A Study Of Impact Of Newspapers On Society Based On Statistical Methods

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Abstract - **News papers play an vital role in day to day life .The paper is not just a carrier of news .The newspaper serves humankind in different manner. Newspapers are printed in various languages. Now a day's every house is familiar with newspaper services. Every one can know many important incidents happening throughout the world sitting in home.so our interest is to know what is the influence of news paper on society .For this purpose we are collected primary data through questionnaires containg various attributes and collected data are analyzed using different statistical tools. and our study shows that most of the males read lokmat newspaper where as most of the females read Pudhari newspaper and average amount paid on newspaper in the slum, rural and urban area is not same. The attribute Gender and Online newspaper readers are positively associated to each other.**

keywords - **Z- Test , Chi-square Test, Nonparametric Test, ANOVA , Level of significance ,P-value**

INTRODUCTION:

A newspaper is a periodical publication containing written information about current events. Newspaper can cover a wide variety of fields such as politics, business, sport and art, and often include materials such as opinion columns, weather forecasts, and reviews of local services. Newspaper developed in the 17th century, as information sheets for businessmen. The history of newspaper starts from 1605 when the first newspaper got printed in Europe. James Augustus Hickey is considered as the "father of Indian press" as they started the first Indian newspaper from Calcutta Most of the newspapers is aimed at a broad spectrum of readers, usually geographically defined; some focus on groups of readers defined more by their location.

Generally newspaper reading habit in the house starts with the traditionally family newspaper. the perception of the readers about newspaper start from writing style, editorial, layout feel of the newspaper and convenience of reading etc. most of the time the family newspaper or 1st choice newspaper of the family is the regional newspaper Marathi , Hindi, etc. secondly is English newspaper. The 1st and 2nd choice of newspaper normally reflects into their socio economic status. Most of the newspapers are aimed at a broad spectrum of readers, usually geographically defined; some focus on groups of readers defined more by their location.

Today's mornings newspaper publishing is a competitive and became a very complex market the morning newspaper complete with each other and with other media such as TV, radio and the internet. The important of the newspaper is not yet changed in the life of people. Newspaper always treated as most reliable, analytical, trusted news source but definitely the content of the newspaper has been changed over the period of time

In Kolhapur city, there are different types of newspaper like Lokmat, Pudhari, Sakal, Maharashtra times, times of India, etc. From these newspapers we select Pudhari, Lokmat, Sakal and Maharashtra times. We collect data from three different area slum, rural and urban.

OBJECTIVES:

a) To study the independence between the occupation and newspaper reading time
b) To study the independence between the area and gender.
c) To study the independence between the area and newspapers.
d) To study the independence between the gender and type of news.
e) To study newspaper reader in rural and urban area gender.
f) To study the male and female daily newspaper readers.
g) To study the independence between the education status and newspapers
h) To study the association between online newspaper readers and gender in urban and rural.
i) To study average amount paid on newspaper in a week according to area is equal or not by using Mann Whitney test.
j) To study the amount paid on newspaper in a week by using ANOVA.
k) To study average amount paid on newspaper in a week according to area by using Z -test

METHODOLOGY:

The main object of our project is to study the impact of newspaper on society in Kolhapur city .So for this project we have collected data from various areas in Kolhapur city. For this process, we have prepared a questionnaire satisfying some characteristics of good questionnaire, from overall city nearly about 170 samples of peoples. We have been collected randomly from following three different areas of Kolhapur city.1) Slum   2) Rural and 3) Urban

STATISTICAL SOFTWARES:

- MS-EXCEL

- MS-WORD

STATISTICAL TOOLS:
➢ **Graphical Tools:** Bar diagram, Multiple Bar diagram, Pie chart
➢ **Test:** Chi-Square Test, Proportion test, Coefficient of association, Z test for two sample means
➢ **Non Parametric Test:** Mann Whitney test, Run test, Median test
➢ **Other Statistical Methods**: ANOVA

METHOD OF DATA COLLECTION: For this study , we have collected primary data from 170 peoples from three areas.

