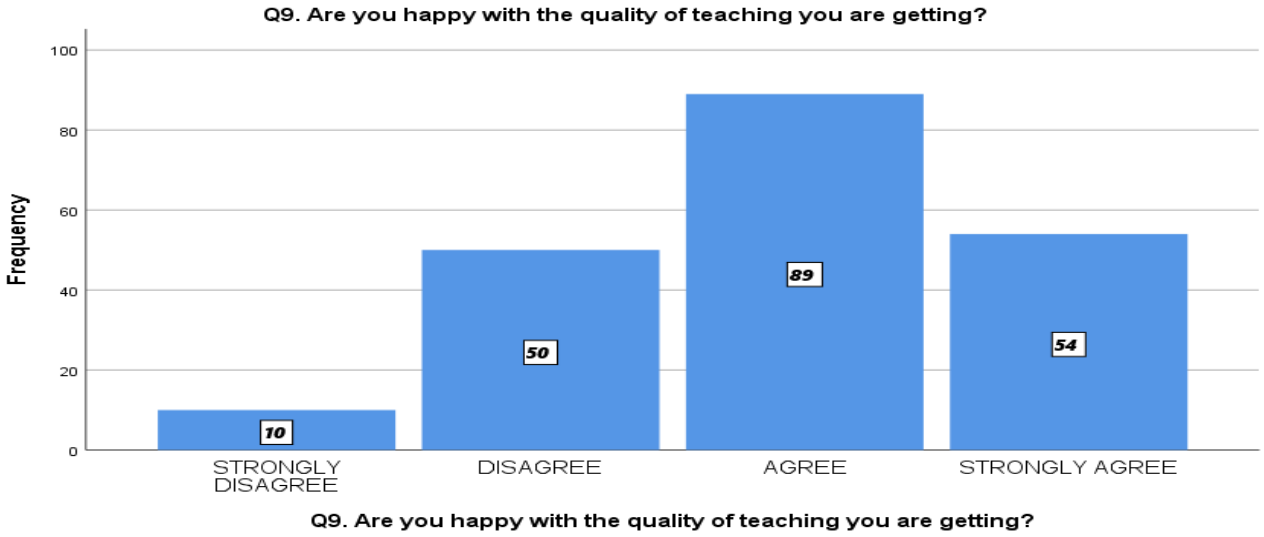
Q7. Are you happy with freedom of choice you have made in your life?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	1	13	91	98	203	1	204
Percent	.5	6.4	44.6	48.0	99.5	.5	100.0
Cumulative Percent	.5	6.9	51.7	100.0			



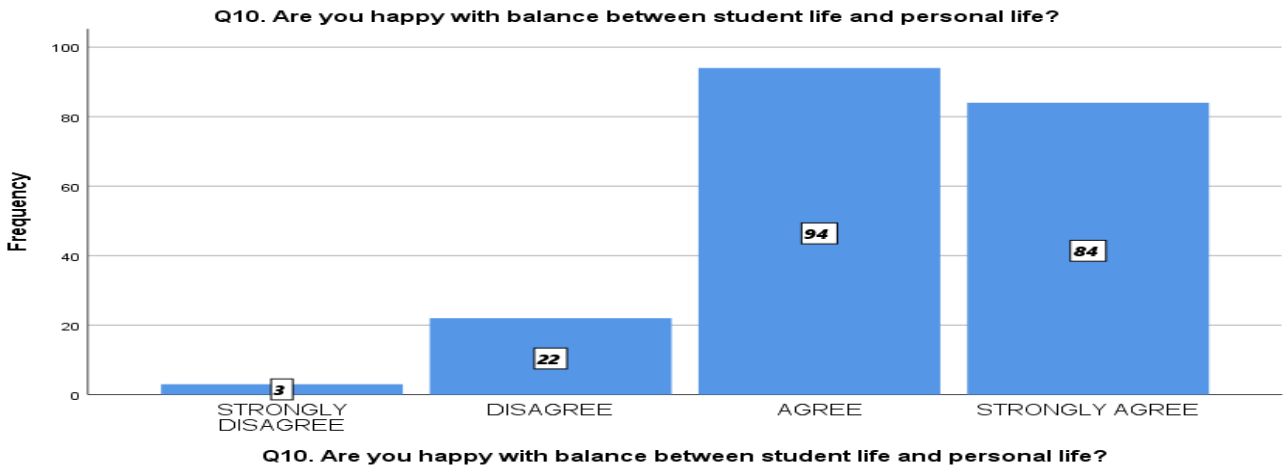
Q8. Do you feel committed and involved in your study?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	5	25	107	66	203	1	204
Percent	2.5	12.3	52.5	32.4	99.5	.5	100.0
Cumulative Percent	2.5	14.8	67.5	100.0			



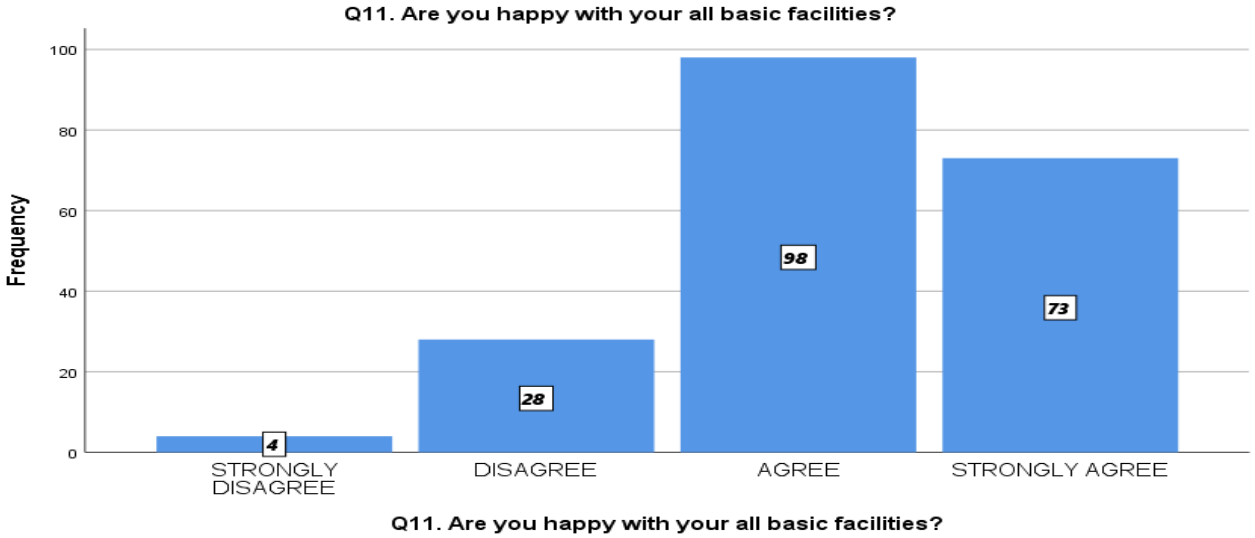
Q9. Are you happy with the quality of teaching you are getting?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	10	50	89	54	203	1	204
Percent	4.9	24.5	43.6	26.5	99.5	.5	100.0
Cumulative Percent	4.9	29.6	73.4	100.0			



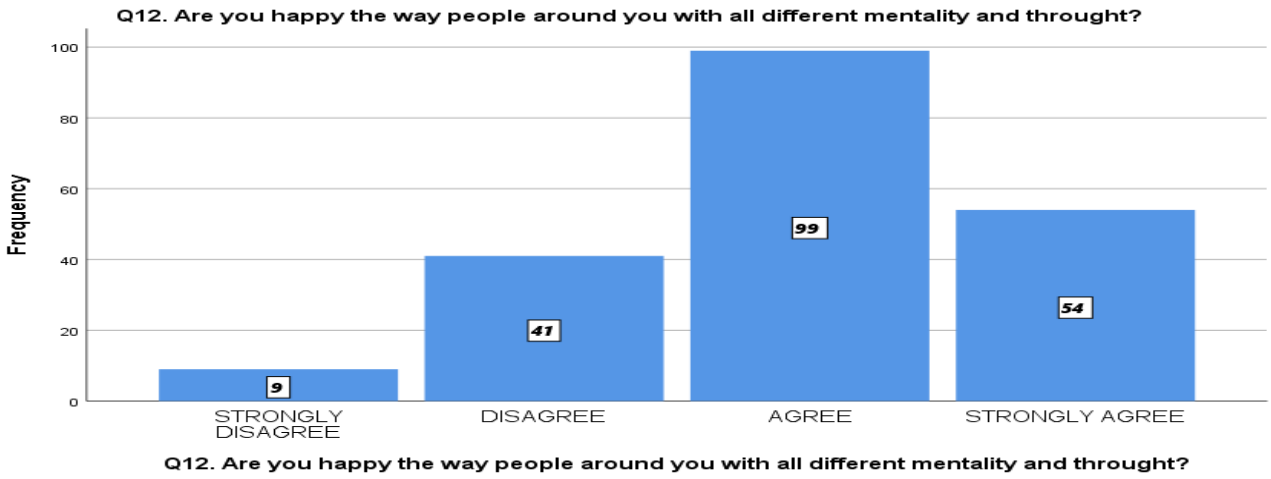
Q10. Are you happy with balance between student life and personal life?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	3	22	94	84	203	1	204
Percent	1.5	10.8	46.1	41.2	99.5	.5	100.0
Cumulative Percent	1.5	12.3	58.6	100.0			



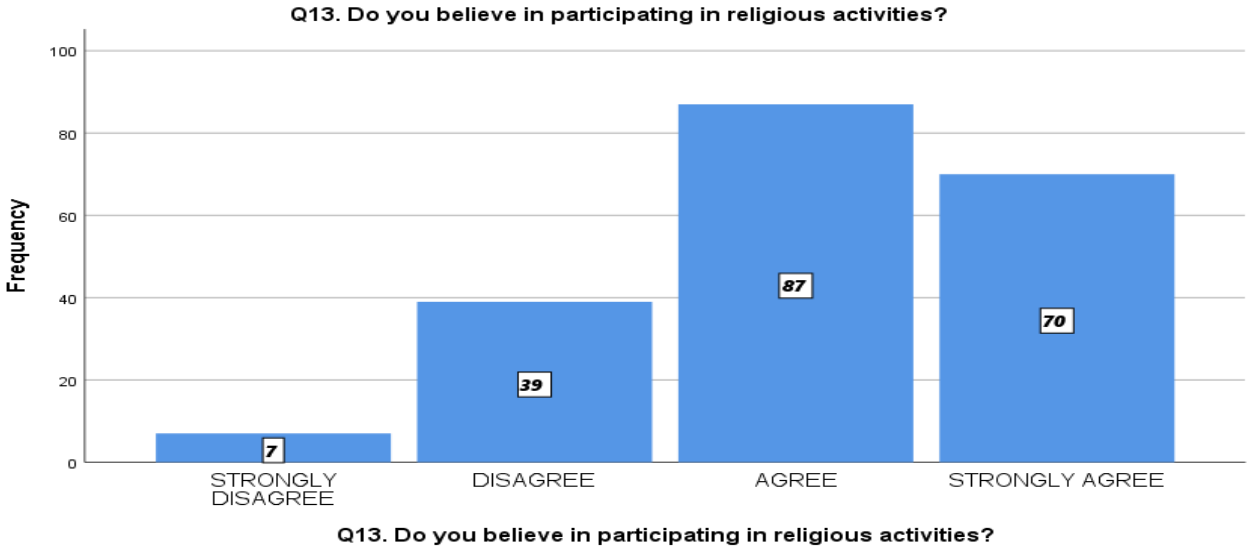
Q11. Are you happy with your all basic facilities?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	4	28	98	73	203	1	204
Percent	2.0	13.7	48.0	35.8	99.5	.5	100.0
Cumulative Percent	2.0	15.8	64.0	100.0			



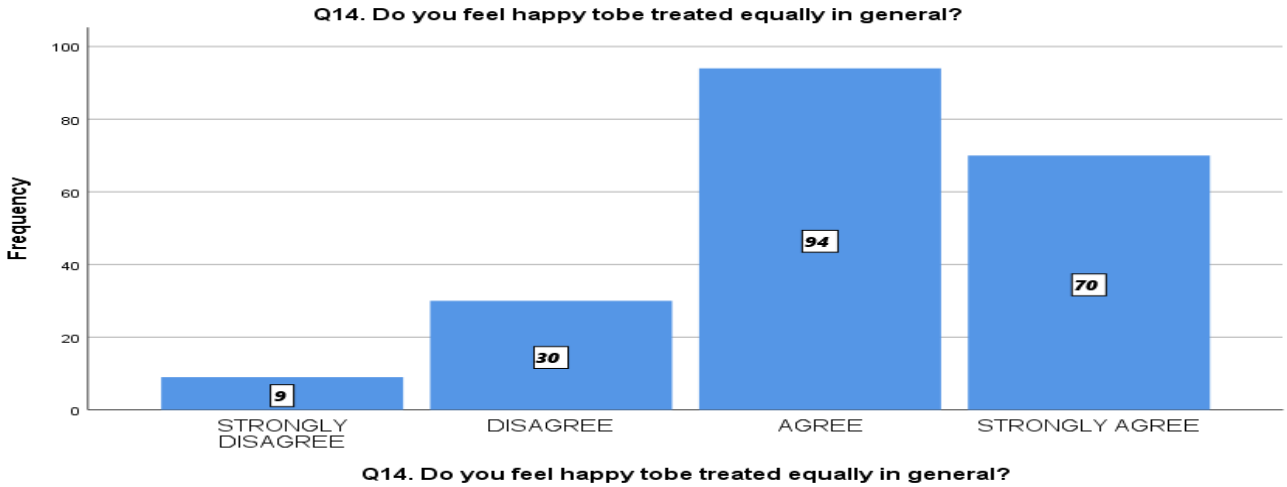
Q12. Are you happy the way people around you with all different mentality and throught?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	9	41	99	54	203	1	204
Percent	4.4	20.1	48.5	26.5	99.5	.5	100.0
Cumulative Percent	4.4	24.6	73.4	100.0			



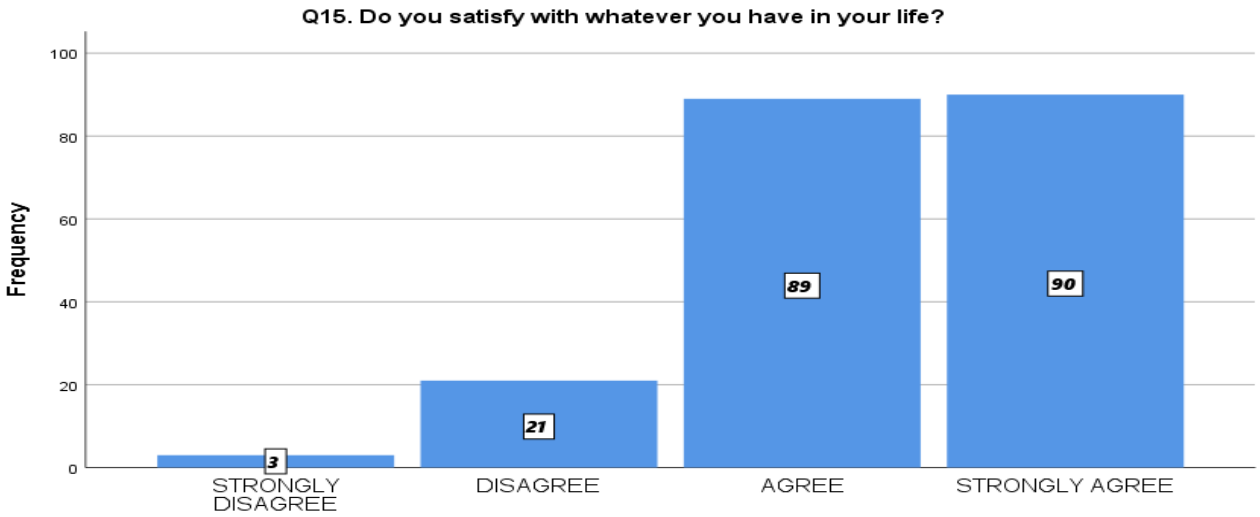
Q13. Do you believe in participating in religious activities?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	7	39	87	70	203	1	204
Percent	3.4	19.1	42.6	34.3	99.5	.5	100.0
Cumulative Percent	3.4	22.7	65.5	100.0			



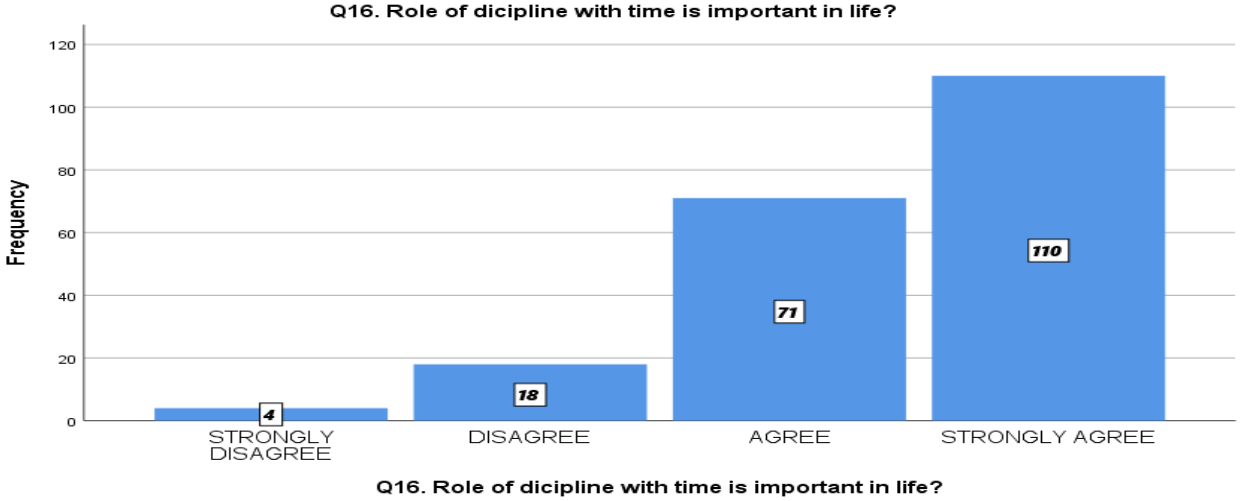
Q14. Do you feel happy tobe treated equally in general?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	9	30	94	70	203	1	204
Percent	4.4	14.7	46.1	34.3	99.5	.5	100.0
Cumulative Percent	4.4	19.2	65.5	100.0			



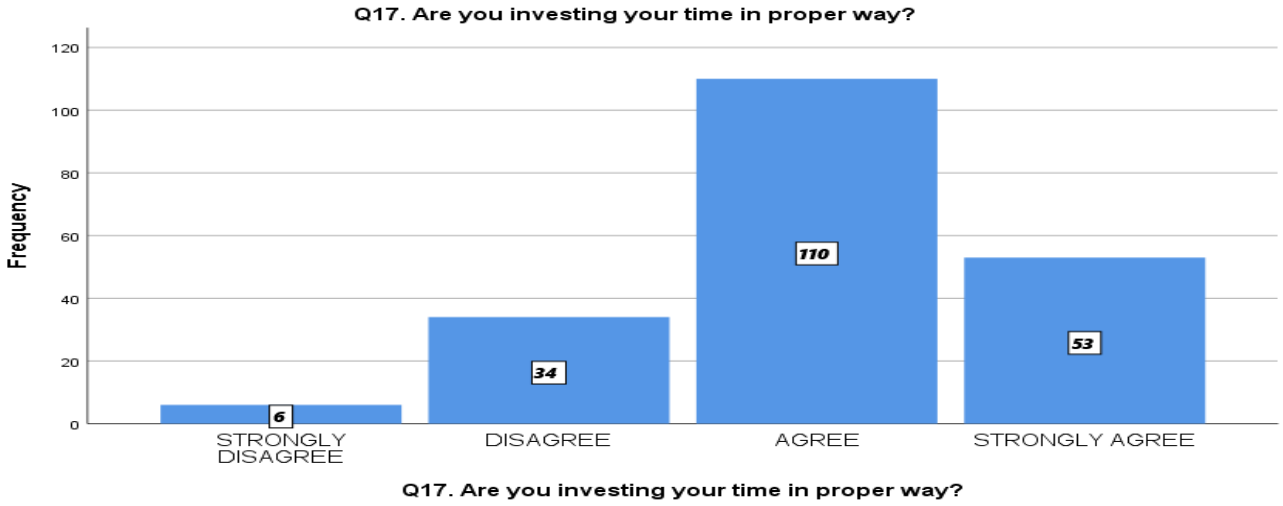
Q15. Do you satisfy with whatever you have in your life?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	3	21	89	90	203	1	204
Percent	1.5	10.3	43.6	44.1	99.5	.5	100.0
Cumulative Percent	1.5	11.8	55.7	100.0			



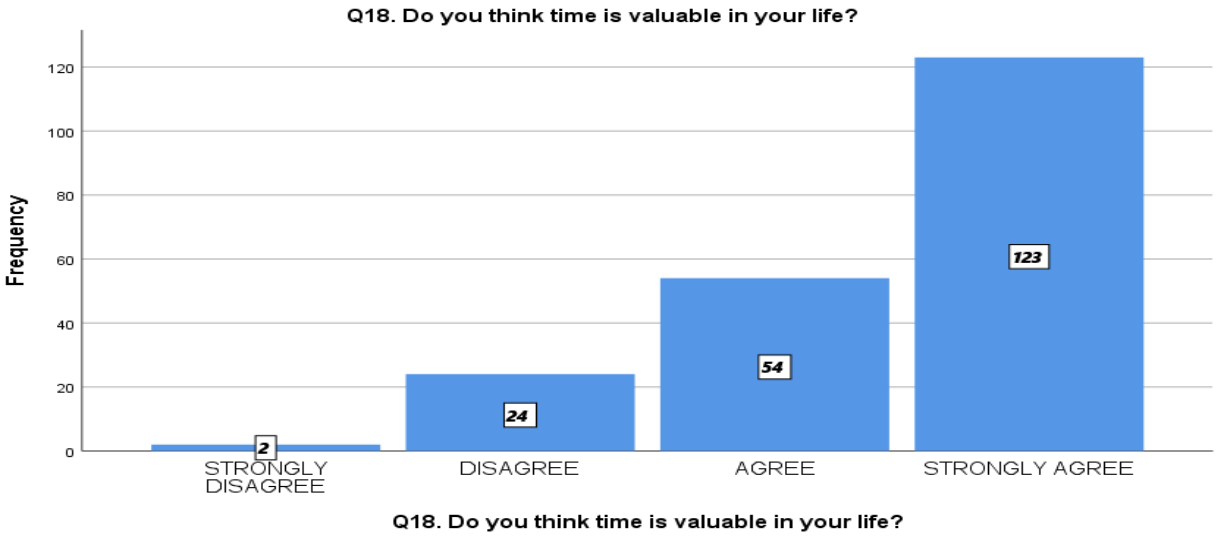
Q16. Role of dicipline with time is important in life?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	4	18	71	110	203	1	204
Percent	2.0	8.8	34.8	53.9	99.5	.5	100.0
Cumulative Percent	2.0	10.8	45.8	100.0			



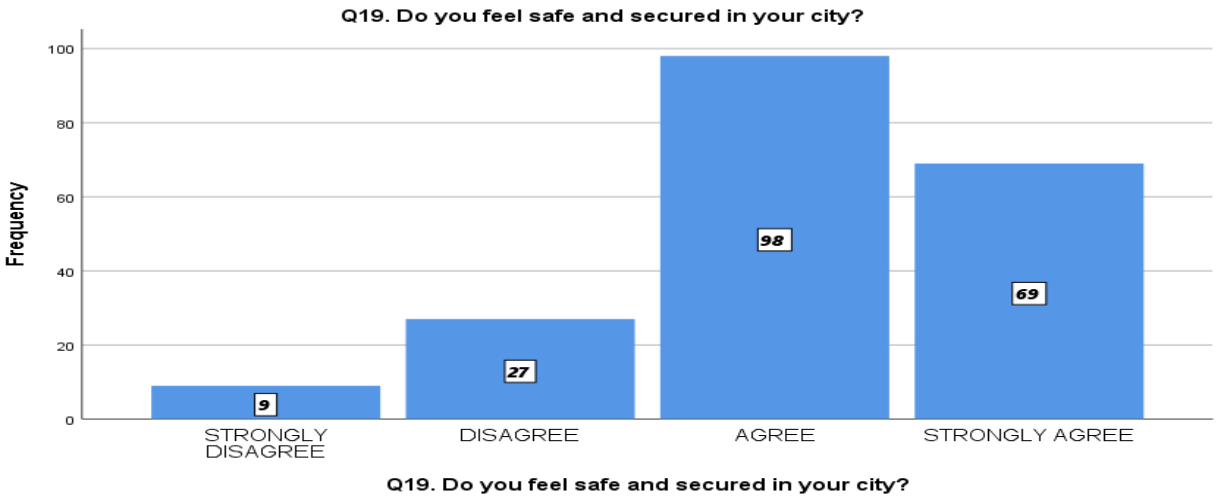
Q17. Are you investing your time in proper way?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	6	34	110	53	203	1	204
Percent	2.9	16.7	53.9	26.0	99.5	.5	100.0
Cumulative Percent	3.0	19.7	73.9	100.0			



