

“Education for Knowledge, Science and Culture”

-Shikhanmaharshi Dr. Bapuji Salunkhe



**VIVEKANAND COLLEGE, KOLHAPUR (Autonomous)**

**DEPARTMENT OF STATISTICS**

**A PROJECT REPORT**

**on**

**“STUDY OF ANALYSIS OF SUGARCANE INDUSTRIES”**

*Submitted by*

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Mr. Rokade Ashutosh Narayan  
Mr. Chougule Shubham Prakash  
Mr. Subhedar Umesh Ramesh**

*in partial fulfillment for the award of*

*the degree of*

**BACHELOR OF SCIENCE**

*in*

**STATISTICS**

**2018-19**

“Education for Knowledge, Science and Culture”

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(स्वायत्त) कोल्हापूर

**VIVEKANAND COLLEGE, KOLHAPUR(Autonomous)  
DEPARTMENT OF STATISTICS**

**Certificate**

This is to Certify that,

Sr. No.	Name	Roll No.
1	Mr. Chavan Akshay Balasaheb	8687
2	Mr. Kumbhar Swaraj Kishor	8695
3	Mr. Rokade Ashutosh Narayan	8698
4	Mr. Chougule Shubham Prakash	8705
5	Mr. Subhedar Umesh Ramesh	8706

Have satisfactorily completed the project work on “STUDY OF ANALYSIS OF SUGARCANE INDUSTRIES” as prescribed by the “Shivaji University, Kolhapur” for B.Sc. III course in STATISTICS, in the academic year 2018-19.

This project has been completed under our guidance and supervision. To the best of our knowledge and belief, the matter presented in this project report is original and has not been submitted elsewhere for any other purpose.

  
Project Guide

(Ms. S. S. Nerlekar)

  
Examiner

  
Head

(Ms. Pawar V. V.)

**HEAD**  
DEPARTMENT OF STATISTICS  
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(AUTONOMOUS)



# ACKNOWLEDGEMENT

Gratitude is the hardest emotion to express and often doesn't find adequate words to convey that entire one feels. It is our foremost duty to express our deep sense of gratitude and respect to the supervisor Prof. Smt. S.S. NERLEKAR, Prof. Smt. V.V. PAWAR for their uplifting tendency and inspiring us for making of this project work complete and successful.

We are indebted to the library personal for offering all the help in completing the project work. Last but not the least we are thankful to our colleagues and those helped us directly or indirectly throughout this project work.

Sincerely,

Project Team

# Declaration

We undersigned, hereby declare that the project report entitled "ANALYSIS OF SUGARCANE INDUSTRIES" Written and submitted to Vivekanand college, Kolhapur partial fulfillment of B.Sc. III( Statistics) under the guidance of Prof. Smt. S.S. Nerlekar are our original work. The empirical results in this project are based on the data collected by ourselves.

We understand that any copying is liable to be published as the authorities deem fit.

Date:

Place: Kolhapur

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# INTRODUCTION

Kolhapur city is well known for agriculture. Mostly sugarcane is the major crop cultivated in the Kolhapur district. Hence sugarcane plays the vital role in specifying the importance of the Kolhapur in terms of sugar production. Beside this sugarcane industries also work silently for economical support to the families of workers. Beyond this sugarcane industries are the backbone of both farmers as well as economical development of Kolhapur. As the industries are working seasonally, the workers are also classified as seasonal and permanent workers. According to our study there are 21 sugarcane industries out of which 17 are cooperative and 4 are private.

Mainly our study deals with the Number of workers working in the industries and their dependency on type of industry they are working i.e. Cooperative and Private. Strength of workers dependence on sugarcane crushing by the industry. Hence our study deals with the workers and industries.

## AIM AND OBJECTIVE

Aim:

**Analysis of sugarcane industries in Kolhapur District.**

Objective:

- 1) To check the independency of No. of workers in industries.
- 2) To check the proportion of seasonal workers in private industries.
- 3) To check the proportion of seasonal workers in private as well as cooperative industries.

# MATERIAL & METHODS

## ❖ Source of Data :

We have collected all the information/data by surfing several websites on internet related with all sugar industries. Also visiting the District Statistical Office (DSO), Kolhapur. And [www.mahades.maharashtra.gov.in](http://www.mahades.maharashtra.gov.in)

## ❖ Statistical Tools :

- Chi-Square Test for Independence of Attributes.
- Test for Single Population Proportions.
- Test for Two Population Proportions

## ❖ Statistical Software :

- MS-Excel
- Microsoft Word



## Proportional test for no. of workers and industries:-

1) For 2013-14

$$H_0 : P = P_0$$

i.e. Proportion of seasonal workers in private industries is same.