GRAPHICAL REPRESENTATION:
Multiple bar diagram of Types of Newspapers reading by peoples

Gender	Newspapers					Total
	Lokmat	Sakal	M.T	Pudhari	All	
Male	50	14	8	40	1	113
Female	17	7	5	26	2	57
Total	67	21	13	66	3	170
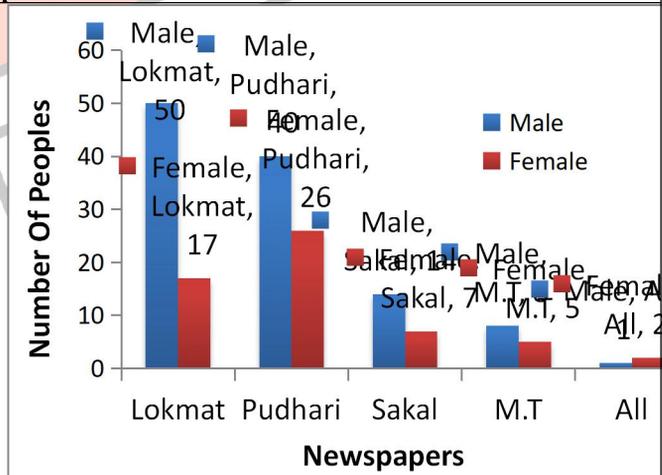
Pie chart for news paper reader:

Newspapers	Peoples
Lokmat	67
Sakal	21
M.T.	16
Pudhari	66
Total	170
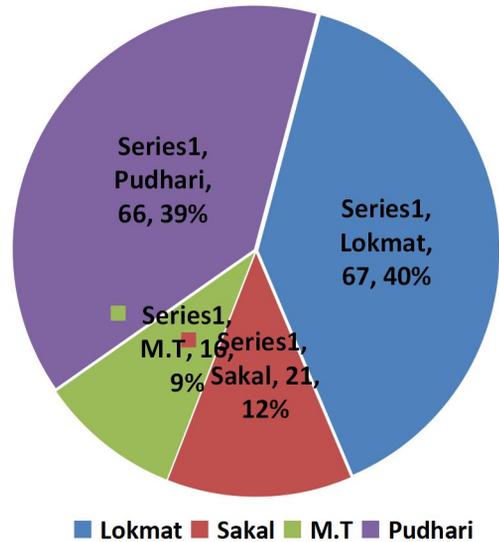
Multiple Bar diagram of news paper reder according to their educational status

Newspapers / Education	Lokmat	Sakal	M.T.	Pudhari	All	Total
Primary	46	10	8	35	1	100
PG	7	7	3	11	0	28
UG	14	4	3	20	1	42
Total	67	21	14	66	2	170
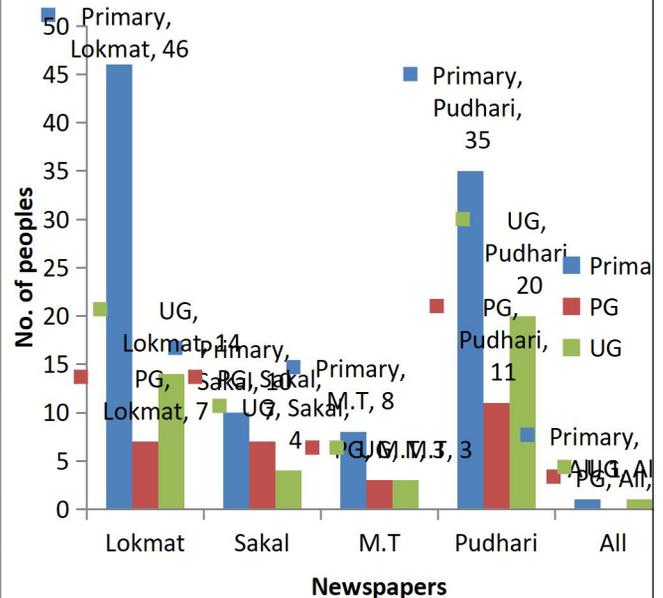
TESTING OF HYPOTHESIS :

A) **Test for Independence between the Education status and Newspapers**

H_0: The attribute education status and newspapers are independent. *V/S*

H_1: The attribute education status and newspapers are not independent.