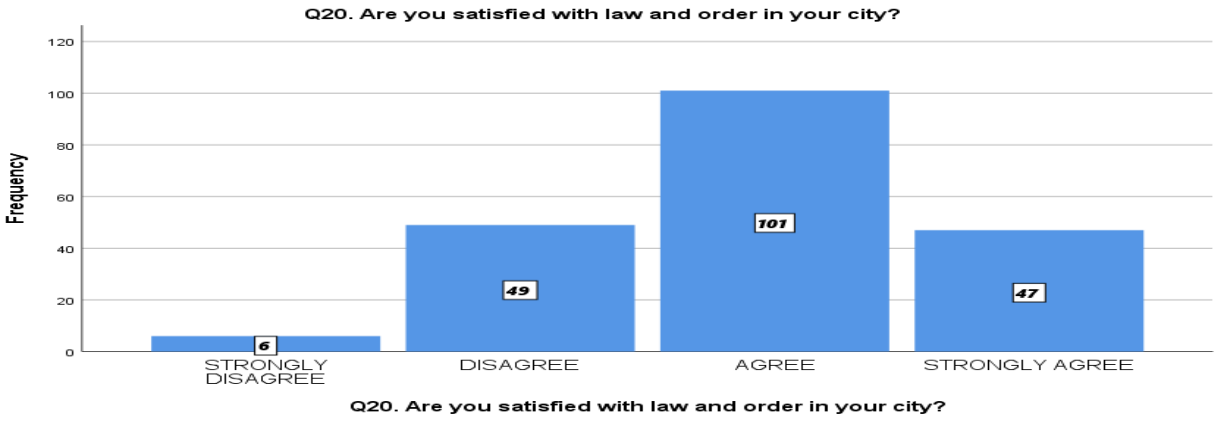
Q18. Do you think time is valuable in your life?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	2	24	54	123	203	1	204
Percent	1.0	11.8	26.5	60.3	99.5	.5	100.0
Cumulative Percent	1.0	12.8	39.4	100.0			



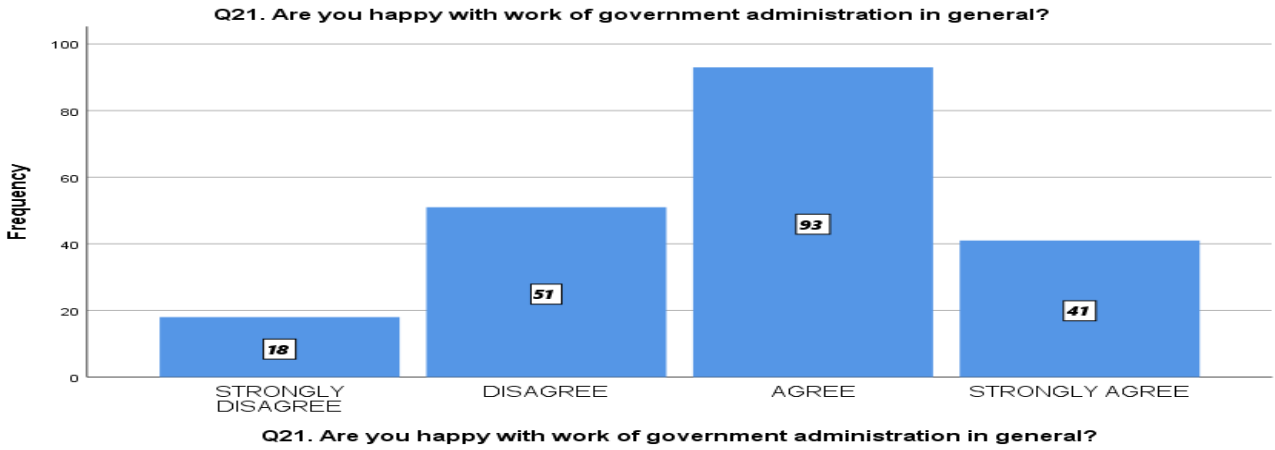
Q19. Do you feel safe and secured in your city?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	9	27	98	69	203	1	204
Percent	4.4	13.2	48.0	33.8	99.5	.5	100.0
Cumulative Percent	4.4	17.7	66.0	100.0			



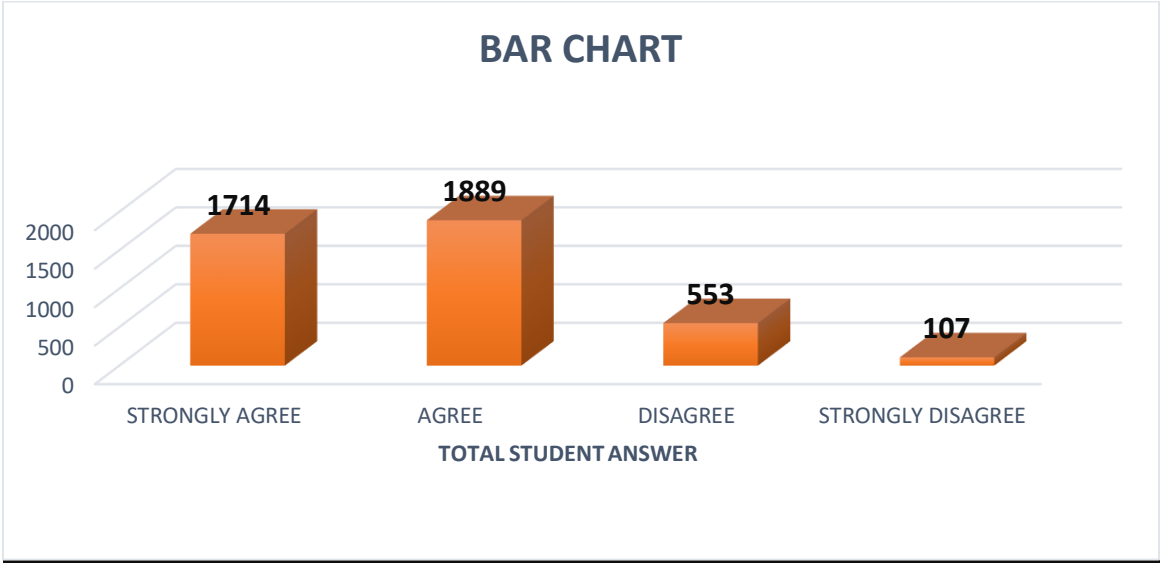
Q20. Are you satisfied with law and order in your city?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	6	49	101	47	203	1	204
Percent	2.9	24.0	49.5	23.0	99.5	.5	100.0
Cumulative Percent	3.0	27.1	76.8	100.0			



Q21. Are you happy with work of government administration in general?							
	Valid					Missing	
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	Total	System	Total
Frequency	18	51	93	41	203	1	204
Percent	8.8	25.0	45.6	20.1	99.5	.5	100.0
Cumulative Percent	8.9	34.0	79.8	100.0			



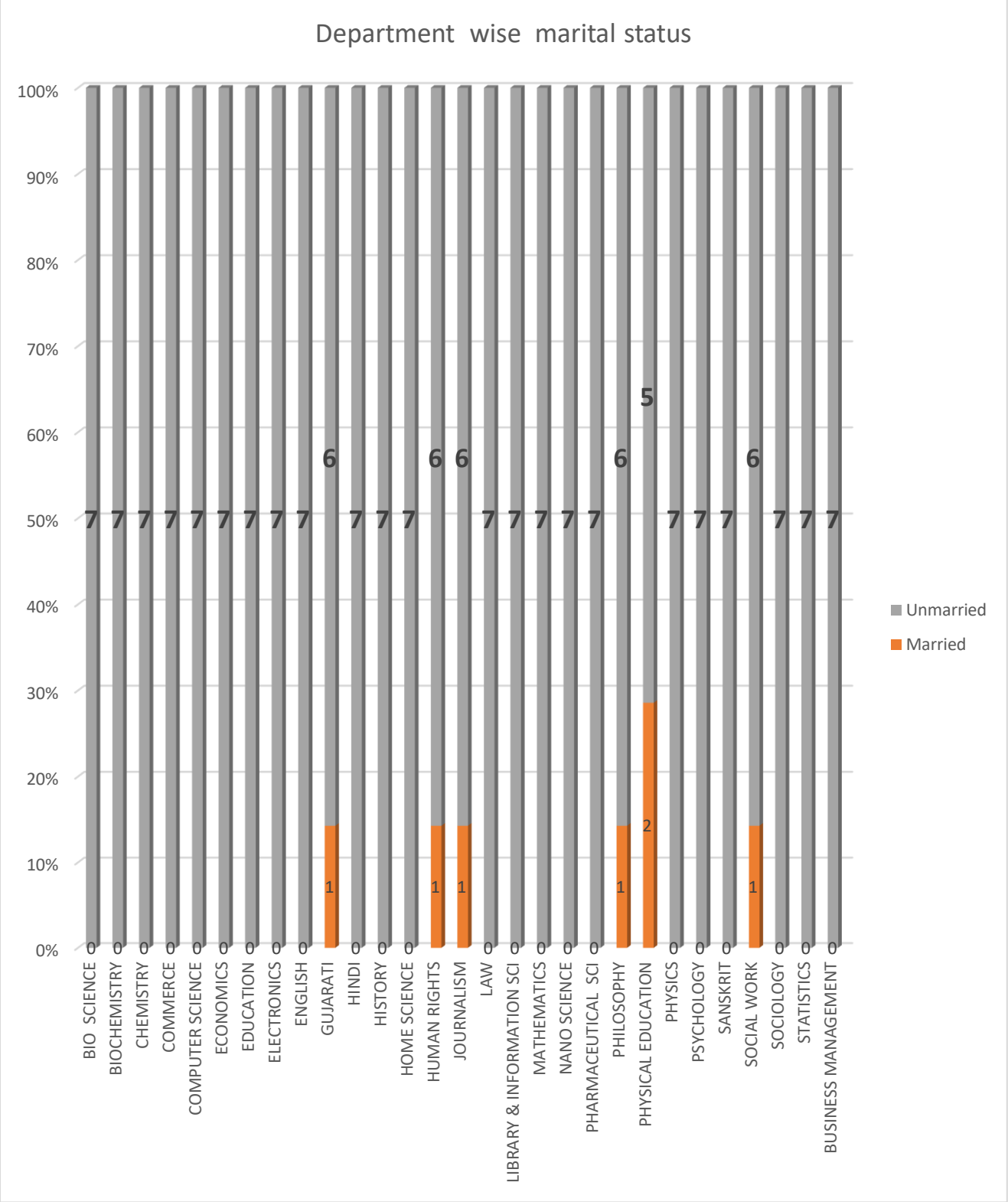
Here is all total frequency answer of our questionnaire of happiness field by campus students in this we can see that the answer of STRONGLY AGREE is 1714 ,AGREE is 1889 ,DISAGREE is 553,STRONGLY AGREE is 107 so from bar chart figure we can say that the answer of all questionnaire of happiness field by students are higest is AGREE 1889 times nd lowest is STRONGLY AGREE 107 times.



DEPARTMENT WISE MARITAL STATUS OF STUDENTS

DEPARTMENT NAME	MARRIED	UNMARRIED
BIO SCIENCE	0	7
BIOCHEMISTRY	0	7
CHEMISTRY	0	7
COMMERCE	0	7
COMPUTER SCIENCE	0	7
ECONOMICS	0	7
EDUCATION	0	7
ELECTRONICS	0	7
ENGLISH	0	7
GUJARATI	1	6
HINDI	0	7
HISTORY	0	7
HOME SCIENCE	0	7
HUMAN RIGHTS	1	6
JOURNALISM	1	6
LAW	0	7
LIBRARY & INFORMATION SCI	0	7
MATHEMATICS	0	7
NANO SCIENCE	0	7
PHARMACEUTICAL SCI	0	7
PHILOSOPHY	1	6
PHYSICAL EDUCATION	2	5
PHYSICS	0	7
PSYCHOLOGY	0	7
SANSKRIT	0	7
SOCIAL WORK	1	6
SOCIOLOGY	0	7
STATISTICS	0	7
BUSINESS MANAGEMENT	0	7

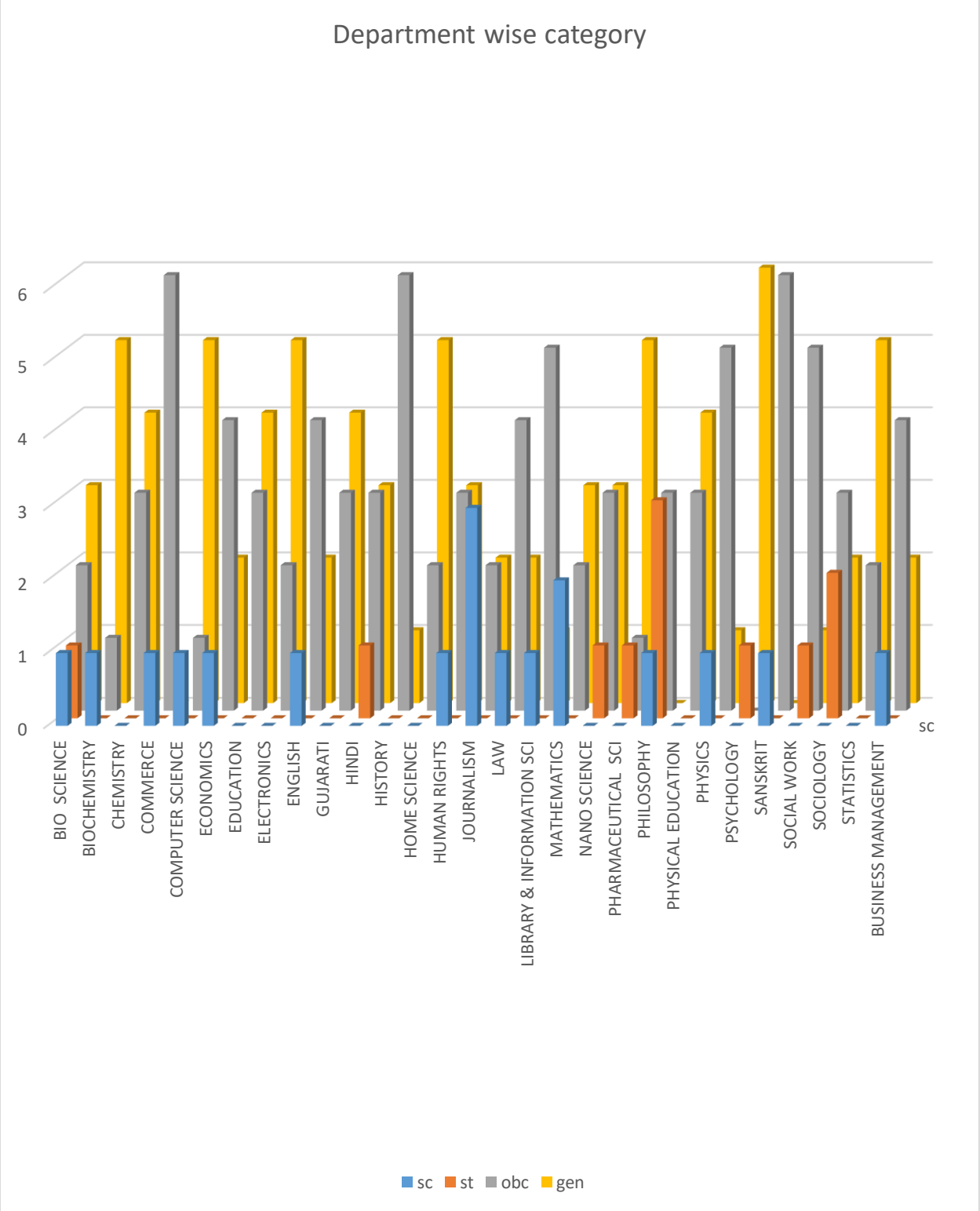
Married	7
Unmarried	196



HERE WE CAN SEE FROM ABOVE FIGURE SUBJECT WISE DATA OF MARRIED AND UNMARRIED STUDENTS , WE HAVE 7 UNMARRIED AND 196 ARE MARRIED.

DEPARTMENT WISE CATEGORY OF STUDENTS

Department name	*sc*	*st*	*obc*	*gen*
BIO SCIENCE	1	1	2	3
BIOCHEMISTRY	1	0	1	5
CHEMISTRY	0	0	3	4
COMMERCE	1	0	6	0
COMPUTER SCIENCE	1	0	1	5
ECONOMICS	1	0	4	2
EDUCATION	0	0	3	4
ELECTRONICS	0	0	2	5
ENGLISH	1	0	4	2
GUJARATI	0	0	3	4
HINDI	0	1	3	3
HISTORY	0	0	6	1
HOME SCIENCE	0	0	2	5
HUMAN RIGHTS	1	0	3	3
JOURNALISM	3	0	2	2
LAW	1	0	4	2
LIBRARY & INFORMATION SCI	1	0	5	1
MATHEMATICS	2	0	2	3
NANO SCIENCE	0	1	3	3
PHARMACEUTICAL SCI	0	1	1	5
PHILOSOPHY	1	3	3	0
PHYSICAL EDUCATION	0	0	3	4
PHYSICS	1	0	5	1
PSYCHOLOGY	0	1	0	6
SANSKRIT	1	0	6	0
SOCIAL WORK	0	1	5	1
SOCIOLOGY	0	2	3	2
STATISTICS	0	0	2	5
BUSINESS MANAGEMENT	1	0	4	2



FROM ABOVE FIGURE WE CAN SEE DEPARTMENT WISE STUDENTS IN ALL CATEGORY.

RELIABLITY STATISTICS

The reliability of the questionnaire that was used for the data collection is used properly in order to understand the opinions of research participants the questionnaire that is being used must be reliable in order to provide effective information . the reliability statistic using statistical package for social science (SPSS) is the used of help of Cronbach Alpha it was detected that 21 items of questions was 74.3 % that means that credible .A value higher than 50% is considered sufficient and in this case it is 74.3 % .

Reliability Statistics	
Cronbach's Alpha	N of Items
.743	21

FACTOR ANALYSIS

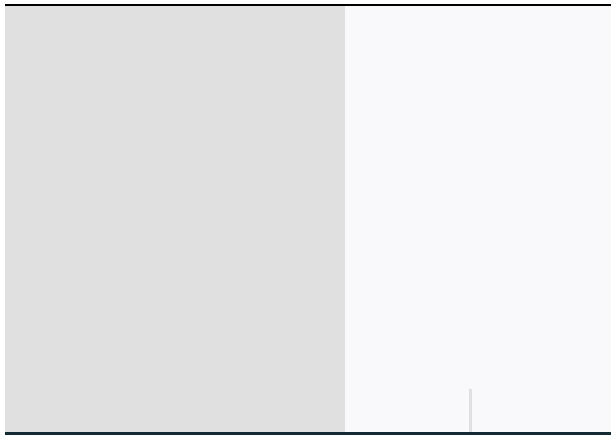
Factor analysis was conducted in order to understand the different factors that were forming the main questions of the study. the information that was obtain from the study helped in understanding the factor loadings. the information further helping in formulating the main variables by transforming the questions that were loading perfectly. the 21 variables in form of questions were independent variables in factor analysis basically.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.682
Bartlett's Test of Sphericity	Approx. Chi-Square	670.224
	df	210
	Sig.	.000

The KMO measure of sampling adequacy is about 0.682 which is greater then0.6 as shown in above table tells us there is sufficient correlation is present for factor analysis. By bartlett’s test of sphericity the test is accepted as the significance value is 0.000 which is less than 0.05.

Communalities

	Initial	Extraction			
Q1. Are you happy at the present moment?	1.000	.601	Q12. Are you happy the way people around you with all different mentality and thought?	1.000	.497
Q2. Do you feel happiness is your own responsibility?	1.000	.578	Q13. Do you believe in participating in religious activities?	1.000	.482
Q3. Do you feel physically fit in yourself ?	1.000	.629	Q14. Do you feel happy tobe treated equally in general?	1.000	.392
Q4. Do you think daily physical excise increase productivity of human body?	1.000	.740	Q15. Do you satisfy with whatever you have in your life?	1.000	.372
Q5. Are you getting good hospital facilities in your city?	1.000	.515	Q19. Do you feel safe and secured in your city?	1.000	.459
Q6. Do you feel education plays an important role in your life?	1.000	.666	Q20. Are you satisfied with law and order in your city?	1.000	.600
Q7. Are you happy with freedom of choice you have made in your life?	1.000	.757	Q21. Are you happy with work of government administration in general?	1.000	.668
Q8. Do you feel committed and involved in your study?	1.000	.576	Extraction Method: Principal Component Analysis. **In this communalities the value of extraction should be more than 0.5 for all question and in which this situation does not follow are will be out from further study. Which is known as reduction of data from given data set**		
Q9. Are you happy with the quality of teaching you are getting?	1.000	.578			
Q10. Are you happy with balance between student life and personal life?	1.000	.525			
Q11. Are you happy with your all basic facilities?	1.000	.500			



Rotated Component Matrix					
	Component				
	1	2	3	4	5
Q20. Are you satisfied with law and order in your city?	.759				
Q21. Are you happy with work of government administration in general?	.695				
Q1. Are you happy at the present moment?	.661				
Q8. Do you feel committed and involved in your study?		.769			
Q6. Do you feel education plays an important role in your life?		.715	.401		
Q9. Are you happy with the quality of teaching you are getting?		.563			
Q17. Are you investing your time in proper way?			.693		
Q18. Do you think time is valuable in your life?			.692		
Q10. Are you happy with balance between student life and personal life?				.707	
Q2. Do you feel happiness is your own responsibility?				.669	
Q3. Do you feel physically fit in yourself ?				.651	
Q16. Role of discipline with time is important in life?					.787
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.					
a. Rotation converged in 11 iterations.					

Here we got our new factors after reduction and loading as follow are written below

FACTOR-1 (1,20,21) FACTOR-2 (6,8,9) FACTOR-3 (6,17,18)
FACTOR-4 (2,3,10) FACTOR-5 (16)

REGRESSION ANALYSIS

H0: $\beta = 0$

H1 : $\beta \neq 0$

Descriptive Statistics			
	Mean	Std. Deviation	N
HAPPY	3.2307	.30692	203
FACTOR 1	.0000000	1.00000000	203
FACTOR 2	.0000000	1.00000000	203
FACTOR 3	.0000000	1.00000000	203
FACTOR 4	.0000000	1.00000000	203
FACTOR 5	.0000000	1.00000000	203

From the above descriptive statistics we can say that the mean and standard deviation of FACTOR 1 ,FACTOR 2 , FACTOR 3 ,FACTOR 4 and FACTOR 5 are 0 and 1 and are independent variables .

Correlation							
		HAPPY	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
Pearson Correlation	HAPPY	1.000	.585	.475	.420	.442	.235
	FACTOR 1	.585	1.000	.000	.000	.000	000
	FACTOR 2	.475	.000	1.000	.000	.000	.000
	FACTOR 3	.420	.000	.000	1.000	.000	.000
	FACTOR 4	.442	.000	.000	.000	1.000	.000
	FACTOR 5	.235	.000	.000	.000	.000	1.000
Sig. (1-tailed)	HAPPY	.	.000	.000	.000	.000	.000
	FACTOR 1	.000	.	.500	.500	.500	.500
	FACTOR 2	.000	.500	.	.500	.500	.500
	FACTOR 3	.000	.500	.500	.	.500	.500
	FACTOR 4	.000	.500	.500	.500	.	.500
	FACTOR 5	.000	.500	.500	.500	.500	.
N	HAPPY	203	203	203	203	203	203
	FACTOR 1	203	203	203	203	203	203
	FACTOR 2	203	203	203	203	203	203
	FACTOR 3	203	203	203	203	203	203
	FACTOR 4	203	203	203	203	203	203
	FACTOR 5	203	203	203	203	203	203

After completing factor analysis we got five factors named as FACTOR 1 ,FACTOR 2 , FACTOR 3 ,FACTOR 4 ,FACTOR 5 and happy are correlated to find the correlation between all variables from above table of correlation we can see difference Pearson correlation of all different variable. As it is first assumption of regression that correlation must be there.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.998[a]	.995	.995	.02134	.995	8320.063	5	197	.000

a. Predictors: (Constant), FACTOR 5, FACTOR 4, FACTOR 3, FACTOR 2, FACTOR 1

The regression analysis is helping in understand the relationship betweenFACTOR 1FACTOR 2 , FACTOR 3 ,FACTOR 4 ,FACTOR 5 with happy. In this case the R shows that the variables are 99.8% predicting the happiness the R square there is variance in the dependent variable that is happy that is brought by FACTOR 1, FACTOR 2 , FACTOR 3 ,FACTOR 4 ,FACTOR 5 .

Coefficients[a]						
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
Model	β	Std. Error	Beta			
(Constant)	3.231	.001		2157.328	.000	
FACTOR 1	.180	.002	.585	119.697	.000	
FACTOR 2	.146	.002	.475	97.040	.000	
FACTOR 3	.129	.002	.420	85.808	.000	
FACTOR 4	.136	.002	.442	90.432	.000	
FACTOR 5	.072	.002	.235	48.118	.000	

a. Dependent Variable: HAPPY

b. Independent variable ; factor 1,factor 2, factor 3 ,factor 4, factor 5 (constant)

The confident table shows the regression line that will be formed based on the data that has been analysed .The significance values for FACTOR 1, FACTOR 2 , FACTOR 3 ,FACTOR 4 and FACTOR 5 are below 0.05 and when the P-value is less than 0.05 that means we reject the null hypothesis and accept the alternative hypothesis

The information is showing that all the FACTOR 1, FACTOR 2 , FACTOR 3 ,FACTOR 4 ,FACTOR 5 . has great impact on HAPPINESS (happy variable name) .The information in the table shows that FACTOR 1 has higher value of t test is 119.697 with unstandardized 0.180 this means that FACTOR 1 is very much strong factor and FACTOR 5 is less effective compare to other factor with HAPPINESS (happy variable name) of students.

ANOVA

H0:There is no significance difference between happiness and life factor effecting it.

H1:There is significance difference between happiness and life factor effecting it

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.939	5	3.788	8320.063	.000[b]
	Residual	.090	197	.000		
	Total	19.029	202			
a. Dependent Variable: HAPPY						
b. Predictors: (Constant), FACTOR 5, FACTOR 4, FACTOR 3, FACTOR 2, FACTOR 1						

The ANOVA table is expaling variance that is brought in HAPPINESS (happy variable name) with the help of FACTOR 1, FACTOR 2 , FACTOR 3 ,FACTOR 4 ,FACTOR 5 . The 18.939 out of 19.029 is explained by variables some portion is explained by other variables that are not included in the study project .
The significance value is below 5% that is showing that the model is a good fit for explaing the relationship that is present among the variables .Here the significance value of our test is less then 0.05 Hence, our null hypothesis is accepted at 95% of confidence interval and we can say There is significance difference between happiness and life factor effecting it.