Vs

$$H_1 : P < P_0$$

i.e. Proportion of seasonal workers in private industries is less.

$$Z_{cal} = -10.727273$$

$$Z_{\alpha} = -1.6448$$

Where,

$$\alpha = 0.05$$

$$P_0 = 0.5$$

$$Z_{cal} < Z_{\alpha} \quad \text{i.e. } |z|_{cal} > |z|_{tab}.$$

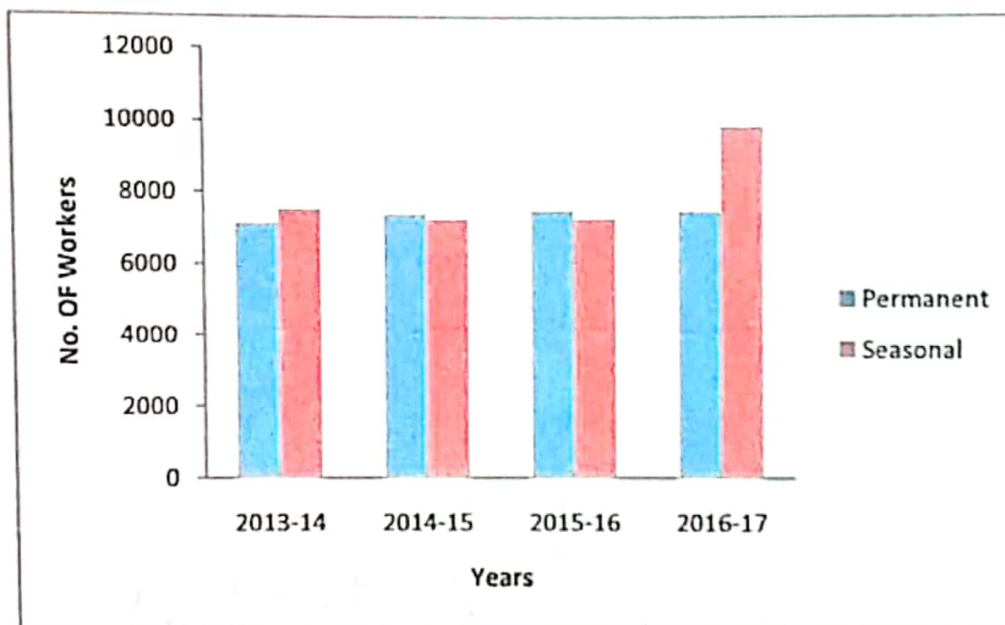
Therefore we reject  $H_0$  at 5% level of significance.

Remark: - The proportion of seasonal workers is less in private industries for the year 2013-14 .

• YEAR WISE GRAPHICAL REPRESENTATION OF WORKERS:

Year	No. Of workers	
	Permanent	Seasonal
2013-14	7115	7511
2014-15	7380	7231
2015-16	7464	7244
2016-17	7446	9798