✓ CONCLUSION:

- the reliability statistic using statistical package for social science (SPSS) is the used of help of Cronbach Alpha it was detected that 21 items of questions was 74.3 % that means that credible .A value higher than 50% is considered sufficient and in this case it is 74.3 %
- The KMO measure of sampling adequacy is about 0.682 which is greater then0.6 as shown in above table tells us there is sufficient correlation is present for factor analysis. By bartlett's test of sphericity the test is accepted as the significance value is 0.000 which is less than 0.05.
- Here we got our new factors after reduction and loading as follow are written below
- FACTOR-1 (1,20,21) FACTOR-2 (6,8,9) FACTOR-3 (6,17,18) FACTOR-4 (2,3,10) FACTOR-5 (16)

- The confident table shows the regression line that will be formed based on the data that has been analysed . The significance values for FACTOR 1, FACTOR 2 , FACTOR 3 ,FACTOR 4 and FACTOR 5 are below 0.05 and when the P-value is less than 0.05 that means we reject the null hypothesis and accept the alternative hypothesis
- The information is showing that all the FACTOR 1, FACTOR 2 , FACTOR 3 ,FACTOR 4 ,FACTOR 5 . has great impact on HAPPINESS (happy variable name) .The information in the table shows that FACTOR 1 has higher value of t test is 119.697 with unstandardized 0.180 this means that FACTOR 1 is very much strong factor and FACTOR 5 is less effective compare to other factor with HAPPINESS (happy variable name) of students.

- The ANOVA table is expaling variance that is brought in HAPPINESS (happy variable name) with the help of FACTOR 1, FACTOR 2 , FACTOR 3 ,FACTOR 4 ,FACTOR 5 . The 18.939 out of 19.029 is explained by variables some portion is explained by other variables that are not included in the study project .

- The significance value is below 5% that is showing that the model is a good fit for explaing the relationship that is present among the variables .Here the significance value of our test is less then 0.05 Hence, our null hypothesis is accepted at 95% of confidence interval and we can say There is significance difference between happiness and life factor effecting it

SAURASHTRAUNIVERSITY

DEPARTMENT OF STATISTICS

RAJKOT-360005

:: QUESTIONNAIRE ::

TOPIC : "A STATISTICAL STUDY FOR MEASURINGHOW LIFE FACTORS AFFECT HAPPINESS OF SAURASHTRA UNIVERSITY CAMPUS STUDENTS"

DEPARTMENT NAME: AGE : _____

NAME : _____ GENDER : MALE / FEMALE

STATUS : MARRIED/UNMARRIED CATEGORY : _____

WEIGHT: _____ HEIGHT : _____

Q.1 What is your education qualification?

(a) ☐ Graduation degree (b) ☐ Master degree

(c) ☐ MPhil / P.Hd (d) ☐ Other

Q.2 What is your occupation?

(a) ☐ Private sectors (b) ☐ Non- Private sectors

(c) ☐ Housewife / Student (d) ☐ Other

Q.3 What is your annual family income?

(a) ☐ Less than 1-lakh (b) ☐ Between 1-5 lakh

(c) ☐ Between 5-10 lakh (d) ☐ More than 10 lakh

Sr. No	QUESTIONS	AGREE	STRONGLY AGREE	DISAGREE	STRONGLY DISAGREE
1	Are you happy at the present moment?				
2	Do you feel happiness is your own responsibility?				
3	Do you feel physically fit in yourself ?				
4	Do you think daily physical excrise increase productivity of human body?				
5	Are you getting good hospital facilities in your city?				
6	Do you feel education plays an important role in your life?				
7	Are you happy with freedom of choice you have made in your life?				
8	Do you feel committed and involved in your study?				
9	Are you happy with the quality of teaching you are getting?				
10	Are you happy with balance between student life and personal life?				
11	Are you happy with your all basic facilities?				
12	Are you happy the way people around you with all different mentality and throught?				
13	Do you believe in participating in religious activities?				
14	Do you feel happy tobe treated equally in general?				
15	Do you satisfy with whatever you have in your life?				
16	Role of dicipline with time is important in life?				
17	Are you investing your time in proper way?				
18	Do you think time is valuable in your life?				
19	Do you feel safe and secured in your city?				
20	Are you satisfied with law and order in your city?				
21	Are you happy with work of government administration in general?				

✓ REFRENCE:

- www.Google.com
- http://en.m.wikipedia.org
- www.bhutanstudies.org.bt
- www.youtube.com
- Deagonfly statistics
- Knowlage abundance
- Quantitive specialist

THANK YOU

Project Report
on

PERFORMANCE OF MUTUAL FUNDS OVER THE PAST DECADE

Project By:
DHRITI CHAVDA

Submitted By:
DHRITI CHAVDA

Guided By:
Dr. K. H. ATKOTIYA

DEPARTMENT OF STATISTICS
SAURASHTRA UNIVERSITY
RAJKOT

Department of Statistics Saurashtra University
Rajkot-360005

CERTIFICATE

This is to certify that **Ms. DHRITI CHAVDA** Student of M.Sc. Semester-4, Department of Statistics, Saurashtra University has satisfactorily completed this project work titled:

"PERFORMANCE OF MUTUAL FUNDS OVER THE PAST DECADE"

Date:

Project Guide: **Head of Department:**

ACKNOWLEDGEMENTS

I express my heartiest gratitude to my professor and guide for this project, Dr. K. H. Atkotiya for his valuable time and effort, this project could not have been completed without his input.

I am thankful to Dr. G. C. Bhimani, Ms. Disha Rank, Ms. Fenal Kachchhi, Mr. Vivek Patadiya as well as the non-teaching staff for being supportive and providing necessary guidance throughout the process.

I am thankful to the department of statistics for access of high-end facilities and resources needed for the completion of this study.

Lastly, I am grateful to my classmates and senior students of the department for maintaining an encouraging environment and for their co-operation.

DECLARATION

I hereby declare that the project titled “PERFORMANCE OF MUTUAL FUNDS OVER THE PAST DECADE” is being submitted by me to Department of Statistics, Saurashtra University, Rajkot. This project is my original work and it has not been presented earlier in this manner.

DATE:

PLACE: RAJKOT

DHRITI CHAVDA

CONTENTS

INTRODUCTION 1

OBJECTIVES 2

WHAT ARE MUTUAL FUNDS? 3

BRIEF HISTORY 4

TYPES OF MUTUAL FUNDS 5

CHOICE OF FUNDS FOR STUDY 6

DATA COLLECTION 9

INTERPRETATION: 14

TIME SERIES ANALYSIS 16

INTERPRETATION: 21

MAJOR FINDINGS 23

SOME DEFINITIONS 28

SOURCES AND REFERENCES 29

INTRODUCTION

Mutual Funds are known as one of the best investment avenues in India. Despite being available in the market, not many Indian householders have invested in Mutual Funds.

According to Economic Times, "The primary reason for not investing appears to be correlated with city size. Among respondents with a high savings rate, close to 40% of those who live in metros and Tier I cities considered such investments to be very risky, whereas 33% of those in Tier II cities said they did not know how or where to invest in such assets."

A report on Mutual Fund Investments in India published by research and analytics firm, Boston Analytics, suggests investors are holding back from putting their money into mutual funds due to their perceived high risk and a lack of information on how mutual funds work.

In this study, I shall delve into the scenario of Indian Mutual Funds in an attempt to answer questions such as how well have the Indian Mutual Funds performed over the years and what are some top performing Mutual Funds with the help of analysis and comparative methods.

OBJECTIVES

The objectives of the study are as follows:

- To study the performance of a growth scheme of selected mutual funds.

- To examine correlation and dependence between the returns and amount of AUM of select Mutual Funds.

- To compute and analyze Gross Profit Rates and Annualised Profit Rates over short, medium, and long terms of investment.

- To perform Time Series Analysis of the historical NAV of the top performing mutual fund and develop a forecast.

- To determine the best choice of Mutual Funds based on comparative analysis of historical NAVs across different durations of investment.

WHAT ARE MUTUAL FUNDS?

A mutual fund is a pool of money managed by a professional Fund Manager.

It is a trust that collects money from a number of investors who share a common investment objective and invests the same in equities, bonds, money market instruments and/or other securities.

The income / gains generated from this collective investment is distributed proportionately amongst the investors after deducting applicable expenses and levies, by calculating a scheme's "Net Asset Value" or NAV. In short, the money pooled in by a large number of investors makes up a Mutual Fund.

Some salient features of Mutual Funds are:

- Higher returns than deposits
- Managed by professionals
- Invest and withdraw any time
- Aggressive growth
- Economies of scale
- Higher level of diversification

India has one of the highest savings rate globally. This penchant for wealth creation makes it necessary for Indian investors to look beyond the traditionally favoured bank FDs and gold towards mutual funds. However, lack of awareness has made mutual funds a less preferred investment avenue.

Therefore, it compels a risk-averse investor to study deeply and understand the performance and behavior of the Mutual Funds market in India.

BRIEF HISTORY

The first modern investment funds (the precursor of today's mutual funds) were established in the Dutch Republic. In response to the financial crisis of 1772–1773, Amsterdam-based businessman Abraham (or Adriaan) van Ketwich formed a trust named Eendragt Maakt Magt ("unity creates strength"). His aim was to provide small investors with an opportunity to diversify.

Mutual funds were introduced to the United States in the 1890s. Early U.S. funds were generally closed-end funds with a fixed number of shares that often traded at prices above the portfolio net asset value. The first open-end mutual fund with redeemable shares was established on March 21, 1924 as the Massachusetts Investors Trust. (It is still in existence today and is now managed by MFS Investment Management.)

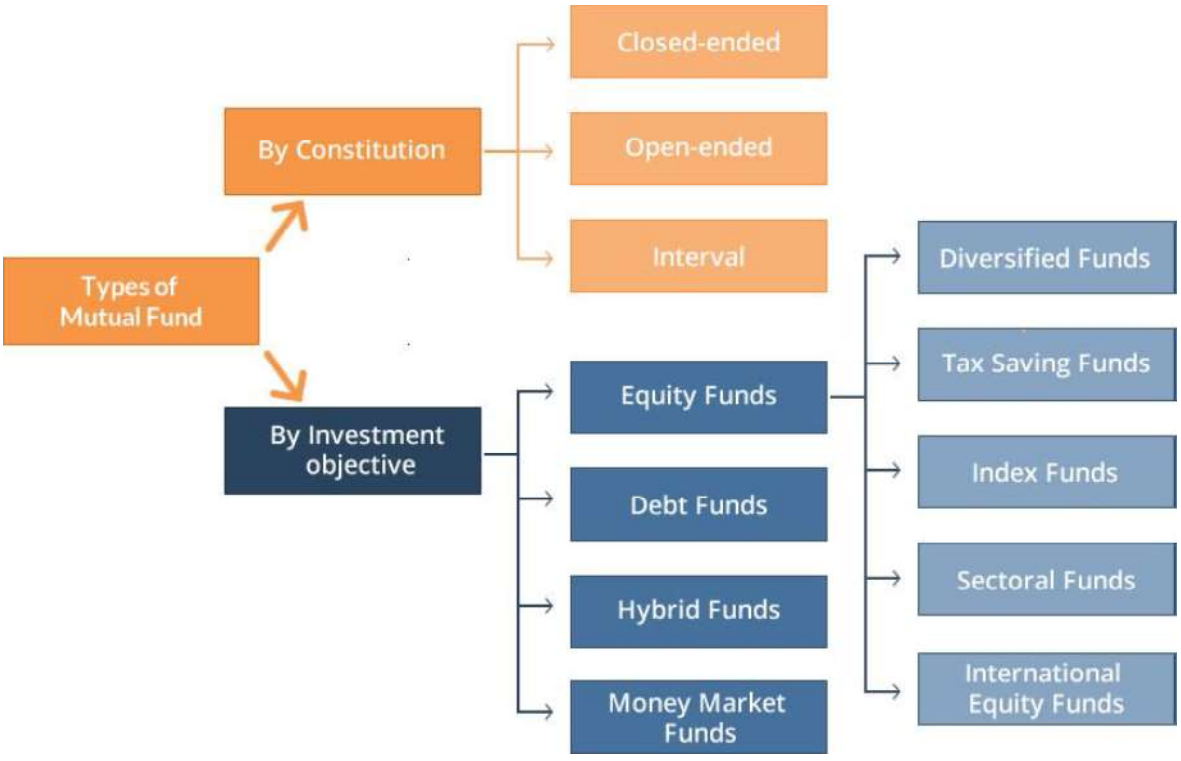
In the United States, closed-end funds remained more popular than open-end funds throughout the 1920s. In 1929, open-end funds accounted for only 5% of the industry's $27 billion in total assets.

The first introduction of a mutual fund in India occurred in 1963, when the Government of India launched Unit Trust of India (UTI).[1] UTI enjoyed a monopoly in the Indian mutual fund market until 1987, when a host of other government-controlled Indian financial companies established their own funds, including State Bank of India, Canara Bank and by Punjab National Bank.

TYPES OF MUTUAL FUNDS

Many investors diversify their portfolio by including a mix of mutual funds. Mutual funds are generally placed into one of four primary categories: equity, debt, money market, or hybrid (balanced).

Equity funds are stocks or equivalents, while debt mutual funds are government treasuries or corporate bonds. Money market funds are short-term investments in high-quality debt instruments (such as corporate AAA bonds) from government, banks or corporations.



FURTHER CLASSIFICATION:

CRISIL is a credit rating company that is a front runner of the mutual funds research services industry in India.

CRISIL Mutual Fund Ranking (CMFR) is highly popular among investors, intermediaries, and asset management companies (AMCs). According to the ranking mechanism by CRISIL, the mutual funds in India are classified into following categories:

Equity funds	**Debt Funds**
1. Large Cap funds	14. Gilt funds
2. Large & Mid Cap funds	15. Banking & PSU funds
3. Multi Cap funds	16. Credit Risk funds
4. Mid Cap funds	17. Corporate Bond funds
5. Small Cap funds	18. Dynamic Bond funds
6. Value/Contra funds	19. Medium to Long Duration funds
7. Focused funds	20. Medium Duration funds
8. Thematic - Infrastructure funds	21. Short Duration funds
9. Equity Linked Savings Schemes (ELSS)	22. Money Market funds
10. Index funds	23. Low Duration funds
Hybrid funds	24. Ultra Short Duration funds
11. Aggressive Hybrid funds	25. Liquid funds
12. Conservative Hybrid funds	
13. Arbitrage funds	

CHOICE OF FUNDS FOR STUDY

In this study, the Mutual Funds under the category of Equity Funds have been selected. Furthermore, only the funds having a CRISIL Ranking of 1 and 2 are shortlisted.Hence, 57 different Equity Mutual Funds are incorporated in this study. The classification and interpretation of CRISIL Rankings of Mutual Funds are given below:

Ranking Category	**Interpretation**
CRISIL Fund Rank 1	Very good performance
CRISIL Fund Rank 2	Good performance
CRISIL Fund Rank 3	Average performance

CRISIL Fund Rank 4	Below average performance
CRISIL Fund Rank 5	Relatively weak performance

As mentioned above, the list of funds included in this study is as follows:

Scheme Name	**Category Name**
Invesco India Contra Fund - GrowthContra Fund	Contra Fund
Kotak India EQ Contra Fund - GrowthContra Fund	
Aditya Birla Sun Life Tax Plan - Regular Plan - GrowthELSS	ELSS
Axis Long Term Equity Fund - GrowthELSS	
BNP Paribas Long Term Equity Fund - GrowthELSS	
Canara Robeco Equity Tax Saver - Regular Plan - GrowthELSS	
DSP Tax Saver Fund - Regular Plan - GrowthELSS	
Kotak Tax Saver Scheme - GrowthELSS	
LIC MF Tax Plan 1997 - GrowthELSS	
Mirae Asset Tax Saver Fund - Regular Plan - GrowthELSS	
Tata India Tax Savings Fund - Regular Plan - GrowthELSS	
Axis Focused 25 Fund - GrowthFocused Fund	Focused Fund
IIFL Focused Equity Fund - GrowthFocused Fund	
SBI Focused Equity Fund - Regular Plan - GrowthFocused Fund	
Sundaram Select Focus - GrowthFocused Fund	
Edelweiss Large and Mid Cap Fund - Regular Plan - GrowthLarge & Mid Cap Fund	Large & Mid Cap Fund
Invesco India Growth Opportunities Fund - GrowthLarge & Mid Cap Fund	
LIC MF Large & Mid Cap Fund - GrowthLarge & Mid Cap Fund	
Mirae Asset Emerging Bluechip Fund - GrowthLarge & Mid Cap Fund	
Sundaram Large and Mid Cap Fund - GrowthLarge & Mid Cap Fund	
Tata Large & Mid Cap Fund - Regular Plan - GrowthLarge & Mid Cap Fund	
Axis Bluechip Fund - GrowthLarge Cap Fund	Large Cap Fund
BNP Paribas Large Cap Fund - GrowthLarge Cap Fund	
Canara Robeco Bluechip Equity Fund - Regular Plan - GrowthLarge Cap Fund	
Edelweiss Large Cap Fund - GrowthLarge Cap Fund	
Indiabulls Bluechip Fund - Existing Plan - GrowthLarge Cap Fund	
Kotak Bluechip Fund - GrowthLarge Cap Fund	
LIC MF Large Cap Fund - GrowthLarge Cap Fund	
Mirae Asset Large Cap Fund - Regular - GrowthLarge Cap Fund	

Axis Midcap Fund - GrowthMid Cap Fund	Mid Cap Fund
DSP Midcap Fund - Regular Plan - GrowthMid Cap Fund	
Invesco India Mid Cap Fund - GrowthMid Cap Fund	
Kotak Emerging Equity - GrowthMid Cap Fund	
Nippon India Growth Fund - GrowthMid Cap Fund	
Tata Mid Cap Growth Fund - Regular Plan - GrowthMid Cap Fund	
Canara Robeco Equity Diversified - Regular Plan - GrowthMulti Cap Fund	Multi Cap Fund
DSP Equity Fund - Regular Plan - GrowthMulti Cap Fund	
Edelweiss Multi-Cap Fund - Regular Plan - GrowthMulti Cap Fund	
JM Multicap Fund - GrowthMulti Cap Fund	
Kotak Standard Multicap Fund - GrowthMulti Cap Fund	
LIC MF Multicap Fund - GrowthMulti Cap Fund	
Union Multi Cap Fund - GrowthMulti Cap Fund	
UTI Equity Fund - GrowthMulti Cap Fund	
Aditya Birla Sun Life Digital India Fund - Regular Plan - GrowthSectoral/Thematic	Sectoral/Thematic
Aditya Birla Sun Life India GenNext Fund - Regular Plan - GrowthSectoral/Thematic	
DSP India T.I.G.E.R. Fund - Regular Plan - GrowthSectoral/Thematic	
DSP Natural Resources and New Energy Fund - Regular Plan - GrowthSectoral/Thematic	
Franklin Build India Fund - GrowthSectoral/Thematic	
L&T Business Cycles Fund - GrowthSectoral/Thematic	
SBI Infrastructure Fund - GrowthSectoral/Thematic	
Sundaram Rural and Consumption Fund - GrowthSectoral/Thematic	
UTI Infrastructure Fund - GrowthSectoral/Thematic	
Axis Small Cap Fund - GrowthSmall Cap Fund	Small Cap Fund
Kotak Small Cap Fund - GrowthSmall Cap Fund	
JM Value Fund - GrowthValue Fund	Value Fund
Nippon India Value Fund - GrowthValue Fund	
UTI Value Opportunities Fund - GrowthValue Fund	

DATA COLLECTION

The data used in this study is Secondary Data. The historical NAV of the funds included in this study have been obtained from the website of the Association of Mutual Funds In India (AMFI).

CALCULATION OF RETURNS

To examine the overall performance of selected mutual funds, it is important to calculate annualized percentage returns of the funds using the historical NAV of each fund starting from January 2010 to Janurary 2020.

AXIS FOCUSED 25 FUND-GROWTH							
Date	**Units**	**NAV**	**Value**	**1 Yr Gain**	**3 Yrs Gain**	**5 Yrs Gain**	**10 Yrs Gain**
1/31/2013	8,305.65	12.040	**100,000**				
1/31/2014	8,305.65	11.620	96,512	-3.49%			
1/30/2015	8,305.65	17.940	149,003	54.39%			
1/29/2016	8,305.65	16.610	137,957	-7.41%			
1/31/2017	8,305.65	19.320	160,465	16.32%			
1/31/2018	8,305.65	26.610	221,013	37.73%			
1/31/2019	8,305.65	25.190	209,219	-5.34%			
1/31/2020	8,305.65	31.410	260,880	**25.04%**	**47.79%**	**59.45%**	**~**
Annualized Rate				**25.04%**	**15.93%**	**11.89%**	**~**

METHOD OF CALCULATION:

For the dates set at an interval of one year, the NAV of the fund is obtained through VLOOKUP function in MS Excel.

In above example, for Axis Focused 25 fund, the fund was established in July 2012, therefore required date I the month of January is only available 2013 onwards.

Now suppose,

Amount of Investment = Rs. 100000

Then Number of Units = Amount/NAV

Assuming that the number of units remains the same during the entire duration of 10 years (no further units are purchased and no units are withdrawn),

Value of Investment = No. of Units * NAV of that date in consequent years

So, 1 Year Gain(%) (on 31 Jan 2014) = 100* $\frac{\text{Value on 2014 – Value on 2013}}{\text{Value on 2013}}$

Similarly,

5 Year Gain(%) (on 31 Jan 2020) =100* $\frac{\text{Value on 2020 – Value on 2015}}{\text{Value on 2015}}$

And so on.

Annualised Rate for 5 Years Gain = $\frac{\text{Nominal Rate}}{5}$

And so on.

Computing the growth rates (% Gain) for 6 months, 1 Year, 3 Years, 5 Years and 10 Years for 57 funds in the same manner, I have organized the results obtained for further analysis and comparison.

The returns in the table are annualized percentage returns. The returns are colour coded to indicate comparison between high and low return within the range of returns of the same duration.

The colours ranging from Blue to Green to Red indicate the spectrum of High to Moderate to Low Returns in that order.

Scheme Name	6M	1Y	3Y	5Y	10Y
Aditya Birla Sun Life Digital India Fund -	10.98%	11.06%	17.94%	9.88%	12.30%
Aditya Birla Sun Life India GenNext Fund	18.00%	21.22%	12.86%	11.72%	17.32%
Aditya Birla Sun Life Tax Plan - Regular P	15.94%	9.06%	9.75%	7.92%	12.94%
Axis Bluechip Fund - GrowthLarge Cap F	15.15%	22.71%	17.75%	10.57%	12.94%
Axis Focused 25 Fund - GrowthFocused	17.84%	25.04%	15.93%	11.89%	-
Axis Long Term Equity Fund - GrowthELS	17.89%	24.77%	15.59%	10.55%	17.63%
Axis Midcap Fund - GrowthMid Cap Fun	21.98%	23.73%	17.09%	10.93%	-
Axis Small Cap Fund - GrowthSmall Cap	24.05%	34.85%	14.82%	12.56%	-
BNP Paribas Large Cap Fund - GrowthLa	13.24%	21.07%	11.60%	7.79%	12.93%
BNP Paribas Long Term Equity Fund - Gr	15.14%	20.56%	11.01%	7.48%	13.28%
Canara Robeco Bluechip Equity Fund - R	18.49%	21.50%	13.39%	9.29%	-
Canara Robeco Equity Diversified - Regu	19.28%	18.82%	14.03%	8.89%	12.48%
Canara Robeco Equity Tax Saver - Regula	20.76%	20.80%	13.85%	8.90%	13.09%
DSP Equity Fund - Regular Plan - Growth	20.96%	27.45%	12.90%	9.72%	12.61%
DSP India T.I.G.E.R. Fund - Regular Plan -	8.34%	11.79%	4.08%	4.93%	7.89%
DSP Midcap Fund - Regular Plan - Growt	21.38%	21.87%	9.45%	11.20%	15.68%
DSP Natural Resources and New Energy	8.57%	3.60%	0.68%	10.34%	9.30%
DSP Tax Saver Fund - Regular Plan - Grov	12.59%	17.58%	9.33%	9.91%	13.66%
Edelweiss Large and Mid Cap Fund - Reg	16.74%	16.71%	11.66%	8.02%	12.02%
Edelweiss Large Cap Fund - GrowthLarge	11.81%	14.19%	11.40%	7.83%	11.99%
Edelweiss Multi-Cap Fund - Regular Plan	12.53%	12.14%	11.66%	8.94%	-
Franklin Build India Fund - GrowthSecto	7.01%	6.27%	4.48%	6.82%	13.91%
IIFL Focused Equity Fund - GrowthFocus	24.62%	35.93%	13.61%	11.94%	-
Indiabulls Bluechip Fund - Existing Plan -	11.19%	12.88%	9.60%	7.87%	-
Invesco India Contra Fund - GrowthCont	16.46%	14.77%	12.20%	10.05%	13.45%
Invesco India Growth Opportunities Fun	14.38%	16.41%	12.65%	9.37%	13.07%
Invesco India Mid Cap Fund - GrowthMi	24.44%	20.81%	11.44%	9.43%	16.78%
JM Multicap Fund - GrowthMulti Cap Fu	15.66%	20.96%	10.85%	9.79%	9.97%
JM Value Fund - GrowthValue Fund	18.17%	16.28%	8.54%	9.90%	7.14%
Kotak Bluechip Fund - GrowthLarge Cap	13.58%	15.19%	9.24%	7.22%	10.88%
Kotak Emerging Equity - GrowthMid Cap	21.82%	22.07%	9.20%	10.99%	15.57%
Kotak India EQ Contra Fund - GrowthCo	12.36%	12.44%	11.96%	8.60%	11.47%
Kotak Small Cap Fund - GrowthSmall Cap	24.89%	22.09%	6.42%	8.93%	14.37%
Kotak Standard Multicap Fund - Growth	12.82%	15.73%	10.49%	9.96%	14.12%
Kotak Tax Saver Scheme - GrowthELSS	15.61%	18.20%	9.93%	8.74%	11.85%
L&T Business Cycles Fund - GrowthSecto	16.19%	18.40%	5.57%	5.64%	-

LIC MF Large & Mid Cap Fund - GrowthL	18.10%	21.59%	11.72%	-	-
LIC MF Large Cap Fund - GrowthLarge Ca	16.48%	21.41%	10.95%	6.94%	10.14%
LIC MF Multicap Fund - GrowthMulti Cap	12.70%	17.16%	7.09%	3.68%	8.16%
LIC MF Tax Plan 1997 - GrowthELSS	16.71%	20.45%	12.30%	7.95%	11.25%
Mirae Asset Emerging Bluechip Fund - G	16.48%	20.73%	13.16%	14.97%	-
Mirae Asset Large Cap Fund - Regular - G	10.94%	12.78%	11.41%	10.24%	14.84%
Mirae Asset Tax Saver Fund - Regular Pla	13.47%	16.51%	13.70%	-	-
Nippon India Growth Fund - GrowthMid	19.78%	19.66%	9.45%	8.62%	11.55%
Nippon India Value Fund - GrowthValue	12.98%	12.09%	8.89%	7.23%	10.93%
SBI Focused Equity Fund - Regular Plan -	20.56%	24.95%	15.87%	11.80%	17.40%
SBI Infrastructure Fund - GrowthSectora	10.65%	16.72%	6.17%	6.56%	4.94%
Sundaram Large and Mid Cap Fund - Gro	16.83%	17.55%	12.02%	10.57%	11.61%
Sundaram Rural and Consumption Fund	17.87%	14.47%	7.76%	11.50%	13.38%
Sundaram Select Focus - GrowthFocused	12.57%	17.94%	13.21%	8.18%	9.51%
Tata India Tax Savings Fund - Regular Pla	12.66%	14.79%	10.78%	10.11%	-
Tata Large & Mid Cap Fund - Regular Pla	12.33%	18.15%	9.48%	7.52%	11.35%
Tata Mid Cap Growth Fund - Regular Pla	19.17%	19.08%	9.69%	8.51%	15.19%
Union Multi Cap Fund - GrowthMulti Cap	14.50%	16.17%	8.98%	4.58%	-
UTI Equity Fund - GrowthMulti Cap Fund	21.13%	19.50%	12.89%	9.01%	13.22%
UTI Infrastructure Fund - GrowthSectora	13.51%	15.30%	4.86%	4.35%	5.04%
UTI Value Opportunities Fund - GrowthV	16.69%	15.34%	9.12%	5.47%	11.27%

RELATION BETWEEN AUM AND RETURNS:

Assets under management (AUM) is the total market value of the investments that a person or entity manages on behalf of clients. Assets under management definitions and formulas vary by company.

In the calculation of AUM, some financial institutions include bank deposits, mutual funds, and cash in their calculations. Others limit it to funds under discretionary management, where the investor assigns authority to the company to trade on his behalf.

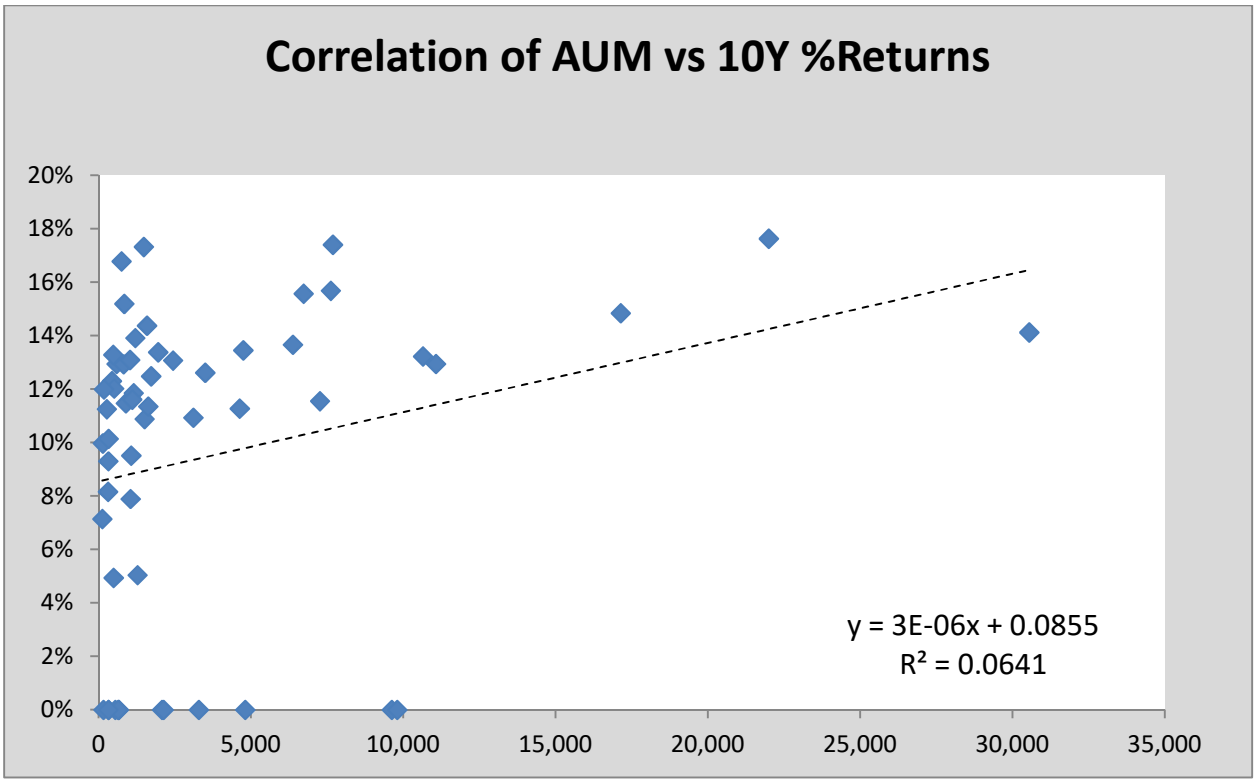
Importance of AUM:

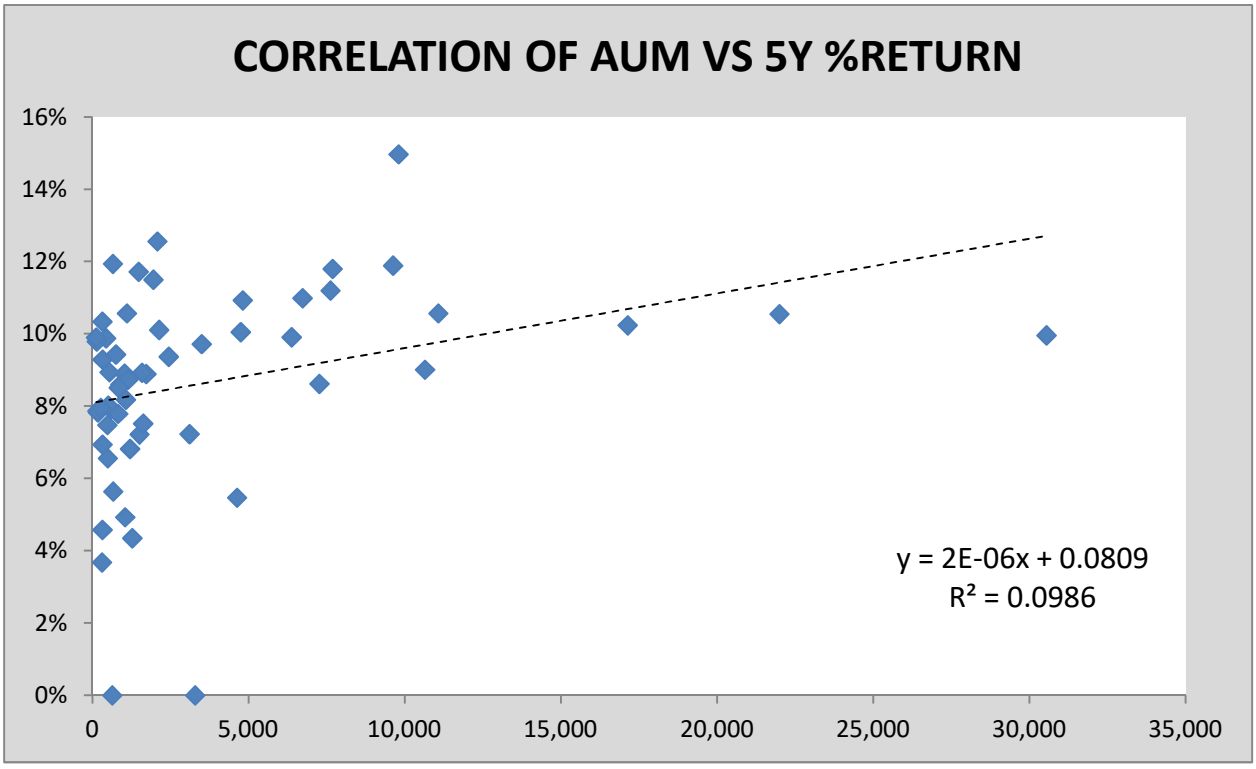
Firm management monitors the AUM as it relates to investment strategy and investor product flows in determining the strength of the company. Investment companies also use AUM as a marketing tool to attract new investors. AUM can help investors get an indication of the size of a company's operations relative to its competitors.

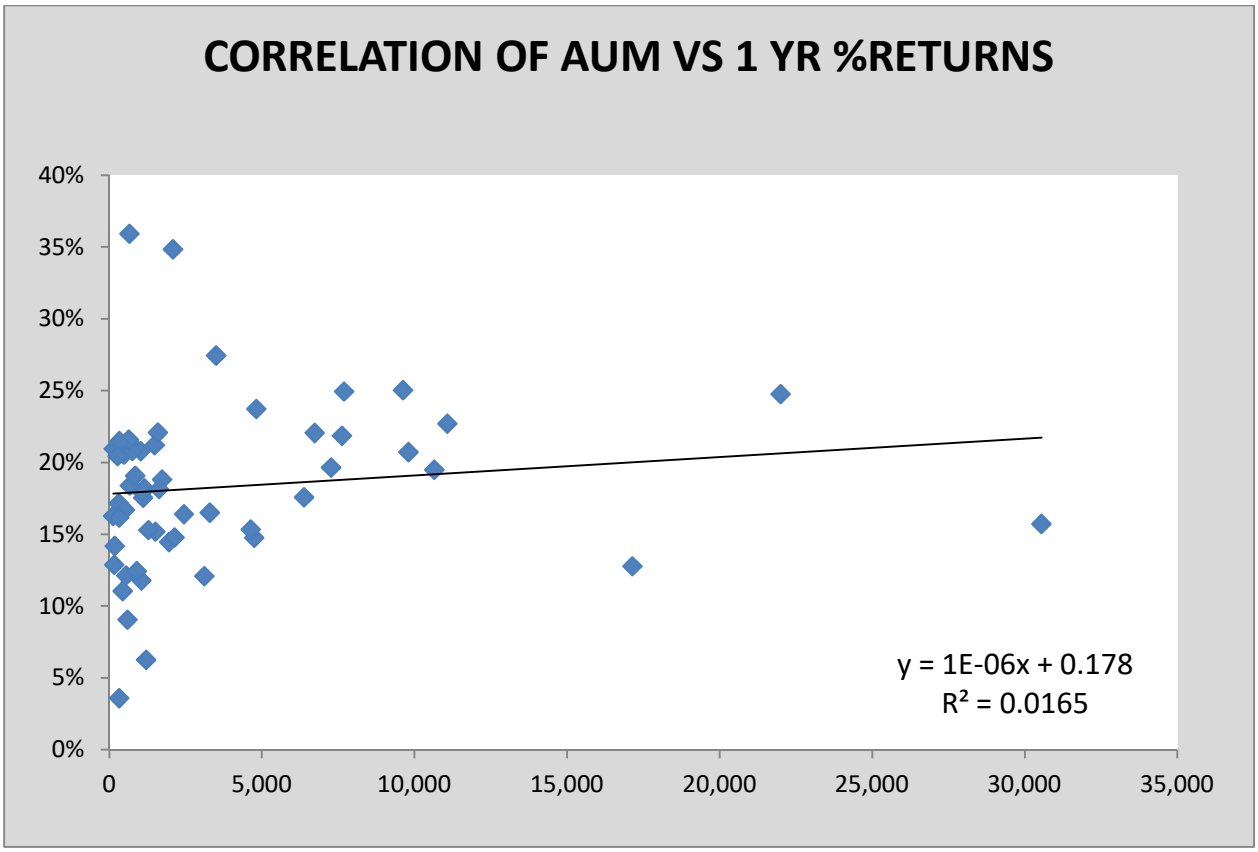
There is no direct relation between the total amount held by the fund and the return it produces, as the returns may depend upon how diversified the fund is, among various other factors.

However, I have plotted a scatter diagram of AUM vs Returns to determine whether funds with a higher AUM actually perform better, as it allows for a higher degree of diversification.

I have also fitted a trend line using Linear Regression Model and obtained corresponding Co-efficient of Determination (R^2).


Correlation of AUM vs 10Y %Returns
20%
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
0
5,000
10,000
15,000
20,000
25,000
30,000
35,000
y = 3E-06x + 0.0855
R² = 0.0641


CORRELATION OF AUM VS 5Y %RETURN
16%
14%
12%
10%
8%
6%
4%
2%
0%
0
5,000
10,000
15,000
20,000
25,000
30,000
35,000
y = 2E-06x + 0.0809
R² = 0.0986



INTERPRETATION:

Linear regression calculates an equation that minimizes the distance between the fitted line and all of the data points.

In general, a model fits the data well if the differences between the observed values and the model's predicted values are small and unbiased.

Here, through visual observation, we can infer that there is a weakly positive correlation between the AUM of a fund and the Returns it produces.

To quantify the above statement, correlation co-efficients of above shown plots are as follows:

Thus, it can be said that an investor cannot completely rule out the AUM of a fund in the judgement of its performance, especially in the long term.

Furthermore, the co-efficient of determination takes a value of less than 2% for all three durations of return calculation.

The more variance that is accounted for by the regression model the closer the data points will fall to the fitted regression line. Theoretically, if a model could explain 100% of the variance, the fitted values would always equal the observed values and, therefore, all the data points would fall on the fitted regression line.

This indicates that the model explains very little of the variability of the response data around its mean.

TIME SERIES ANALYSIS

A *univariate time series* is a sequence of observations of a single process taken
at a sequence of different times. Such a series can in general be written as:
$\{x(ti\ ) : i = 1,2,3,\ldots,n\}$

For instance, a sequence of daily closing prices of a given share constitutes a time series, as does a sequence of monthly inflation figures.

The purposes of a practical time series analysis may be summarised as:

- description of the data
- construction of a model which fits the data
- forecasting future values of the process
- deciding whether the process is out of control, requiring action
- for vector time series, investigating connections between two or more observed processes with the aim of using values of some of the processes to predict those of the others

In this study, the daily NAVs corresponding to dates ranging from January 2010 to January 2020 constitute a time series process.

Out of 57 schemes under consideration in this study,
Axis Long Term Equity Fund (ELSS) has shown the highest return (**17.63%**) in the long term investment duration of 10 years.

Therefore, I have performed a Time Series Analysis of the NAVs of this fund.

NAV corresponding to each date ranging from January 2010 upto January 2020 has been incorporated in this analysis. Accounting for weekend days and national holidays for which NAV are not available, there are a total of 2483 data points in the timeline of NAVs of this fund.

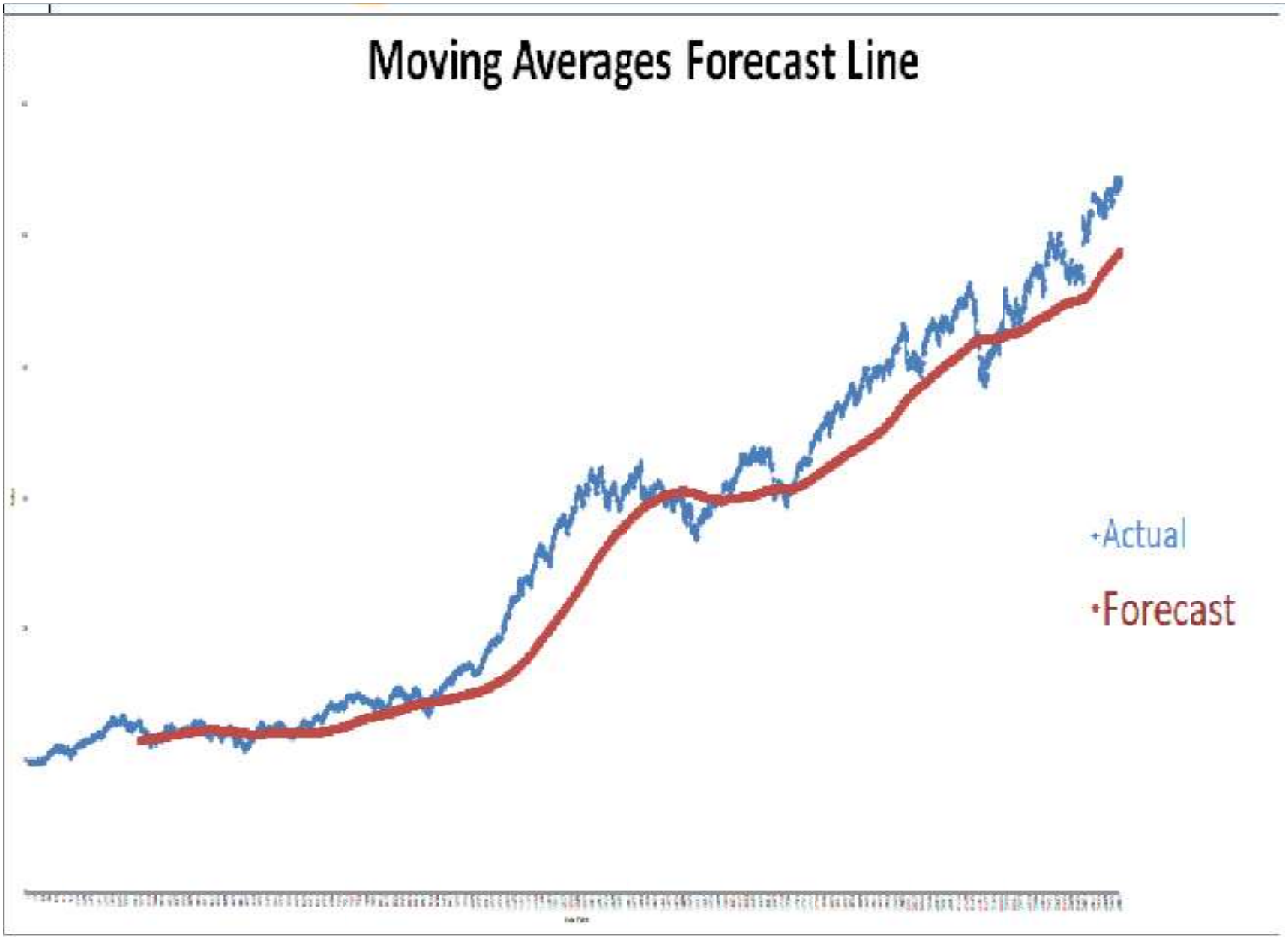
METHODOLOGY:

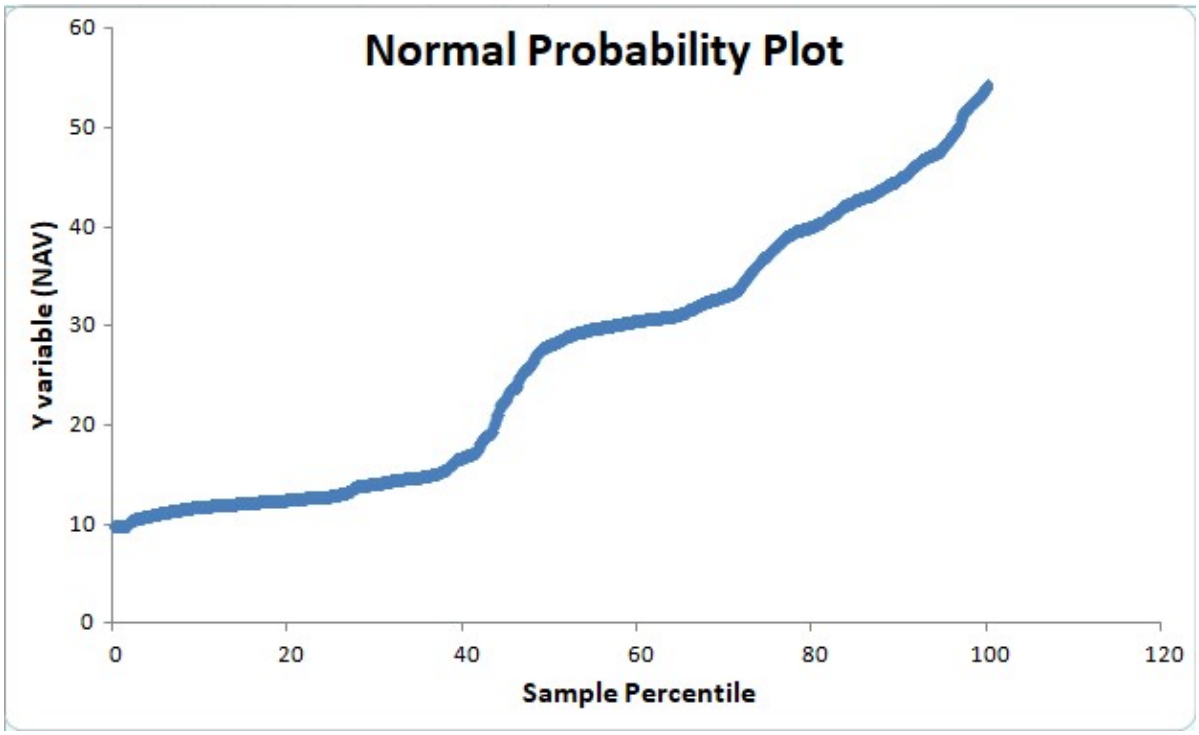
1. MOVING AVERAGES: To obtain the forecast line for a long-term trend, the method of moving averages is used, with a period of 250 data points. This method gives a smoother curve by lessening the influence of the fluctuations that pull the annual figures away from the general trend.

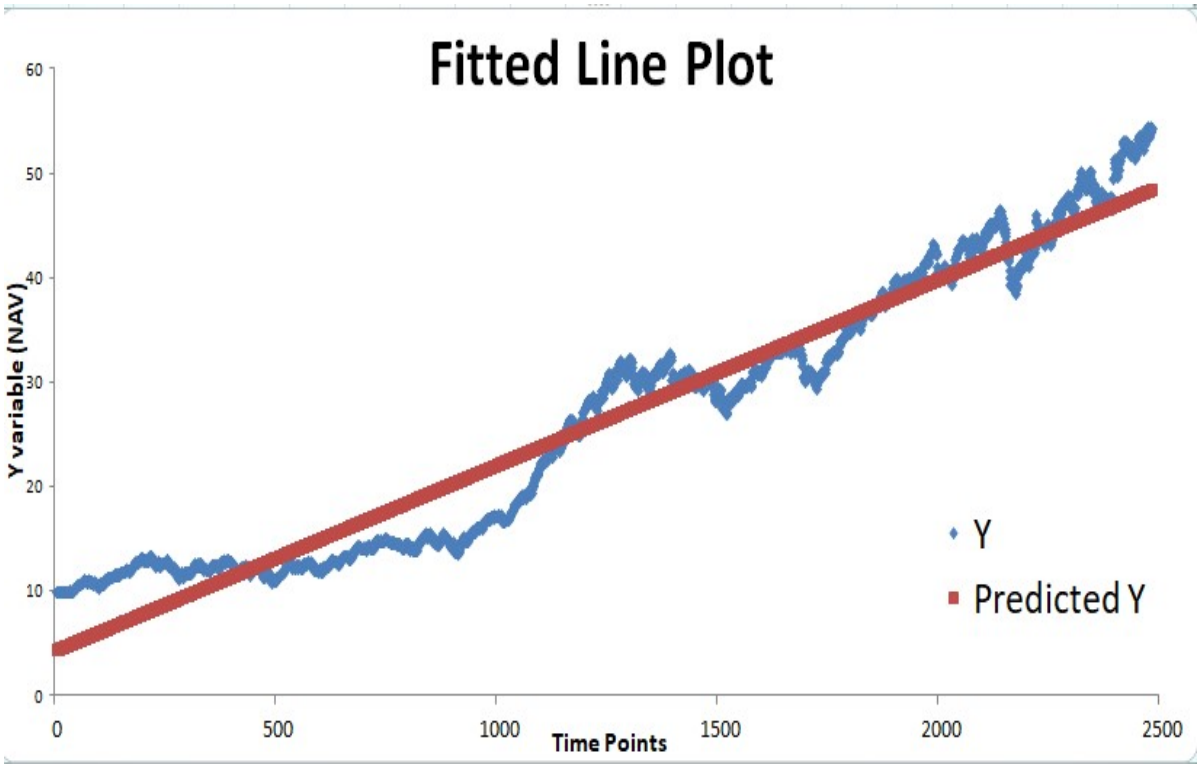
2. FORECASTING: In order to get the smallest possible sum of squares and draw a line that comes closest to the data, Linear Regression Method is used. This method allows to understand how the dependent variable(NAV) changes when the independent variable(Time) progresses. The Regression Method also estimates the co-efficients of the regression line which can be used to extrapolate the historical data to predict the value that the dependent variable(NAV) will take in some future date.