GRAPHICAL REPRESENTATION:-

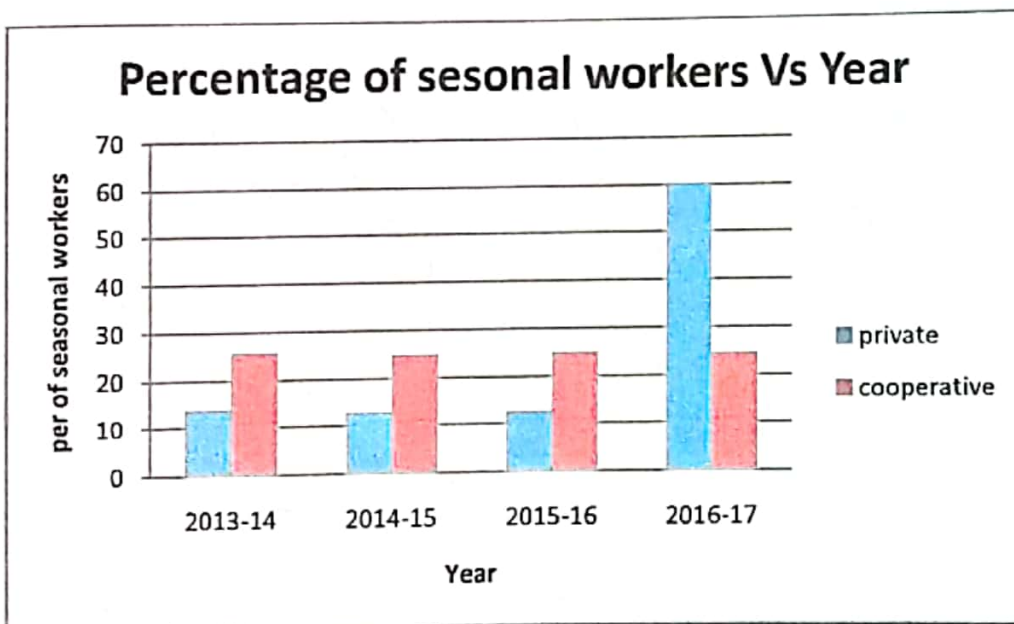


Comment: Seasonal workers in the year 2016-17 have increased compared to last three years.

• **GRAPHICAL REPRESENTATION OF SEASONAL WORKERS IN PRIVATE AND COOPERATIVE SECTOR. (PERCENTAGE)**

YEAR	private	cooperative
2013-14	13.94842	25.66025
2014-15	12.91319	24.81163
2015-16	12.78605	24.88774
2016-17	60.35234	24.64038
	100	100

**Graphical Representation:**

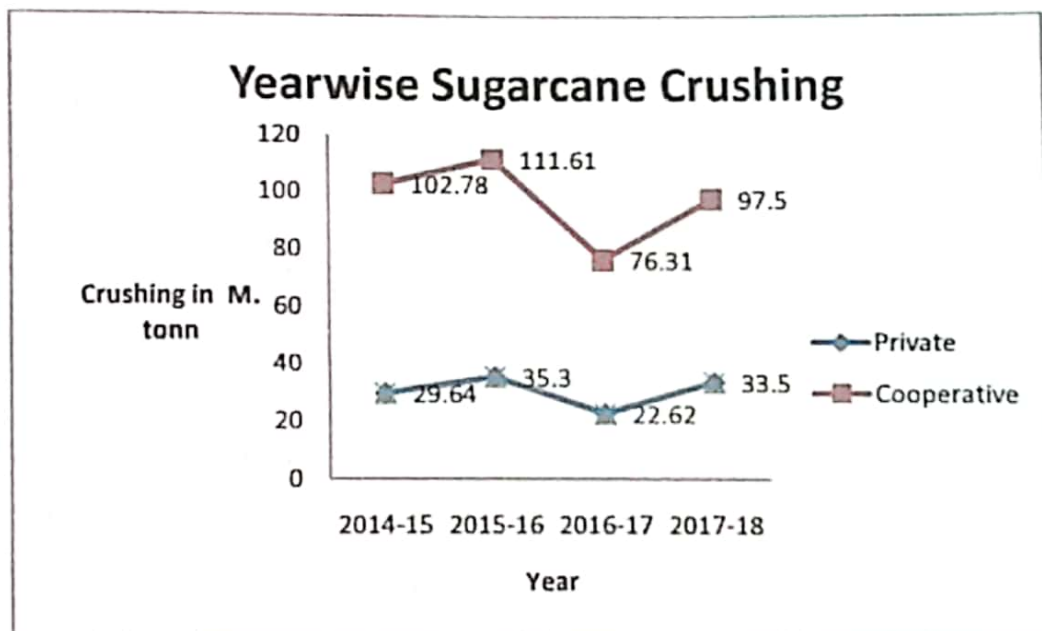


Comment: - In the year 2016-17 seasonal workers have increased in private sector as compared to cooperative sector.

- YEAR WISE GRAPHICAL REPRESENTATION OF CRUSHING OF SUGARCANE IN PRIVATE AND COOPERATIVE INDUSTRIES.

TYPE OF INDUSTRY	YEAR			
	2014-15	2015-16	2016-17	2017-18
Private	29.64	35.3	22.62	33.5
Cooperative	102.78	111.61	76.31	97.5

### Graphical Representation:-



### Conclusion:

- 1) Over all, in cooperative sector sugarcane crushing is more compared to private sector
- 2) There is highest crushing in cooperative sector during the year 2015-16.
- 3) There is lowest crushing in private sector during the year 2016-17.