These methods are used in analysis through Microsoft Excel and its Data Analysis Toolpak Add-In.

Plot of NAV at each date across 10 years vs time points, in comparison with smoothened plot of moving averages.




Normal Probability Plot
Y variable (NAV)
Sample Percentile
0
10
20
30
40
50
60
0
20
40
60
80
100
120


Fitted Line Plot
Y variable (NAV)
Time Points
Y
Predicted Y
0
10
20
30
40
50
60
0
500
1000
1500
2000
2500

OUTPUT:

Regression Statistics	
Multiple R	0.970912916
R Square	0.942671891
Adjusted R Square	0.942648775
Standard Error	3.138974499
Observations	2482

	Coefficients	*Standard Error*
Intercept	4.457803387	0.126051536
Slope	0.017758165	8.79378E-05

Therefore, Equation of Regression Line:

Y = 0.0178*X + 4.4578

ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	401809.50	401809.50	40779.76	2.13E-15
Residual	2480	24435.84	9.85		
Total	2481	426245.34			

INTERPRETATION:

1. **Multiple R.** This is the correlation coefficient which determines how strong the linear relationship is. Here, the value is 0.97 which is very close to 1, hence the linear relationship is strong.
2. **R square** is the Coefficient of Determination. It is the measure of how many points fall on the regression line. Here, 94% of the variation of y-values (NAV) around the mean are explained by the x-values. In other words, 94% of the values fit the model.
3. **Adjusted R square** adjusts for the number of terms in a model when there is more than one x variable. This measure is not required as this is a univariate time series.
4. **Standard Error of the regression** is an estimate of the standard deviation of the error μ. It indicates the precision of the regression coefficient.
5. **Observations** is simply the number of observations in the sample, which is 2483.
6. **SS** = Sum of Squares.
7. **Regression MS** = Regression SS /Regression degrees of freedom.
8. **Residual MS** = mean squared error (Residual SS / Residual degrees of freedom).
9. **F**: Overall F test statistic for the null hypothesis.
10. **Significance F**: The significance associated P-Value.
11. **Normal Probability Plot**: shows whether sample is normally distributed. Here, it is not.

FORECAST USING EQUATION OF LINE:

slope	**0.017758**
intercept	**4.457803**

Y = 0.0178 * t + 4.4578

t	Date	NAV (Y)
2483	1-Feb-20	48.55
2484	2-Feb-20	48.57
2485	3-Feb-20	48.59
2486	4-Feb-20	48.60
2487	5-Feb-20	48.62
2488	6-Feb-20	48.64
2489	7-Feb-20	48.66
	And so on……	

Here, the equation of line obtained by fitting a linear regression model to the time series can be used to compute the values of the response variable Y (NAV) for future values of the independent variable X (time).

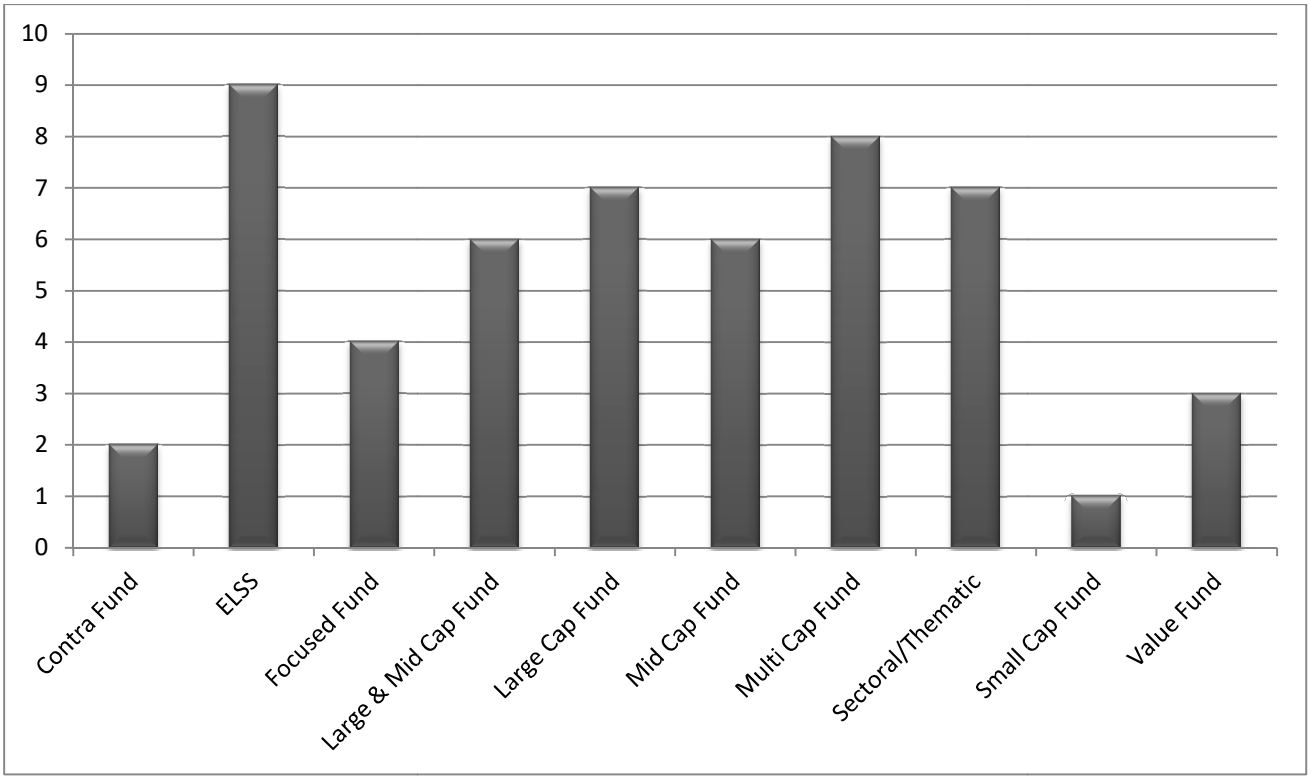
Thus, by putting the next time point value X=2483 in the equation, we get a prediction of NAV of this fund for the dates of February month, following the end of time series data at 31 January.

In this way, the fitted regression model can be used for forecasting and obtaining prediction of the NAV in addition to the trend lines visible in the graphical diagrams which clearly show that the NAVs have increased over time and a long term duration of investment is quite suitable for investing in a mutual fund.

MAJOR FINDINGS

1. **Best Category of Funds:**
   In the vast horizon of hundreds of Mutual Funds operating in the Indian Financial Market, 57 Equity Funds are included in this study as per highest ranking awarded by the reputed credit rating agency CRISIL.
   In this set of funds, the category comprising of the largest number of high-performance funds are ELSS funds as well as Sectoral/Thematic funds.

   These two categories of funds make up almost one-third of the number of funds in this selection of top performing equity funds.



2. **High Return in Short Term Investment:**
A short term refers to a duration of less than or equal to 12 months.
In this case, the growth rates for the duration of 6 Months and 1 Year show the following results:

In the last 6 months,
3 Funds have given Very High Returns
9 Funds have given High Returns

IIFL Focused Equity Fund - GrowthFocused Fund	24.62%
Invesco India Mid Cap Fund - GrowthMid Cap Fund	24.44%
Axis Small Cap Fund - GrowthSmall Cap Fund	24.05%

Axis Midcap Fund - GrowthMid Cap Fund	21.98%
Kotak Emerging Equity - GrowthMid Cap Fund	21.82%
DSP Midcap Fund - Regular Plan - GrowthMid Cap Fund	21.38%
UTI Equity Fund - GrowthMulti Cap Fund	21.13%
DSP Equity Fund - Regular Plan - GrowthMulti Cap Fund	20.96%
Canara Robeco Equity Tax Saver - Regular Plan - GrowthELSS	20.76%
SBI Focused Equity Fund - Regular Plan - GrowthFocused Fund	20.56%
Nippon India Growth Fund - GrowthMid Cap Fund	19.78%
Tata Mid Cap Growth Fund - Regular Plan - GrowthMid Cap Fund	19.17%

In the last 1 Year,
2 Funds have given Very High Returns
4 Funds have given High Returns

IIFL Focused Equity Fund - GrowthFocused Fund	35.93%
Axis Small Cap Fund - GrowthSmall Cap Fund	34.85%

DSP Equity Fund - Regular Plan - GrowthMulti Cap Fund	27.45%
Axis Focused 25 Fund - GrowthFocused Fund	25.04%
SBI Focused Equity Fund - Regular Plan - GrowthFocused Fund	24.95%
Axis Long Term Equity Fund - GrowthELSS	24.77%

3.High Return in Medium Term Investment:

A medium term refers to a duration of more than 12 months but less than 8-10 years.
In this case, the growth rates for the duration of 3 and 5 Years show the following results:

In the last 3 Years,
3 Funds have given Very High Returns
3 Funds have given High Returns

Aditya Birla Sun Life Digital India Fund - Regular Plan - GrowthSectoral/Thematic	17.94%
Axis Bluechip Fund - GrowthLarge Cap Fund	17.75%
Axis Midcap Fund - GrowthMid Cap Fund	17.09%

Axis Focused 25 Fund - GrowthFocused Fund	15.93%
SBI Focused Equity Fund - Regular Plan - GrowthFocused Fund	15.87%
Axis Long Term Equity Fund - GrowthELSS	15.59%

In the last 5 Years,
Only 1 Fund has given Very High Returns
6 Funds have given High Returns

Mirae Asset Emerging Bluechip Fund - GrowthLarge & Mid Cap Fund	14.97%

Aditya Birla Sun Life India GenNext Fund - Regular Plan - GrowthSectoral/Thematic	11.72%
Axis Focused 25 Fund - GrowthFocused Fund	11.89%
Axis Small Cap Fund - GrowthSmall Cap Fund	12.56%
IIFL Focused Equity Fund - GrowthFocused Fund	11.94%
SBI Focused Equity Fund - Regular Plan - GrowthFocused Fund	11.80%
Sundaram Rural and Consumption Fund - GrowthSectoral/Thematic	11.50%

4. High Return in Long Term Investment:

A long term refers to a duration of 8-10 years or more.

In this case, the growth rates for the duration of 10 Years show the following results:

In the last 10 Years,
3 Funds have given Very High Returns
4 Funds have given High Returns

Aditya Birla Sun Life India GenNext Fund - Regular Plan - GrowthSectoral/Thematic	17.32%
Axis Long Term Equity Fund - GrowthELSS	17.63%
SBI Focused Equity Fund - Regular Plan - GrowthFocused Fund	17.40%

DSP Midcap Fund - Regular Plan - GrowthMid Cap Fund	15.68%
Invesco India Mid Cap Fund - GrowthMid Cap Fund	16.78%
Kotak Emerging Equity - GrowthMid Cap Fund	15.57%
Tata Mid Cap Growth Fund - Regular Plan - GrowthMid Cap Fund	15.19%

6. Consistently High or Increasing Returns: The funds that have performed consistently well in short, medium as well as long term are:

- Aditya Birla Sun Life India GenNext Fund - Regular Plan-Growth - Sectoral/Thematic
- Axis Focused 25 Fund - GrowthFocused Fund
- Axis Long Term Equity Fund - GrowthELSS
- Axis Midcap Fund - GrowthMid Cap Fund
- Axis Small Cap Fund - GrowthSmall Cap Fund
- Mirae Asset Emerging Bluechip Fund - GrowthLarge & Mid Cap Fund
- SBI Focused Equity Fund - Regular Plan - GrowthFocused Fund

7. Consistently Low Returns: Despite belonging to the highest CRISIL ranks among all mutual funds in India, the funds that have consistently shown a low performance in comparison are:

- DSP India T.I.G.E.R. Fund - Regular Plan – Growth - Sectoral/Thematic
- DSP Natural Resources and New Energy Fund - Regular Plan – Growth - Sectoral/Thematic
- Franklin Build India Fund - GrowthSectoral/Thematic
- SBI Infrastructure Fund - GrowthSectoral/Thematic
- UTI Infrastructure Fund - GrowthSectoral/Thematic

SOME DEFINITIONS

Large Cap funds invest mostly in big companies. Funds identify these companies by their market capitalisation. These funds are likely to offer modest returns as they carry relatively less risk.

Equity Linked Savings Schemes (ELSS) are suitable for investors looking to save taxes under Section 80 C of the Income Tax Act. Investments in these funds qualify fora tax deduction of up to Rs 1.5 lakh. They come with a mandatory lock-in period of three years.

Midcap funds invest mostly in medium-sized companies. Investors with high risk appetite should bet on these funds.

Smallcap funds invest in small companies. These companies can be extremely risky, as there will be very little information about them available in the public domain. However, they can also offer phenomenal return. They are suitable only for investors with a very high risk appetite.

Sector/Thematic funds invest mostly in a particular sector or along the lines of a defined theme. Since the investments are concentrated on a single sector or theme, sector funds are considered extremely risky.

SOURCES AND REFERENCES

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A PROJECT REPORT ON

"STATISTICAL ANALYSIS AND FORECASTING OF CROP PRODUCTION IN INDIA"

A project report submitted to

Department of Statistics

Saurashtra University,

Rajkot .

For the partial fulfillment of the degree

Masters of Science

In Statistics

Submitted by

Mr .Jadhav Ajay Vilas

Under the Guidancence of

Miss . Fenal kachchhi

DEPARTMENT OF STATISTICS

Saurashtra University Rajkot,

2018-2019

Department of Statistics

Saurashtra University

Rajkot 360005

CERTIFICATE

This is to certify that Students of M.Sc. Semester-4, Department of Statistics, Saurashtra University has satisfactorily completed her project

work entitled

"Statistical Analysis & forecasting of crop production in india".

1.Ajay vilas jadhav.

Place: Rajkot

Date:

Project guide Head of department

Acknowledgement

It gives me a pleasure to express my sincere thanks with deep sense

to Dr.G.C.Bhimani Head of department statistics, Dr.Kishor Atkotiy, Dr.Annasaheb Suryawanshi, Miss.Fenal Kachchhi, Miss.Disha rank for their inspiring guidance, constant encouragement, kind co-operation.

I am grateful to him for providing me the necessary facilities.
I am very much thankful to all research students for their guidance.
Also I would like to thank all non-teaching staff of our department for their help and co-operation.
I thank all my friends for their very well support.
I am indebted to my parents for their encouragement and patience throughout my study.

Your's Sincerely
Mr. Jadhav Ajay Vilas

DECLARATION

I hereby declaration that the project entitled “STATISTICAL ANALYSIS AND FORCASTING OF CROP PRODUCTION IN INDIA” is being submitted by me to Department of statistics, Saurashtra University, Rajkot. This project is my original work and it has been presented earlier in this manner.

DATE:-
PLACE:- Rajkot

Mr. Jadhav Ajay Vilas

Contents

1. Introduction

2. Objectives

3. Method of Data collection

4. Statistical tools

5. Data Analysis

6. Major Findings

7. Limitations and Future Scope

8. References

Introduction:

The project involves the time series analysis of various crops in states. Time series analysis provides tools for selecting a model that can be used to forecast of future events. Modeling the time series is a statistical problem. Forecasts are used in computational procedures to estimate the parameters of a model being used to allocate limited resources.

Human life is surrounded by many things. Due to large population, there is chaos in each field. In this risky life everyone wants to be secured future. This happens only after very well planning and understanding.

In this analysis our first assumption about the series is, it is stationary series and it has certain stochastic behavior. Stationary series means, the series has constant mean over the time period, the auto covariance between the observations dependent on only lag between the observations and not on time, it has finite second order moment. One characterizing property of the stationary series is that the auto covariance at lag zero is higher than any other two different observations.

An agricultural commodity can be defined as grain, pulses, fruit, timber or any other items produced from agricultural activities.

Time series models have been the basis for any study of a behavior of process or metrics over a period of time. Time series models have been found one of the most effective methods of forecasting.

Objectives:-

1) To study the different crop production in all states.

2) To model & forecast the production of pulses in Karnataka state.

3) To model & forecast the production of cotton in Maharashtra state.

4) To study & forecast the production of coarse cereals in Arunachal Pradesh state.

5) To study & forecast the production of wheat in Bihar state.

Method of data collection:-

In order to achieve the above objective we collect the data as Described above,

a) A collection of Secondary data:

- This data is collected from website http://www.rbi.org.in starts from 1995 to 2014.The data consist of state wise production of food grain & major non food grain crops.

List of Abbreviations:

- TS – Time Series
- ACF – Autocorrelation Function
- PACF – Partial Autocorrelation Function
- AR – Autoregressive Model
- MA – Moving Average Model
- ARMA – Autoregressive Moving Average Mode
- ARIMA - Autoregressive Integrated Moving Average Model

Statistical techniques:

- Tabulation & Graphical representation.
- The main statistical tool used is Time Series Analysis

Statistical Packages used:

1) SPSS software
2) Microsoft Excel

Name of Commodity and pictures

Wheat

Coarse cereal

Rice

Food grain

Pulses

Sugarcane

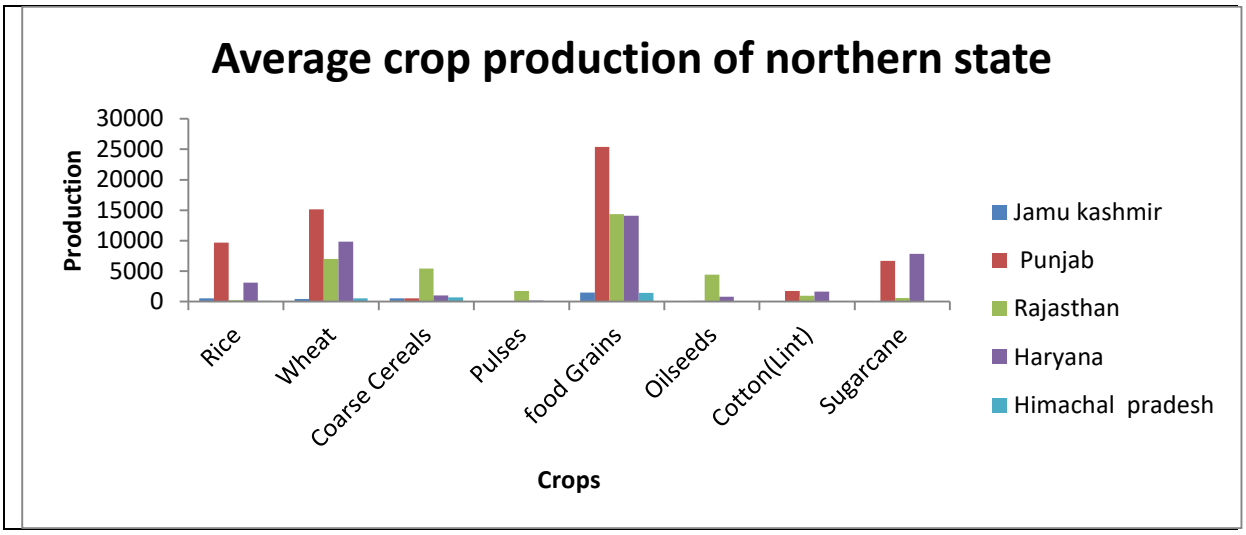
Crop production regional divisions of India as graphically described below :

GRAPHICAL REPRESENTATION:

Objective:-Which crop is favorable in division of India

1] AVERAGE PRODUCTION OF NORTHERN STATE:

States	Rice	Wheat	Coarse Cereals	Pulses	food Grains	Oilseeds
Jamu Kashmir	519.615	420.21	522.405	15.04	1477.26	48.185
Punjab	9689.4	15157.23	514.61	43.97	25405.21	115.585
Rajasthan	206.575	7007.995	5413.875	1720.985	14349.43	4427.715
Haryana	3095.2	9844.995	994.77	171.725	14106.69	796.145
Himachal Pradesh	118.805	560.1	708.67	24.065	1411.63	8.135

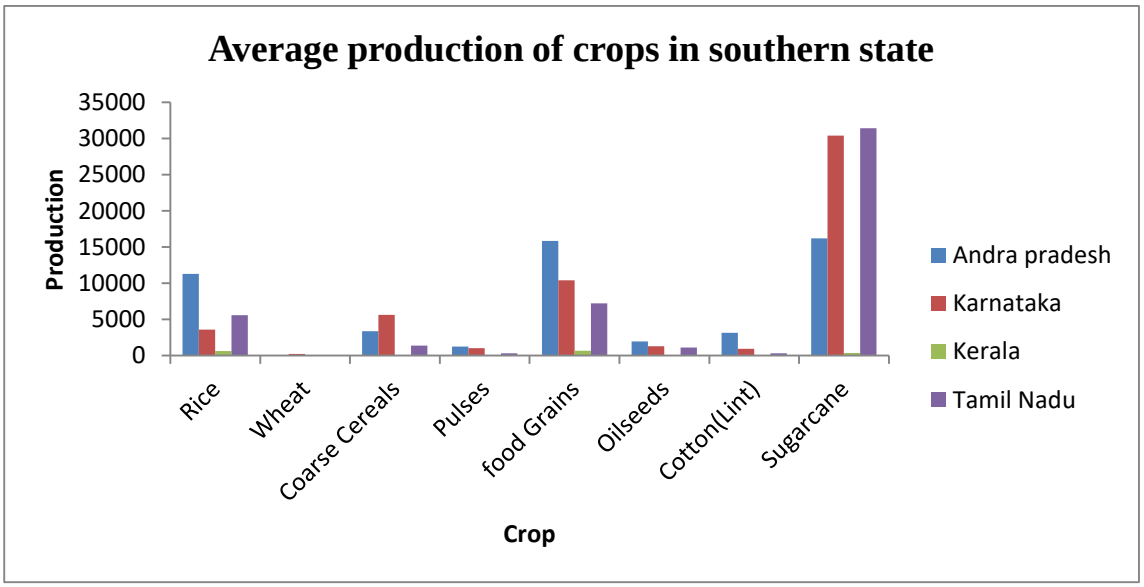


Conclusion:

From the above graph it is clear that the production of food grains is higher in Punjab in northern state. In Punjab state all production of rice wheat also comparatively high than all state in northern state.

2] AVERAGE PRODUCTION OF SOUTHERN STATE:

States	Rice	Wheat	Coarse Cereals	Pulses	food Grains	Oilseeds	Cotton(Lint)	Sugarcane
Andra Pradesh	11262.35	8.84	3352	1211.94	15835.13	1920.625	3117.715	16181.41
Karnataka	3576.66	200.705	5634.2	988.98	10400.55	1283.18	915.04	30431.22
Kerala	622.475	-	2.76	10.04	635.28	3.835	8.413333	363.105
Tamil Nadu	5589.095	0	1346.885	294.68	7230.66	1117.105	322.92	31431.85

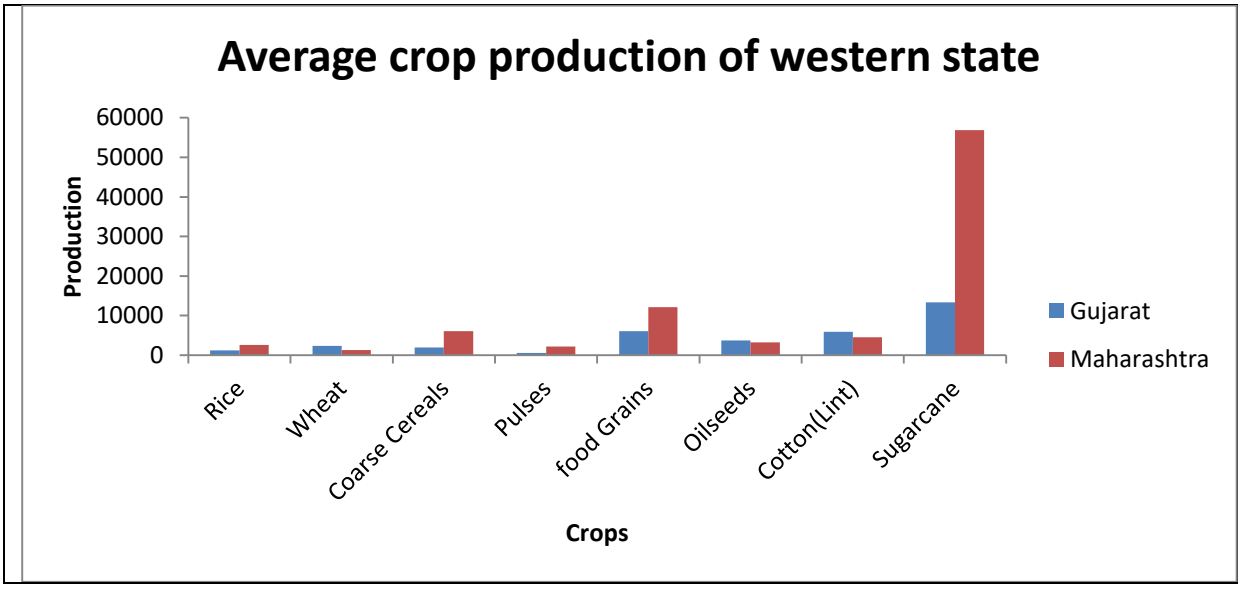


Conclusion:

From the above graph it is clear that the production of sugarcane is higher in Tamil Nadu southern state. After that also production is higher in Karnataka. The production of cotton & oilseeds is relatively low in southern state.

3] AVERAGE PRODUCTION OF WESTERN STATE:

States	Rice	Wheat	Coarse Cereals	Pulses	food Grains	Oilseeds
Gujarat	1212.145	2326.345	1954.11	564.55	6057.145	3681.635
Maharashtra	2570.945	1309.105	6067.98	2150.99	12099.02	3228.200

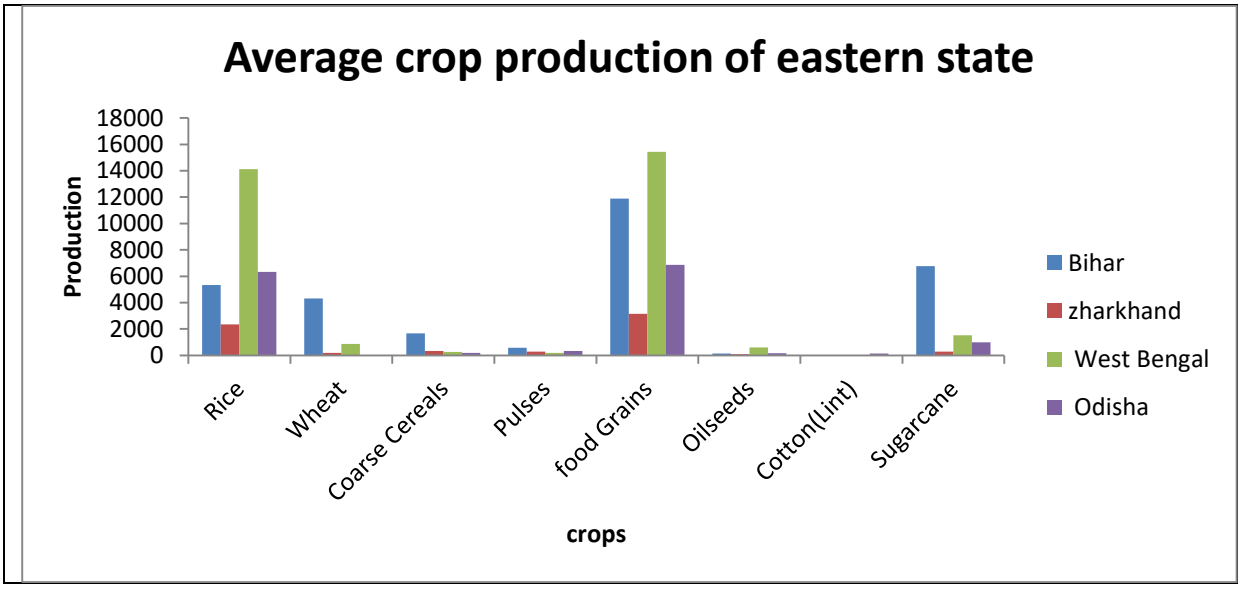


Conclusion:

From the above graph it is clear that the production of sugarcane is higher in Maharashtra in western state. Here the production of rice & wheat is comparatively low.

4] AVERAGE PRODUCTION OF EASTERN STATE:

States	Rice	Wheat	Coarse Cereals	Pulses	food Grains	Oilseeds	Cotton(Lint)	Sugarcane
Bihar	5326.945	4305.49	1678.505	575.755	11886.7	136.975	0.1	6777.06
zharkhand	2346.067	183.06	332.2867	288.7333	3150.153	78.86	-	283.1267
West Bengal	14127.46	868.065	254.65	175.83	15426.03	608.075	4.066667	1524.08
Odisha	6323.52	5.805	192.74	337.3	6859.36	168.63	145.825	983.905

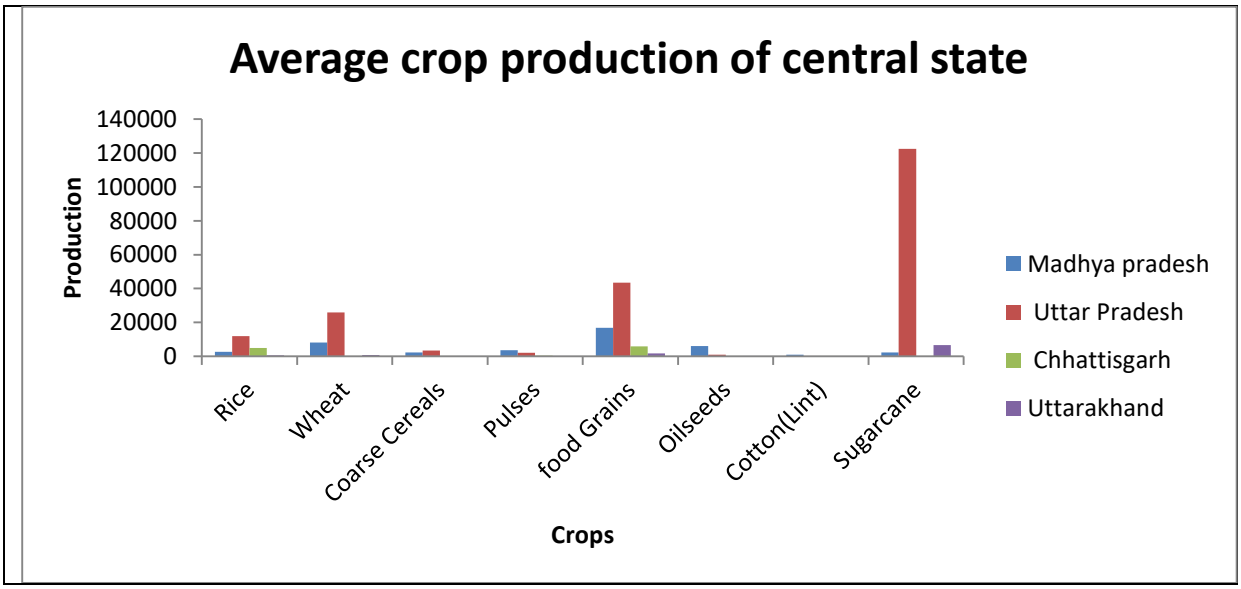


Conclusion:

From the above graph it is clear that the production of food grains is higher in West Bengal eastern state also production of food grain, rice, sugarcane in Bihar is high.

5] AVERAGE PRODUCTION OF CENTRAL STATE:

States	Rice	Wheat	Coarse Cereals	Pulses	food Grains	Oilseeds	Cotton
Madhya pradesh	2746.04	8134.975	2403.25	3590.675	16874.95	6069.335	916.39
Uttar Pradesh	12042.85	25853.34	3439.67	2203.65	43539.5	1053.98	5.693333
Chhattisgarh	5036.293	109.2467	204.2933	488.2067	5838.047	159.1333	0.288889
Uttarakhand	579.8467	784.5333	334.2733	39.50667	1738.227	28.56667	-

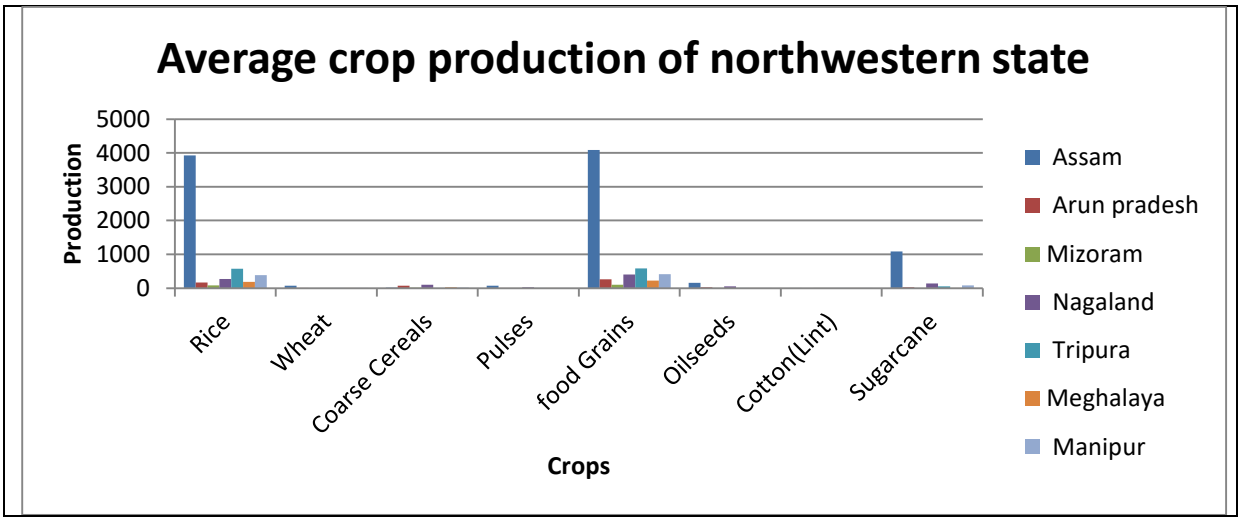


Conclusion:

From the above graph it is clear that the production of Sugarcane is higher in Uttar Pradesh. In central state. Cotton production is very low in central state i.e. the cotton crop is not favorable.

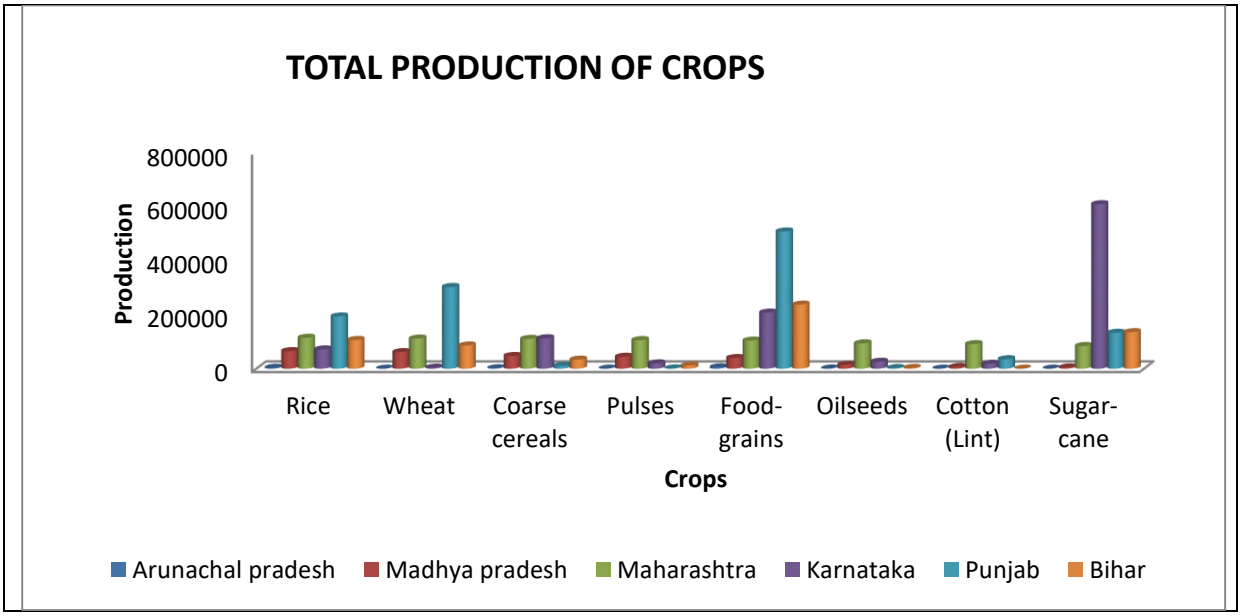
6] AVERAGE PRODUCTION OF NORTHEASTERN STATE:

	Rice	Wheat	Coarse Cereals	Pulses	food Grains	Oilseeds	Cotton(Lint)	Sugarcane
Assam	3923.075	72.62	19.895	71.31	4086.895	154.56	0.813333	1085.245
Arunachal pradesh	168.4263	5.810526	76.43158	7.689474	258.3526	26.74737	-	22.23077
Mizoram	78.08421	-	13.75263	5.584211	97.41579	5.163158	1.66	6.663158
Nagaland	266.7684	7.121053	97.85789	28.30526	400.0526	56.84737	0.86	137.2947
Tripura	575.8	2.326316	2.615789	5.484211	586.2316	4.326316	1.46	51.48947
Meghalaya	187.8316	3.142105	28.05789	3.4	222.4263	6.968421	6.64	0.547368
Manipur	388.4632	5.8	18.33684	8.021053	415.9947	6.905263	0.3	86.38947



Conclusion:

From the above graph it is clear that the production of food grain is higher in Assam in northeastern state. Wheat, oilseed, cotton crops are not favorable.

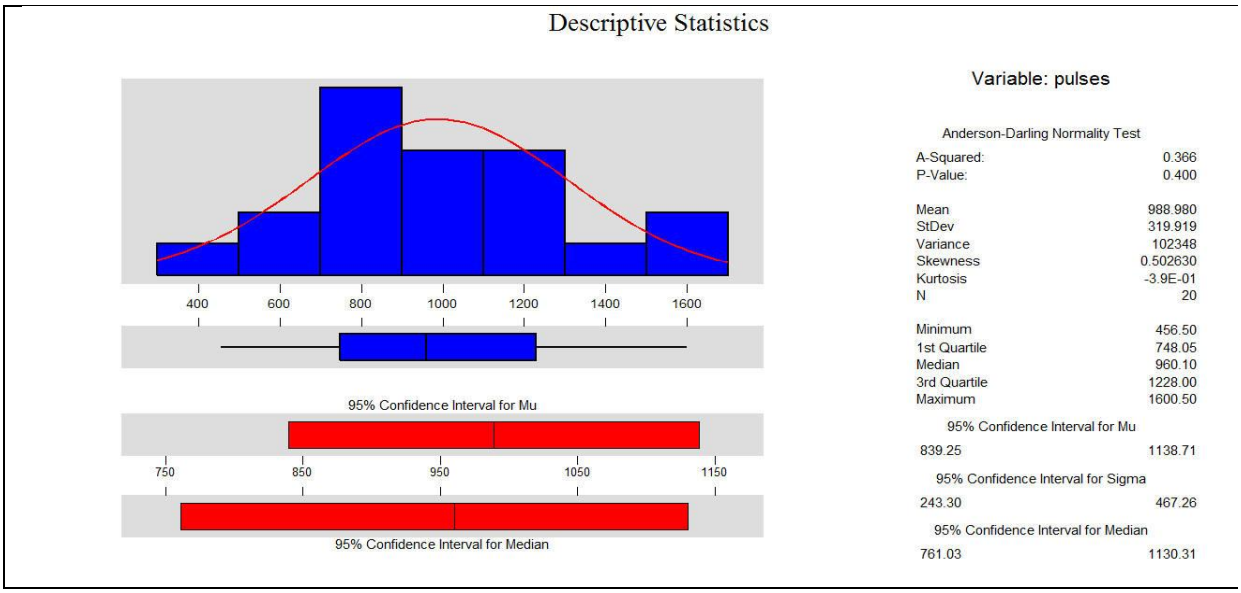


Conclusion:-

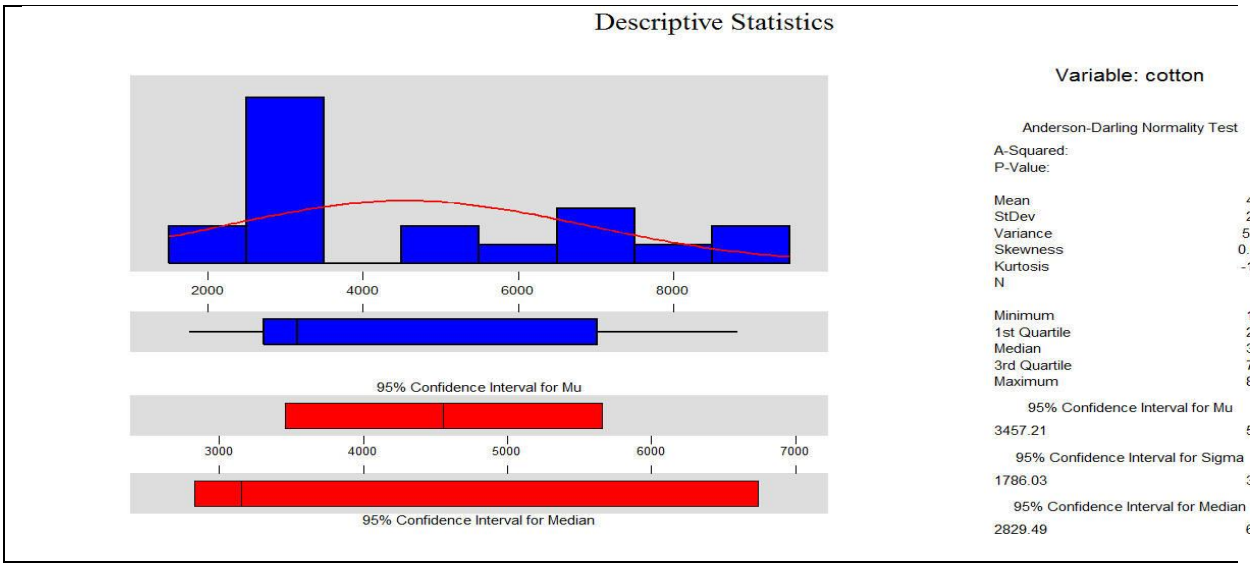
From the above graph it is concluded that Punjab state higher production of rice, wheat,& food grain as compare to other state.

Descriptive Statistics:-

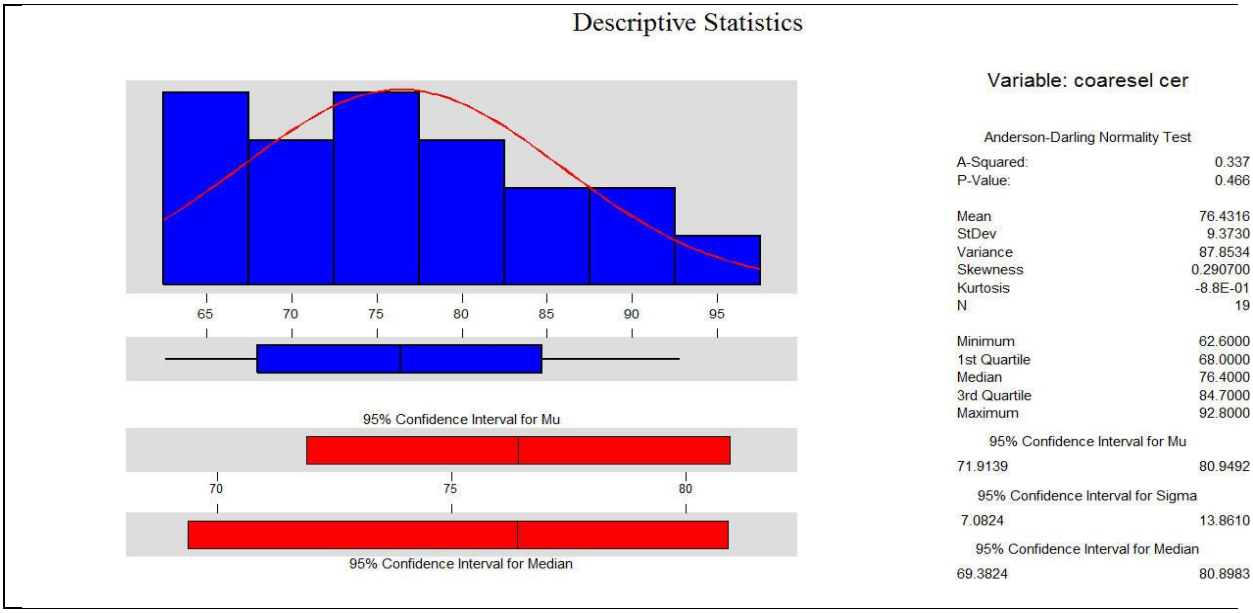
1)The pulses production in Karnataka state



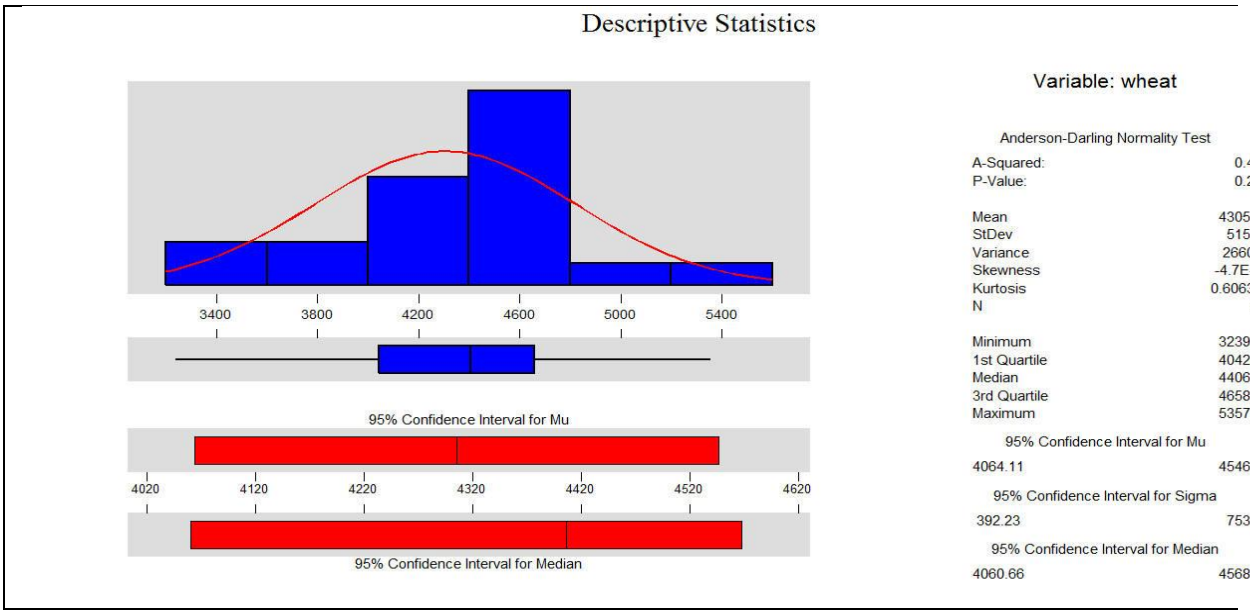
2) The cotton production in Maharashtra state



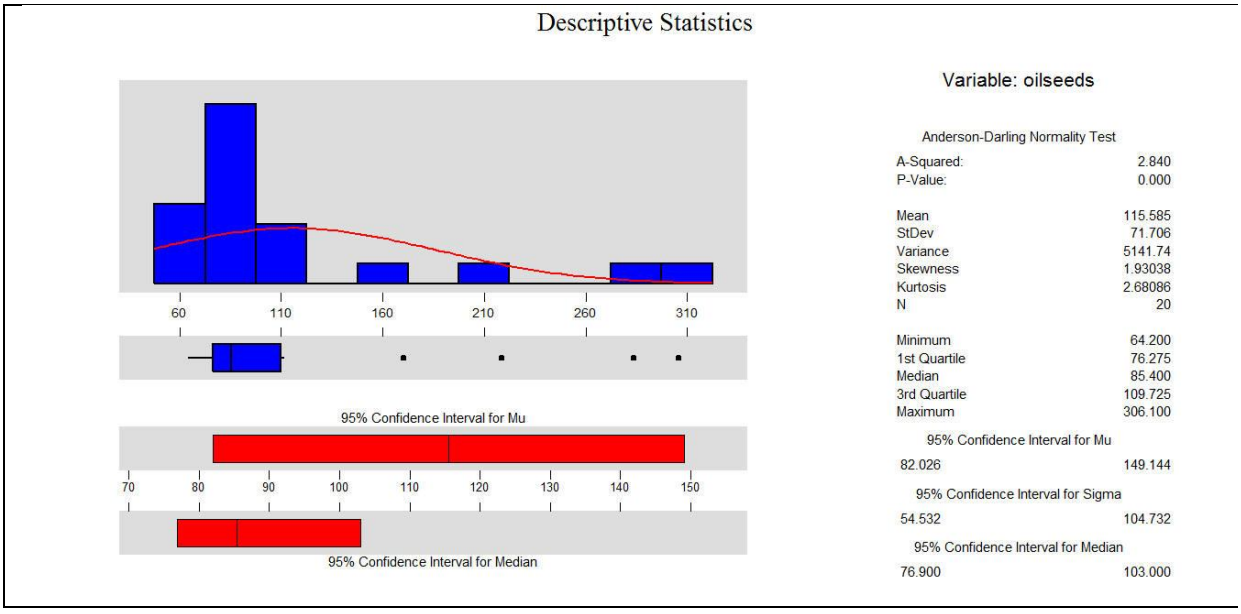
4) The coarse cereals production in Arunachal Pradesh state



5) The wheat production in Bihar state



6) The oilseeds production in Punjab state



➢ DATA ANALYSIS

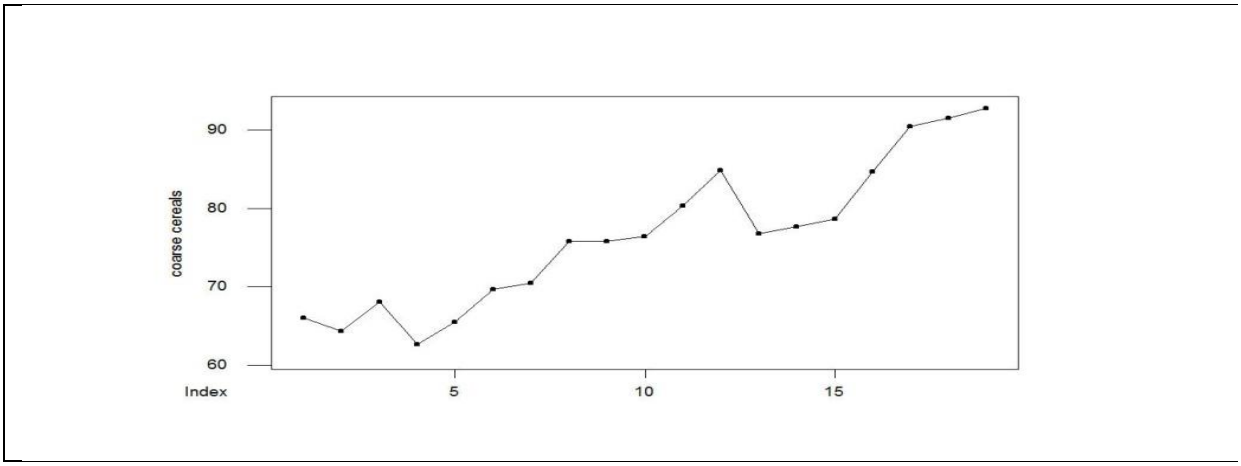
➢ Time Series analysis:-

1)Analysis of production of coarse cereals:

A) Arunachal Pradesh state:-

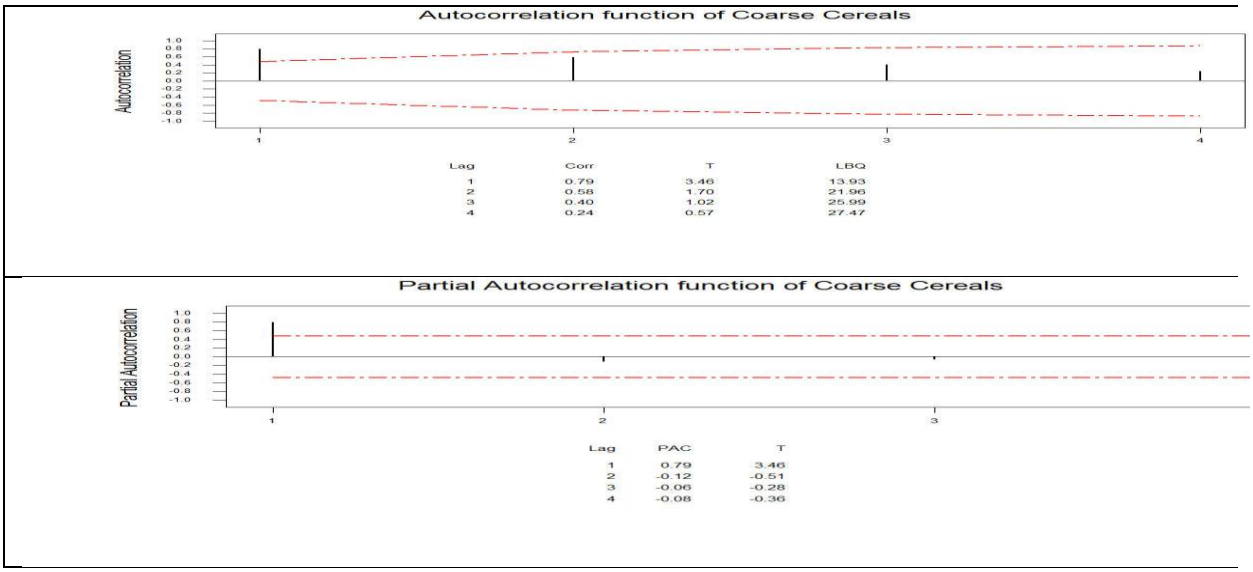
In this the variable of interest is the production of coarse cereals in Arunachal Pradesh state. This series is available from 1995 to 2014. Usually the series is assumed to be a normally distributed.