2) For 2014-15

$$H_0 : P = P_0$$

i.e. Proportion of seasonal workers in private industries is same.

Vs

$$H_1: P < P_0$$

i.e. Proportion of seasonal workers in private industries is less.

$$Z_{cal} = -4.6384$$

$$Z_{\alpha} = -1.6448$$

Where,

$$\alpha = 0.05$$

$$P_0 = 0.5$$

$$Z_{cal} < Z_{\alpha}$$

Therefore we reject  $H_0$  at 5% level of significance.

Remark: - The proportion of seasonal workers is less in private industries for the year 2014-15.

3) For 2015-16

$$H_0 : P = P_0$$

i.e. Proportion of seasonal workers in private industries is same.

Vs

$$H_1 : P < P_0$$

i.e. Proportion of seasonal workers in private industries is less.

$$Z_{cal} = -5.220715607$$

$$Z_{\alpha} = -1.6448$$

Where,

$$\alpha = 0.05$$

$$P_0 = 0.5$$

$$Z_{cal} < Z_{\alpha}$$

Therefore we reject  $H_0$  at 5% level of significance.

Remark: - The proportion of seasonal workers in private industries is less for the year 2015-16.

4) For 2016-17

$$H_0 : P = P_0$$

i.e. Proportion of seasonal workers in private industries is same.

Vs

$$H_1: P > P_0$$

i.e. Proportion of seasonal workers in private industries is more.

$$Z_{\text{cal}} = 39.19095816$$

$$Z_{\alpha} = 1.6448$$

Where ,

$$\alpha = 0.05$$

$$P_0 = 0.5$$

$$Z_{\text{cal}} > Z_{\alpha}$$

Therefore we reject  $H_0$  at 5% level of significance.

Remark: - The proportion of seasonal workers in private industries is higher for the year 2017-18.

# Tests for independence of two Attributes:

1) For 2013-14

Type of workers	Type of industries		Total
	private	cooperative	
permanent	928 (13.04)	6187 (86.96)	7115 (100.00)
seasonal	768 (10.23)	6743 (89.77)	7511 (100.00)
Total	1696 (11.60)	12930 (88.40)	14626 (100.00)

Here,

$$N=14626, (a+b) =7115 (c+d) =7511, (a+c) =1696, (b+d) =12930$$

Hypothesis:

$H_0$  : No. of workers depends on type of industry.

$H_1$  : No. of workers do not depends on type of industry.

$$\chi^2 =28.30179$$

$$\chi^2_{tab} = 3.841$$

Here

$$\chi^2_{cal} > \chi^2_{tab}$$

Hence,

We reject  $H_0$  at 5% l.o.s.

Remark: Strength of workers does not depend on type of industry for the year 2013-14.



2) For 2014-15

Type of workers	Type of industries		Total
	private	cooperative	
permanent	897 (12.15)	6483 (87.85)	7380 (100.00)
seasonal	711 (9.83)	6520 (90.17)	7231 (100.00)
Total	1608 (11.01)	13003 (88.99)	14611 (100.00)

Here,

$$N=14611, (a+b) =7380 (c+d)=7231 , (a+c) =1608 , (b+d)=13003$$

Hypothesis:

$H_0$  : No. of workers depends on type of industry.

$H_1$ : No. of workers do not depends on type of industry.

$$\chi^2 =20.10282773$$

$$\chi^2_{tab} = 3.841$$

Here

$$\chi^2_{cal} > \chi^2_{tab}$$

Hence ,

We reject  $H_0$  at 5% l.o.s.

Remark: - Strength of workers does not depend on type of industry for the year 2014-15.

3) For 2015-16

Type of workers	Type of industries		Total
	private	cooperative	
permanent	914 (12.25)	6550 (87.75)	7464 (100.00)
seasonal	704 (9.72)	6540 (90.28)	7244 (100.00)
Total	1618 (11.00)	13090 (89.00)	14708 (100.00)

Here,

$$N=14708, (a+b) =7464 (c+d) =7244, (a+c) =1618, (b+d) =13090$$

Hypothesis:

$H_0$ : No. of workers depends on type of industry.