The time series plot of production of coarse cereals



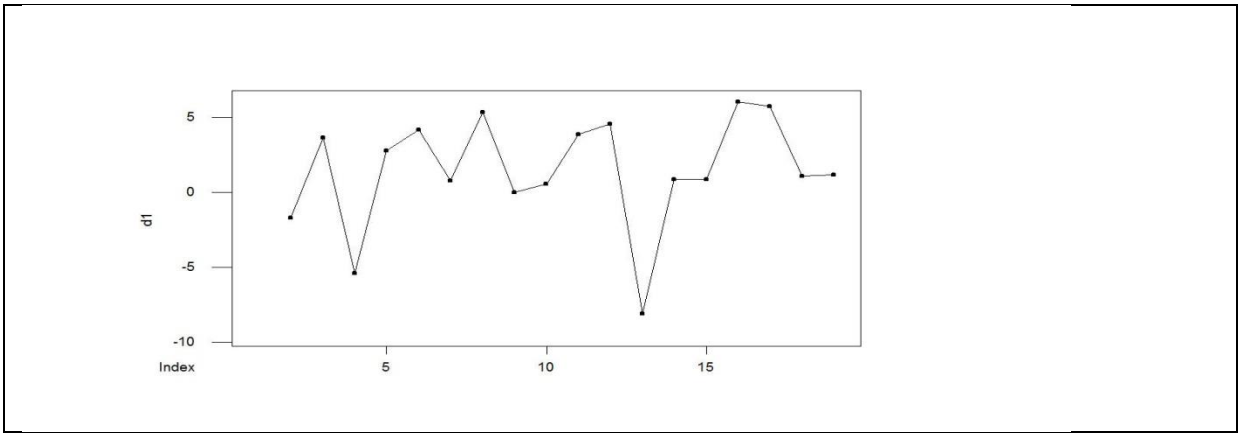
From the above time series plot it is clear that only trend is present in the data.

Plot of ACF & PACF of the original series is



It is clear that there is evidence of non-stationary.

Plot of detrened series



The spss output is

Type	Coef	SE Coef	T	P
AR 1	0.3932	0.3113	1.26	0.226
MA 1	0.9484	0.2689	3.53	0.003
Constatnt	0.9549	0.1128	8.47	0.000

Differencing: 1 regular difference
Number of observations: Original series 19, after differencing 18
Residuals: SS = 174.728 (back forecasts excluded)
MS = 11.649 DF = 15

From the above output I concluded that ARIMA(1,1,1) model is well fitted to the data by trying various ARIMA model ARIMA(1,1,1) is well fitted to the data.

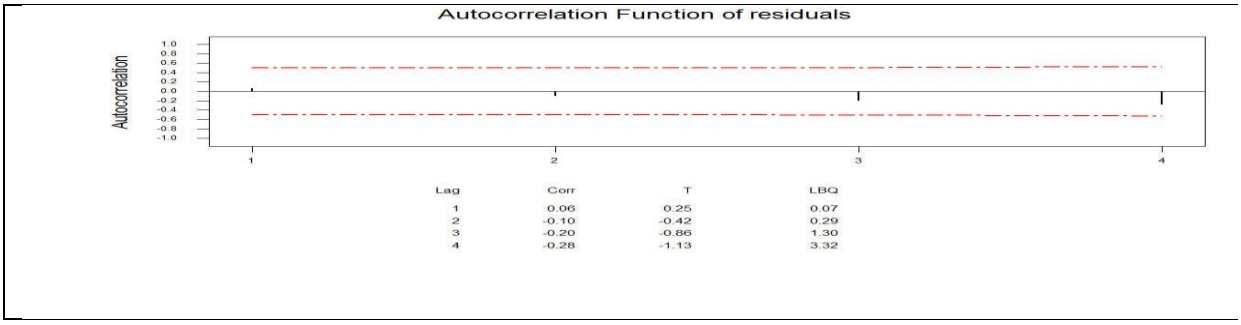
From the output table the model obtained is

Xt -0.3932* Xt-1 =0.9484* Zt-1 +Zt

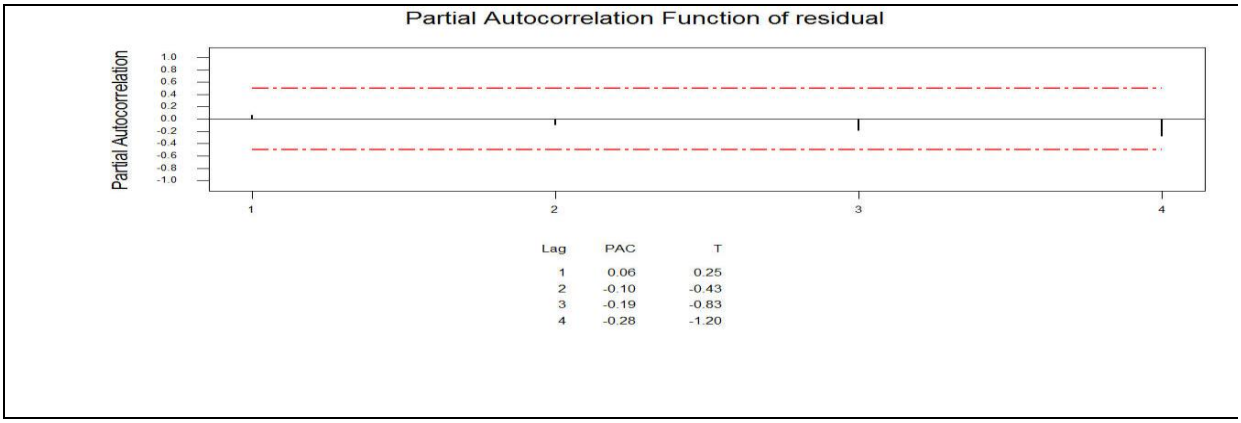
It is clear that there is no any kind of dependency or correlation in the residual series

Residual analysis:-

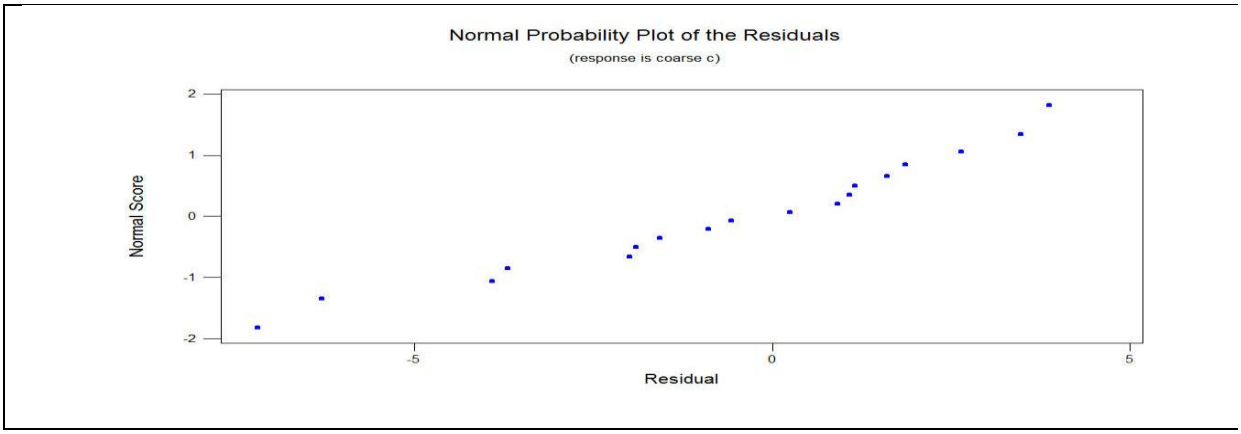
In this we first plot the ACF and PACF of the residual series



Autocorrelation Function for residuals



Partial autocorrelation function for residuals



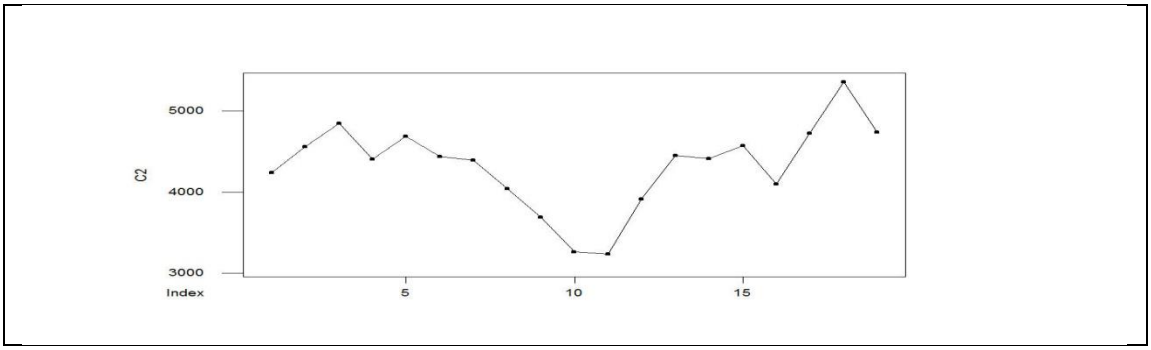
Normal probability plot

Further we give a forecast of the series

Forecasts	From Year 2010		95 percent Limit	
Year	Forecast	Actual value	Upper Limit	Lower Limit
2011	**83.6110**	**84.70**	90.3018	76.9202
2012	**76.9202**	**90.50**	93.8587	79.2134
2013	**86.5361**	**91.60**	96.1187	81.1633
2014	**90.42**	**92.80**	97.9601	82.8869
2015	**92.0793**	-	99.6497	84.5088

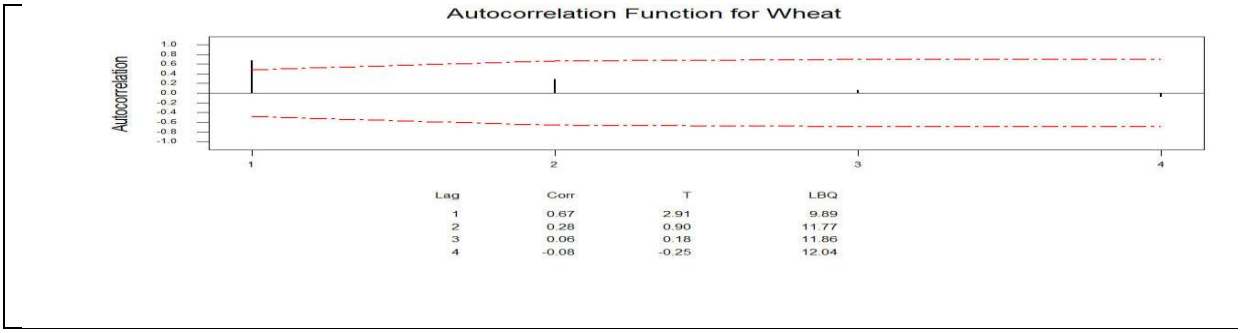
2) Analysis of production of wheat:
B) Bihar state

The time series plot of production of wheat

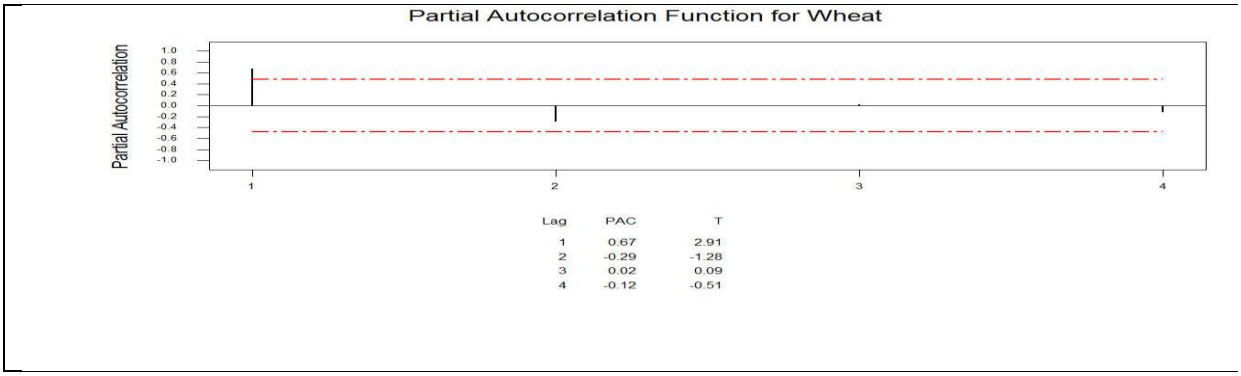


From the above graph there is no trend & seasonality in the data.

Plot of ACF & PACF of the original series is



Autocorrelation Function for wheat production



Partial Autocorrelation Function for wheat production

The Spss output is

Final Estimates of Parameters

Type	Coef	SE Coef	T	P
MA 1	-0.6911	0.1758	-3.93	0.001
Constatnt	4322.1	155.3	27.83	0.000

Number of observations: 19

Residuals: SS = 2809959 (backforecasts excluded)
MS = 165292 DF = 17

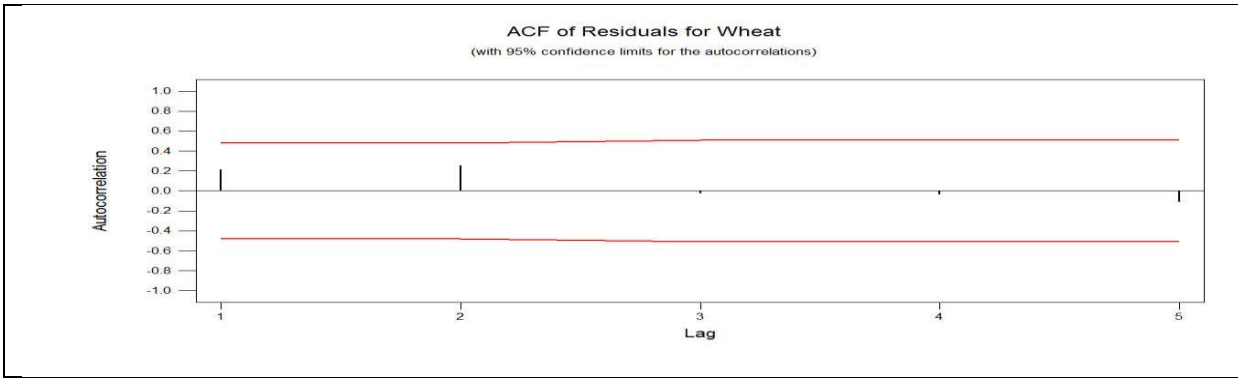
From the above output I concluded that ARIMA(0,0,1) model is well fitted to the data by trying various ARIMA model ARIMA(0,0,1) is well fitted to the data. From the output table the model obtained is

Xt = -0.6911*Zt-1 + Zt Where Zt is White noise process.

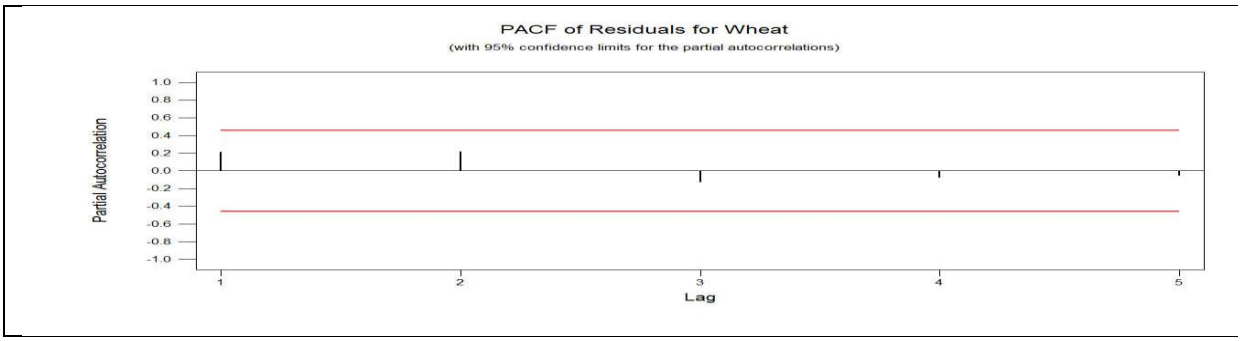
It is clear that there is no any kind of dependency or correlation in the residual series

Residual analysis:-

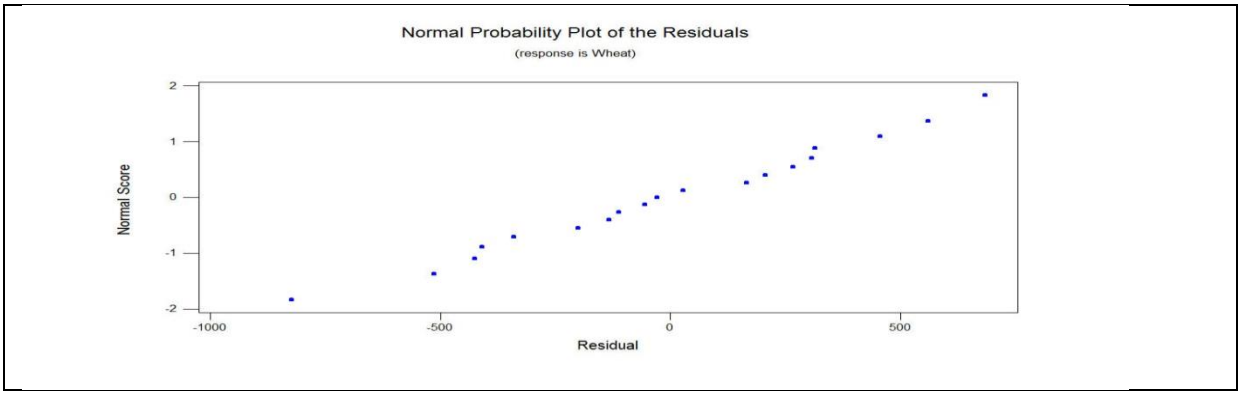
In this we first plot the ACF and PACF of the residual series



Autocorrelation function for residuals



Partial Autocorrelation function for residuals



Normal probability plot

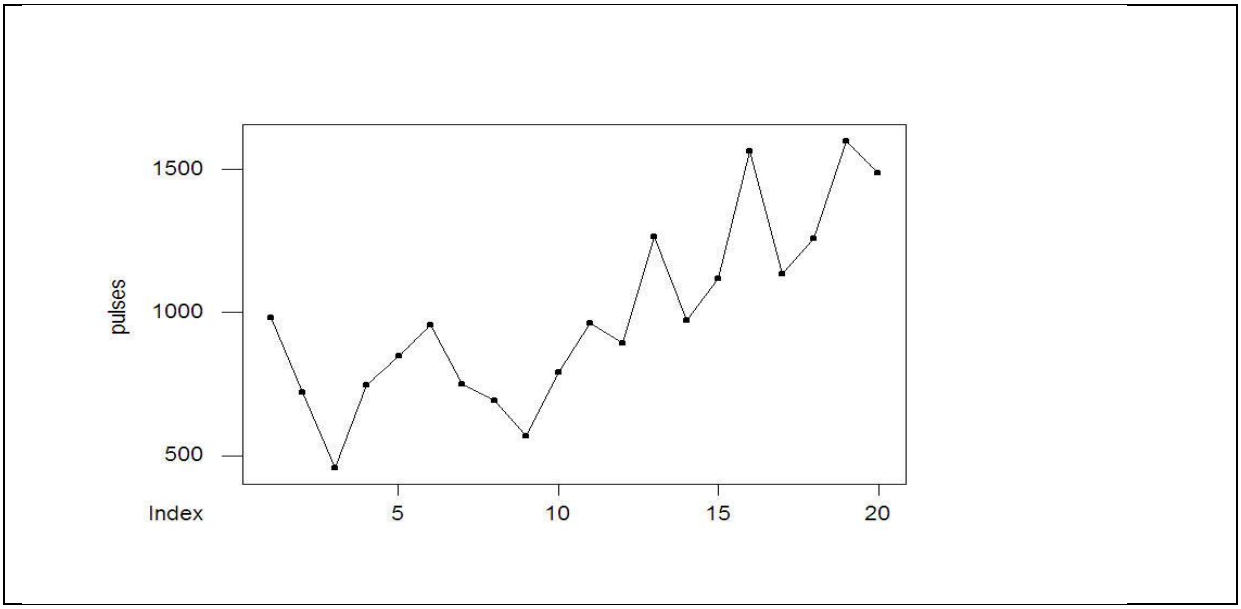
Further we give a forecast of the series

Forecasts	From Year 2013	95% Limits		
Year	Forecast	Lower	Upper	Actual
2014	**4709.89**	3912.87	5506.91	**4049.3**
2015	**4322.12**	3353.29	5290.96	-
2016	**4322.22**	3353.29	5290.96	-

3) Analysis of production of pulses :

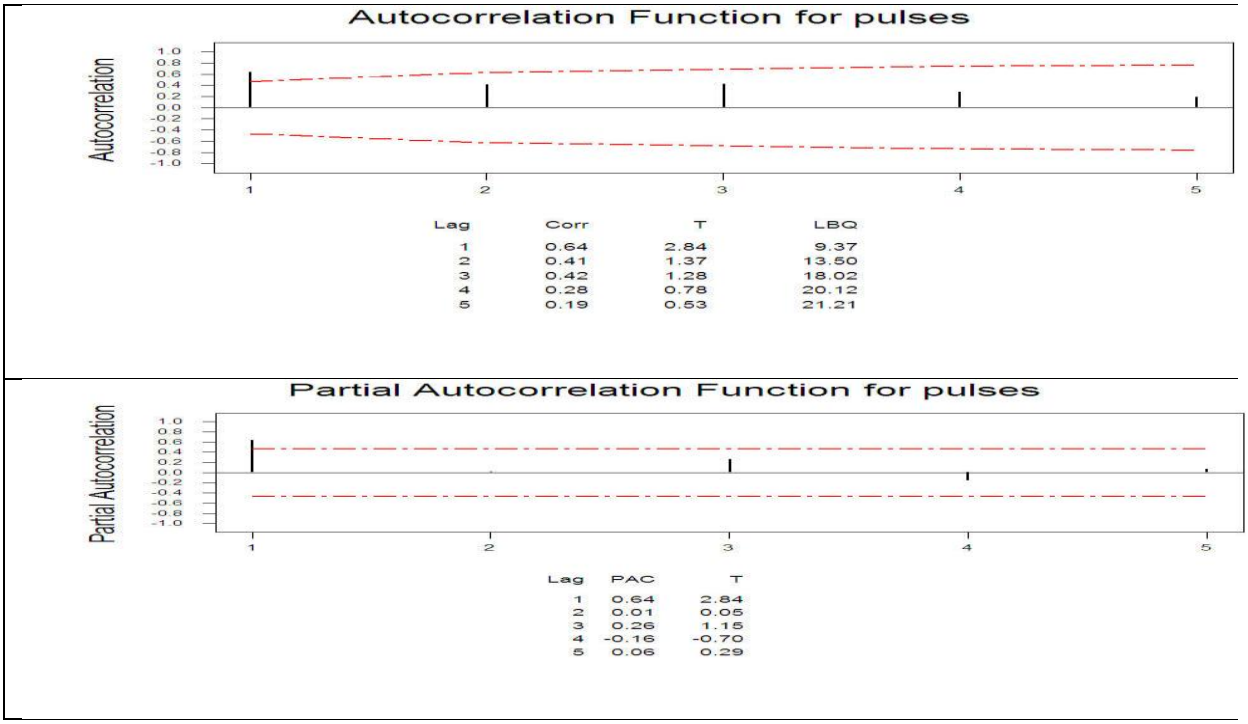
C) Karnataka state:-

The time series plot of production of pulses is

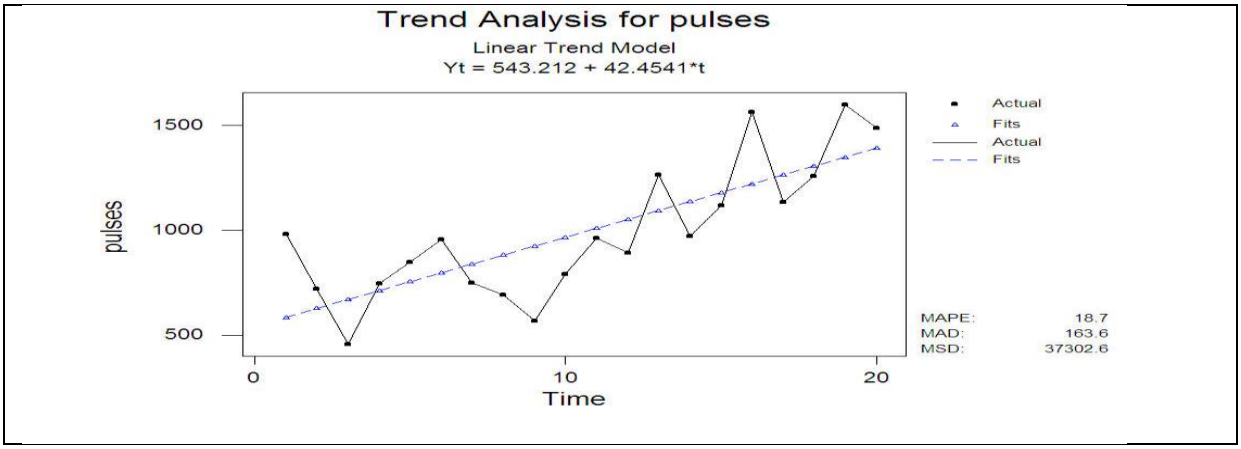


From the above time s plot it is clear that only trend is present in the data.

Plot of ACF & PACF of the original series is

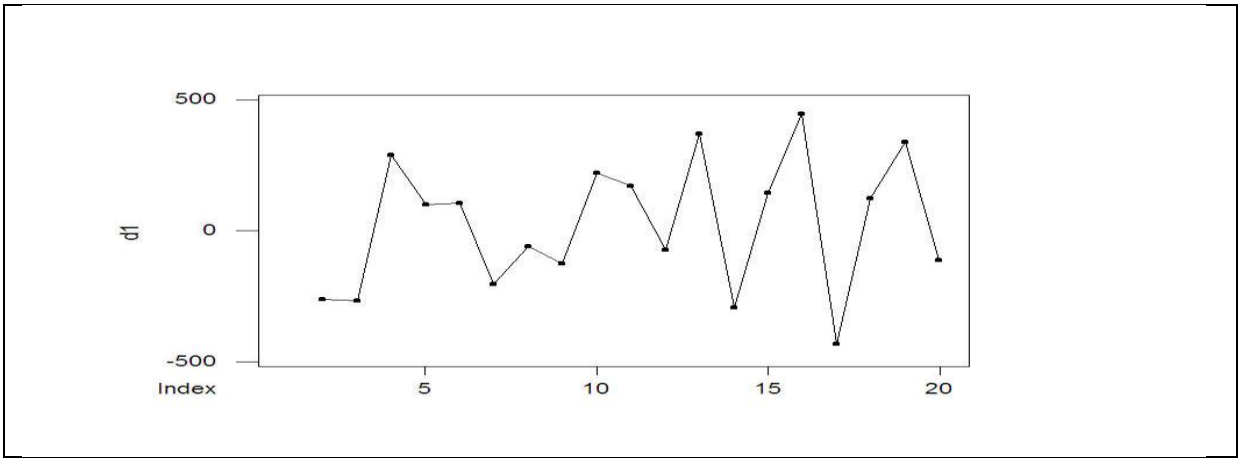


Trend Analysis:



For making detrened data we can take a differencing on original series by lag 1 again plot the time series plot of detrened data It is given as

Time series plot of detrened data is



The Spss output is

Final Estimates of Parameters

Type	Coef	SE Coef	T	P
MA 1	0.4553	0.2228	2.04	0.059
MA 2	0.6312	0.2450	2.58	0.021
MA 3	-0.6441	0.2222	-2.90	0.011
Constatnt	37.68	23.29	1.62	0.126

Differencing: 1 regular difference

Number of observations: Original series 20, after differencing 19

Residuals: SS = 519479 (back forecasts excluded)

MS = 34632 DF = 15

From the above output I concluded that MA(3) model is well fitted to the data by trying various MA model MA(3) is well fitted to the data.

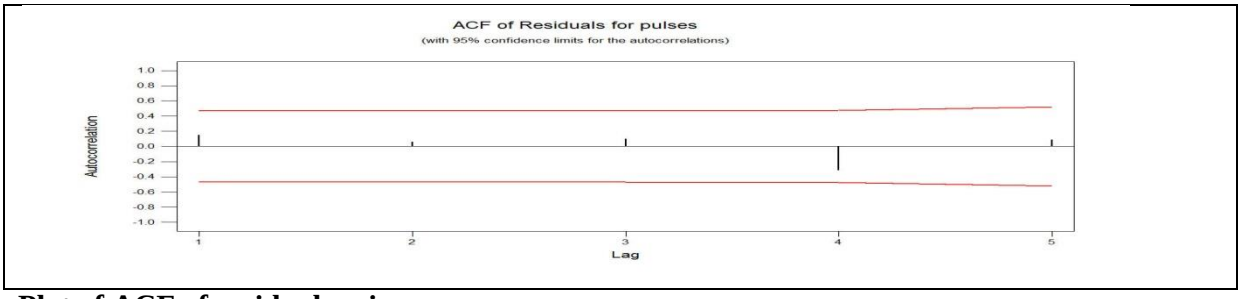
From the output table the model obtained is

$$\mathbf{Xt = 0.4553^{*} Z_{t-1} + 0.6312^{*} Z_{t-2} - 0.6441^{*} Z_{t-3} + Z_t}$$

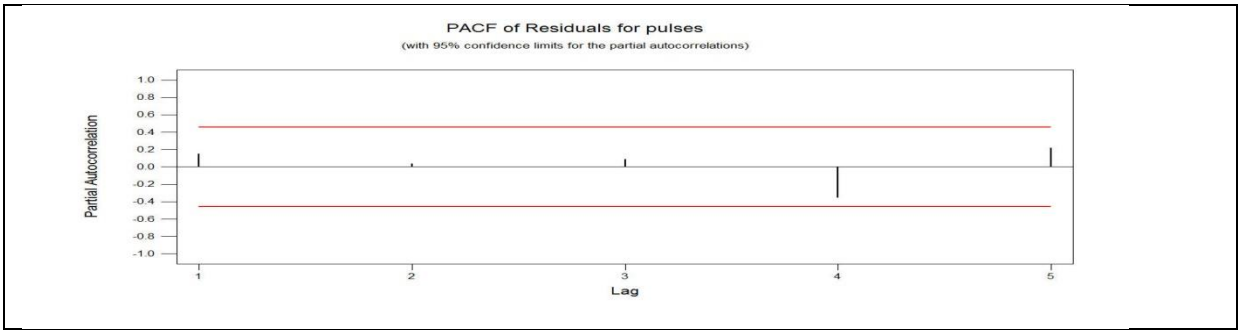
It is clear that there is no any kind of dependency or correlation in the residual series

Residual analysis:-

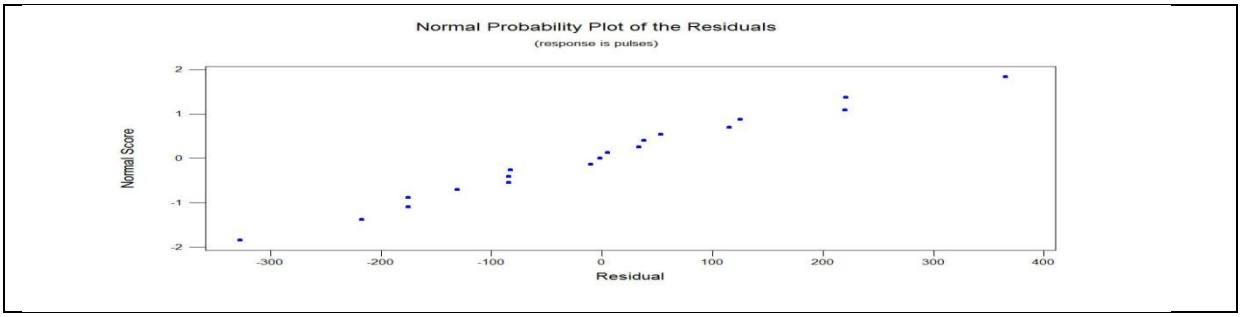
In this we first plot the ACF and PACF of the residual series



Plot of ACF of residual series



Plot of PACF of residual series



Normal probability Plot

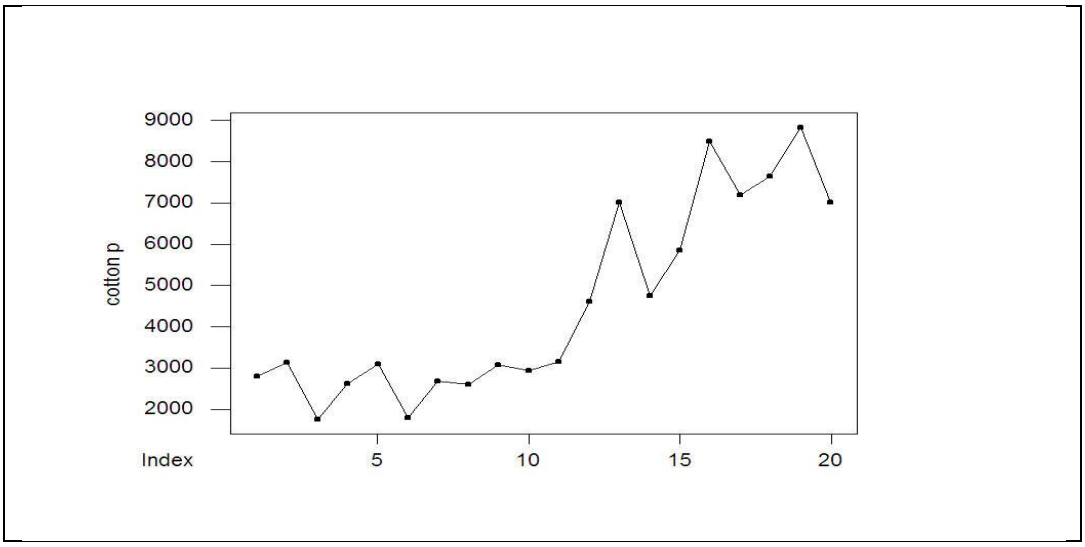
Further we give a forecast of the series

Forecasts	From Year 2014	95 Percent limit		
Year	Forecast	Lower limit	Upper limit	Actual
2015	**1497.88**	1133.00	1862.65	**1488**
2016	**1505.37**	1089.93	1920.81	-
2017	**1577.38**	1160.74	1994.01	-
2018	**1635.15**	1151.39	2078.72	-

4) Analysis of production of cotton:

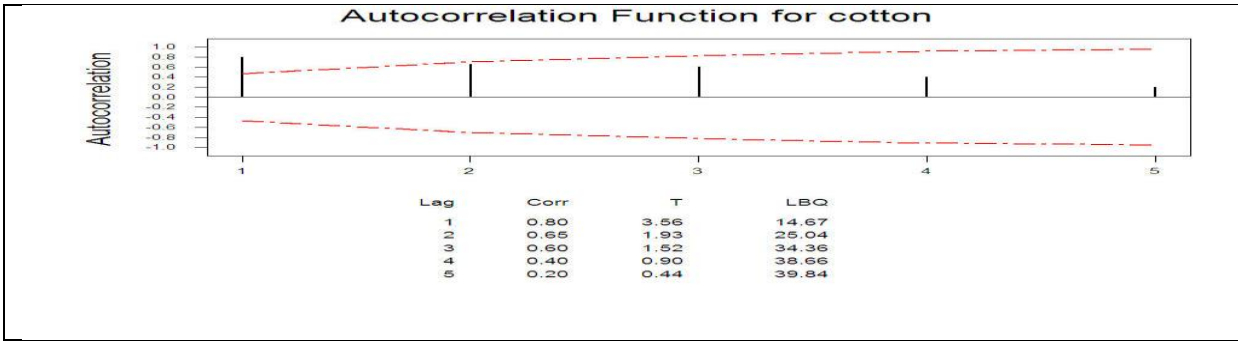
D) Maharashtra state:-

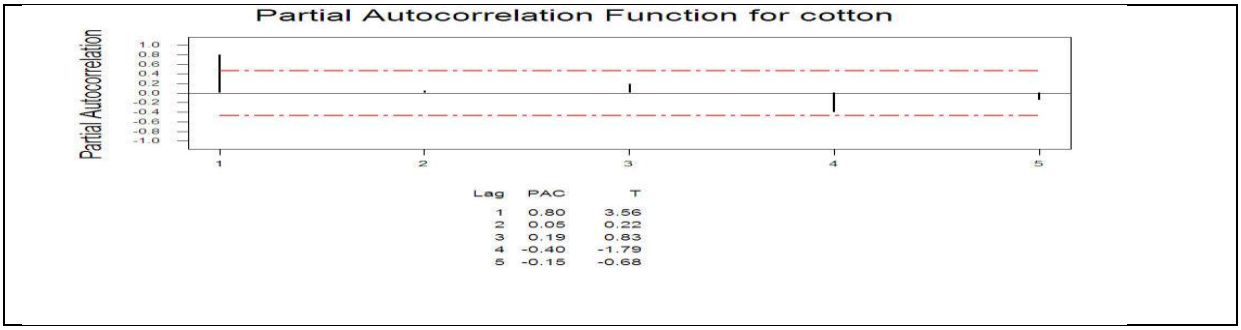
The time series plot of production of cotton is



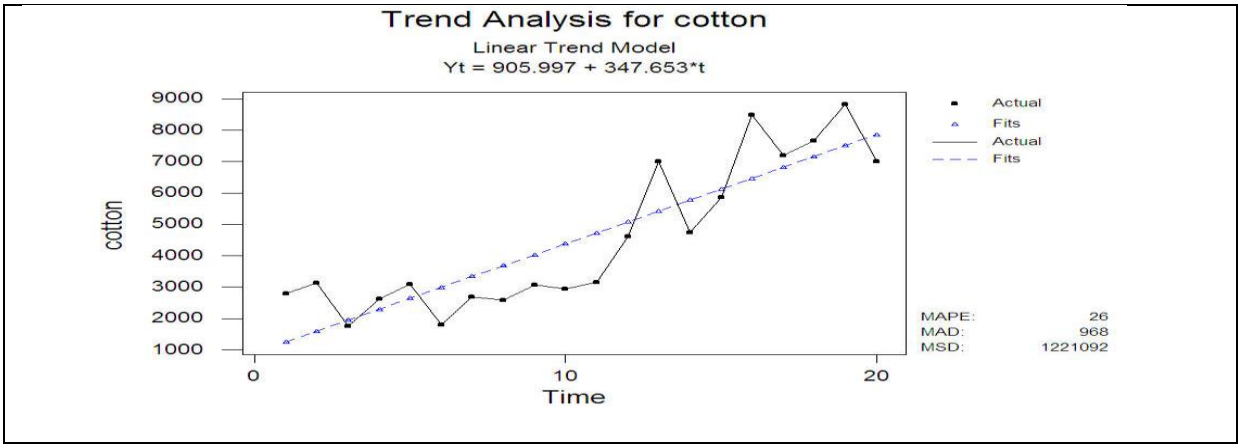
From the above time series plot it is clear that only trend is present in the data.

Plot of ACF & PACF of the original series is





Trend Analysis



The Spss output is

Final Estimates of Parameters

Type	Coef	SE Coef	T	P
AR 1	-0.2707	0.4600	-0.59	0.565
MA 1	0.2052	0.3757	0.55	0.593
MA 2	0.6967	0.3085	2.26	0.039
Constatnt	436.66	46.15	9.46	0.000

Differencing: 1 regular difference

Number of observations: Original series 20, after differencing 19

Residuals: SS = 20281821 (backforecasts excluded)

MS = 1352121 DF = 15

From the above output I concluded that ARIMA(1,1,2) model is well fitted to the data by trying various model ARIMA(1,1,2) is well fitted to the data.

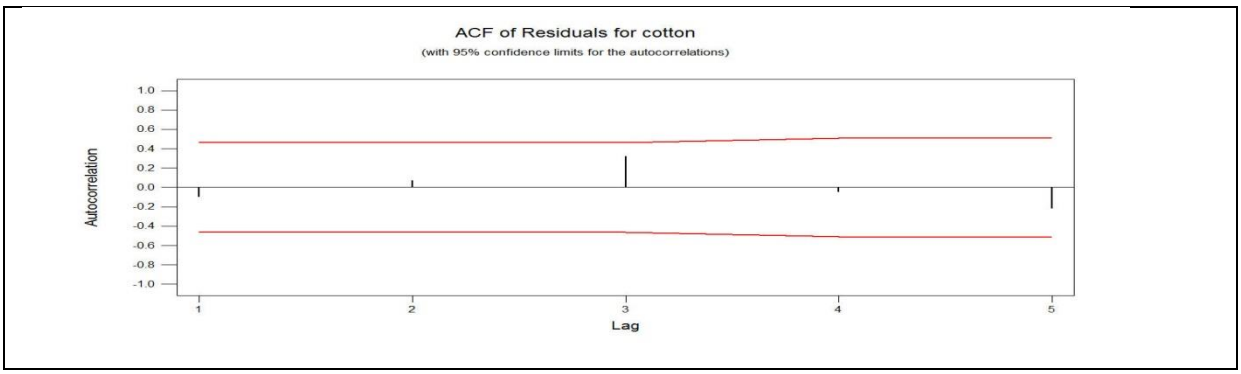
From the output table the model obtained is

Xt +0.2707 * Xt-1 =-0.2052 *Zt-1-0.6967*Zt-2+ Zt

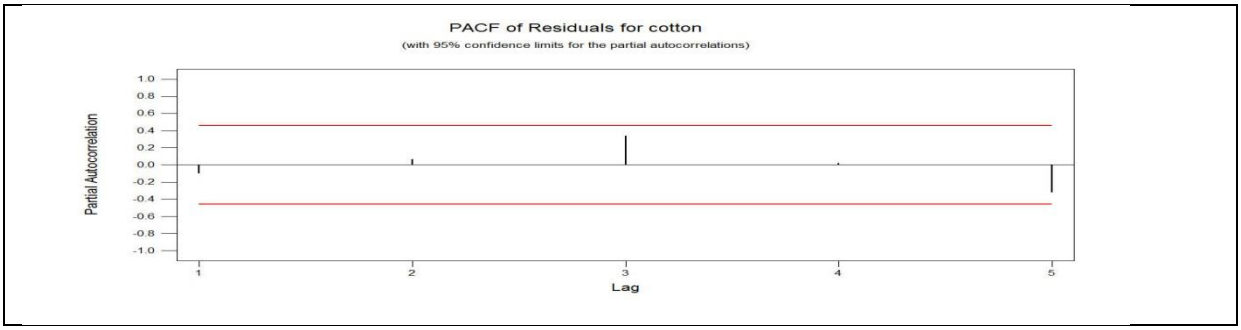
It is clear that there is no any kind of dependency or correlation in the residual series

Residual analysis:-

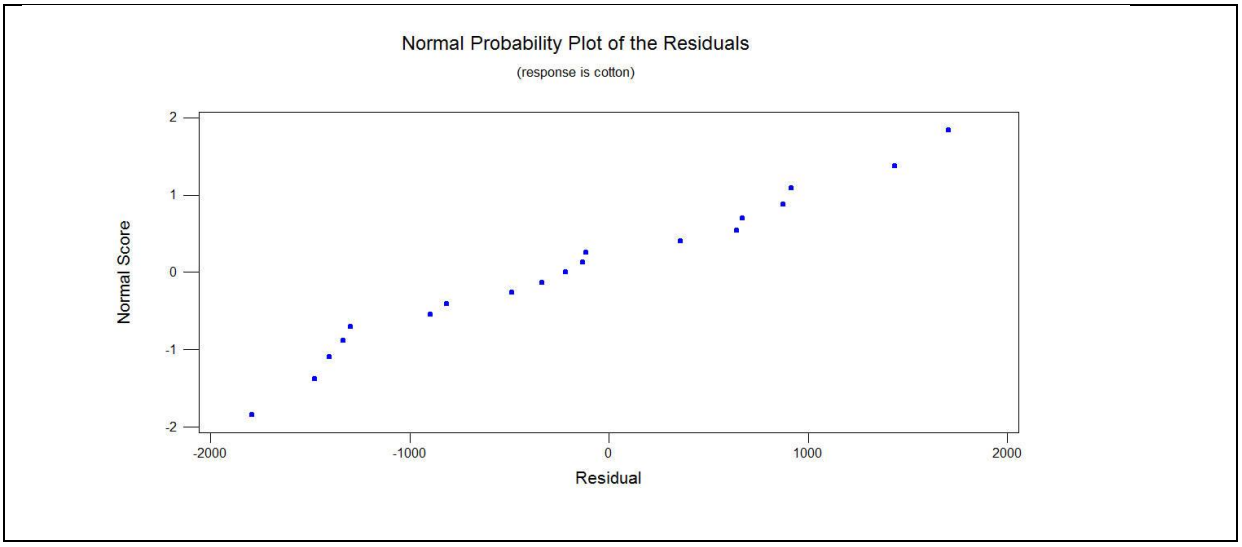
In this we first plot the ACF and PACF of the residual series



Plot of ACF of residual series.



Plot of ACF of residual series.



Normal probability plot

Further we give a forecast of the series

Forecasts	From Year2013	95% Limits		
Year	Forecast	Lower	Upper	Actual
2014	**8315.9**	6036.3	10595.4	**7019.0**
2015	**8254.3**	5680.7	10827.9	-
2016	**8707.6**	6132.1	11283.2	-
2017	**9021.6**	6433.8	11609.3	-

Major finding:-

From all the above analysis

1.The time series analysis gives model for production of crop of coarse cereals in Arunachal Pradesh is

Xt -0.3932* Xt-1 =0.9484* Zt-1 +Zt

And forecast for next year is given as,

Forecasts	From Year 2010		95 percent Limit	
Year	Forecast	Actual value	Upper Limit	Lower Limit
2011	**83.6110**	**84.70**	90.3018	76.9202
2012	**76.9202**	**90.50**	93.8587	79.2134
2013	**86.5361**	**91.60**	96.1187	81.1633
2014	**90.42**	**92.80**	97.9601	82.8869
2015	**92.0793**	-	99.6497	84.5088

2. The time series analysis gives model for production of crop of wheat in Bihar is

Xt = -0.6911*Zt-1 + Zt

And forecast for next year is given as,

Forecasts	From Year 2013	95% Limits		
Year	Forecast	Lower	Upper	Actual
2014	**4709.89**	3912.87	5506.91	**4049.3**
2015	**4322.12**	3353.29	5290.96	-
2016	**4322.22**	3353.29	5290.96	-

3. The time series analysis gives model for production of crop of pulses in Karnataka is

$X_t = 0.4553 * Z_{t-1} + 0.6312 * Z_{t-2} - 0.6441 * Z_{t-3} + Z_t$

And forecast for next year is given as,

Forecasts	From Year 2014	95 Percent limit		
Year	Forecast	Lower limit	Upper limit	Actual
2015	**1497.88**	1133.00	1862.65	**1488**
2016	**1505.37**	1089.93	1920.81	-
2017	**1577.38**	1160.74	1994.01	-
2018	**1635.15**	1151.39	2078.72	-

4. The time series analysis gives model for production of crop of cotton in Maharashtra is

Xt +0.2707 * Xt-1 =-0.2052 *Zt-1-0.6967*Zt-2+ Zt

Further we give a forecast of the series

Forecasts	From Year2013	95% Limits		
Year	Forecast	Lower	Upper	Actual
2014	**8315.9**	6036.3	10595.4	**7019.0**
2015	**8254.3**	5680.7	10827.9	-
2016	**8707.6**	6132.1	11283.2	-
2017	**9021.6**	6433.8	11609.3	-

Limitation & future scope:

1) The series is also not available for last consecutive two years, so if it is studied using Time series analysis it will be very helpful for the farmers.

2) Forecasting can only estimate the future events. It cannot guarantee that these events will take place in the future. The long-term forecasts will be less accurate as compared to short-term forecast.

3) The study period is too short.

References:

a) Analysis of financial time series –
By, Ruey S. Tsay , Second Edition.
A JOHN WILEY & SONS CO., PUBLICATION

b) Introduction to Time Series Analysis and Forecasting –
By Peter J. Brockwell & Richard A. Davis 2nd Edition,
Springer International Edition (SIE).

c) Time Series: Theory and Methods
Peter J. Brockwell & Richard A. Davis: 2nd Edition,
Springer International Edition (SIE).

THANK YOU