$H_1$ : No. of workers do not depends on type of industry.

$$\chi^2 =23.97815$$

$$\chi^2_{tab} = 3.841$$

Here

$$\chi^2_{cal} > \chi^2_{tab}$$

Hence,

We reject  $H_0$  at 5% I.o.s.

Remark: Strength of workers does not depend on type of industry for the year 2015-16.

4) For 2016-17

Type of workers	Type of industries		Total
	private	cooperative	
permanent	805 (10.96)	6541 (89.04)	7346 (100.00)
seasonal	3323 (33.92)	6475 (66.08)	9798 (100.00)
Total	4128 (24.08)	13016 (75.92)	17144 (100.00)

Here,

$$N=17144, (a+b) =7346, (c+d) =9798, (a+c) =4128, (b+d) =13016$$

Hypothesis:

$H_0$  : No. of workers depends on type of industry.

Vs

$H_1$ : No. of workers do not depends on type of industry.

$$\chi^2 =1210.33$$

$$\chi^2_{tab} = 3.841$$

Here

$$\chi^2_{cal} > \chi^2_{tab}$$

Hence,

We reject  $H_0$  at 5% I.o.s.

Remark: Strength of workers does not depend on type of industry for the year 2016-17.

## Proportion of seasonal workers in private sector and cooperative sector.

1) For 2013-14

$$H_0: P_1 = P_2$$

i.e. Proportion of seasonal workers in private sector and cooperative sector is equal.

Vs

$$H_1: P_1 \neq P_2$$

i.e. Proportion of seasonal workers in private sector and cooperative sector is not equal.

$$|Z_{cal}| = 5.31994249$$

$$|Z_{\alpha}| = 1.96$$

Where,

$$\alpha = 0.05$$

$$\hat{P} = 0.513537536$$

$$|Z_{cal}| > |Z_{\alpha}|$$

Therefore we reject  $H_0$  at 5% level of significance.

Remark: - Proportion of seasonal workers in private sector and cooperative sector is not equal for the year 2013-14.

2) For 2014-15

$$H_0: P_1 = P_2$$

i.e. Proportion of seasonal workers in private sector and cooperative sector is equal.

Vs

$$H_1: P_1 \neq P_2$$

i.e. Proportion of seasonal workers in private sector and cooperative sector is not equal

$$|Z_{cal}| = 4.483617706$$

$$|Z_{\alpha}| = 1.96$$

Where,

$$\alpha = 0.05$$

$$\hat{P} = 0.49490110$$

$$|Z_{cal}| > |Z_{\alpha}|$$

Therefore we reject  $H_0$  at 5% level of significance.

Remark: - Proportion of seasonal workers in private sector and cooperative sector is not equal for the year 2014-15.

3) For 2015-16

$$H_0 : P_1 = P_2$$

i.e. Proportion of seasonal workers in private sector and cooperative sector is equal

Vs

$$H_1 : P_1 \neq P_2$$

i.e. Proportion of seasonal workers in private sector and cooperative sector is not equal

$$|Z_{cal}| = 4.89675$$

$$|Z_\alpha| = 1.96$$

Where,

$$\alpha = 0.05$$

$$\bar{p} = 0.492521$$

$$|Z_{cal}| > |Z_\alpha|$$

Therefore we reject  $H_0$  at 5% level of significance.

Remark: Proportion of seasonal workers in private sector and cooperative sector is not equal for the year 2015-16.

4) For 2016-17

$$H_0: P_1 = P_2$$

i.e. Proportion of seasonal workers in private sector and cooperative sector is equal

Vs

$$H_1: P_1 \neq P_2$$

i.e. Proportion of seasonal workers in private sector and cooperative sector is not equal

$$|Z_{cal}| = 34.78979$$

$$|Z_{\alpha}| = 1.96$$

Where,

$$\alpha = 0.05$$

$$\bar{P} = 0.571512$$

$$|Z_{cal}| > |Z_{\alpha}|$$

Therefore we reject  $H_0$  at 5% level of significance.

Remark:-Proportion of seasonal workers in private sector and cooperative sector is not equal for the year 2016-17.

## CONCLUSIONS

- 1) Proportion of seasonal workers in private industries is less than permanent workers for 2013-14, 2014-15, 2015-16 and more in the year 2016-17.
- 2) Number of workers do not depend on type of industry i.e. number of workers is not affected by private and cooperative industries.
- 3) Proportion of seasonal workers is not same in private and cooperative industries for any of the year.



# Bibliography

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