Under H_0 the test statistic is,

$$\chi^2_{cal} = \Sigma \frac{Oi^2}{Ei} - N ; \qquad \chi^2_{cal} = 8.2602 ; \qquad \chi^2_{tab} = \chi^2_{(10-1)} = \chi_{(9,0.05)} = 16.9190$$

B) **Test for Independence between the Occupation and Newspaper reading time.**

H_0**:** The attribute occupation and newspaper reading time is independent. *V/S*

H_1: The attribute occupation and newspaper reading time are not independent

Under H_0 the test statistic is,

$$\chi^2_{cal} = \Sigma \frac{Oi^2}{Ei} - N \quad ; \quad \chi^2_{cal} = 5.9322 ; \qquad \chi^2_{tab} = \chi^2_{(12-1)} = \chi_{(11,0.05)} = 19.6751$$

C) **Test for Independence between the Area and Gender.**

H_0: The attribute area and gender are independent. *V/S*

H_1: The attribute area and gender are not independent

Level of significance: α = 5%

Under H_0 the test statistic is, $\quad \chi^2_{cal} = \Sigma \frac{Oi^2}{Ei} - N$; $\quad \chi^2_{cal} = 30.6 ; \quad \chi^2_{tab} = \chi^2_{(6-1)} = 11.0705$

D) **Test for Independence between the Area and Newspapers.**

H_0: The attribute area and newspapers is independent. *V/S*

H_1: The attribute area and newspapers are not independent

Under H_0 the test statistic is, $\chi^2_{cal} = \Sigma \frac{Oi^2}{Ei} - N$; $\chi^2_{cal} = 4.5413$; $\chi^2_{tab} = \chi^2_{(9-1)} = 5.5073$

E)Test for Independence between the Gender and type of news.

H_0: The attribute gender and type of news is independent.   *V/S*

H_1: The attribute gender and type of news are not independent.

Under H_0 the test statistic is,

$$\chi^2_{cal} = \Sigma \frac{Oi^2}{Ei} - N ; \qquad \chi^2_{cal} = 10; \qquad \chi^2_{tab} = \chi^2_{(8-1)} = \chi_{(7,0.05)} = 14.0671$$

F) Test for equality of proportion of newspaper readers in Rural and Urban area.

H_0: Proportion of newspaper readers in urban and rural area is equal V/S.

H_1: Proportion of newspaper readers in urban and rural area is not equal.

$$\hat{p} = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2} ; \qquad \hat{p} = 0.5546 \quad \text{and} \quad \hat{q} = 0.4454$$

Under H_0 the test statistics is, $|Z_0| = \left| \dfrac{p_1 - p_2}{\sqrt{\hat{p} \times \hat{q} \times (\frac{1}{n_1} + \frac{1}{n_2})}} \right|$

$|Z_0| = 2.12$; $Z_{\alpha/2} = Z_{0.025} = 1.96$

Here the alternative hypothesis is two sided there for the P-Value is given by following formula

$; P = 2[1 - \Phi|Z_0|]; P = 2(1 - 0.9830) \therefore P = 0.034006$

G) Test for equality of proportion of Male and Female daily newspaper readers

H_0: Proportion of male and female daily newspaper readers is equal. V/S

H_1: Proportion of male and female daily newspaper readers is not equal.

Population first is male daily Newspaper readers.&Population second female daily Newspaper readers

n_1=Sample of male newspaper readers =113 and n_2=Sample of female newspaper readers=57

p_1=Sample proportion of male daily newspaper readers = 0.7699

p_2=Sample proportion of female daily newspaper readers =0.8596

$$\hat{p} = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2}; \qquad \hat{p} = 0.7999 \quad \text{and} \therefore \quad \hat{q} = 0.2000$$

Under H_0 the test statistics is,

$|Z_0| = 1.38$

Critical value: $Z_{\alpha/2} = Z_{0.025} = 1.96$

Here the alternative hypothesis is two sided there for the P-Value is given by following formula;

$P = 2[1 - \Phi|1.38|] ; \therefore P = 0.1675$

H) Association between online newspaper readers and Gender in urban and rural area

The attribute A, α, B and β has following usual meaning,

(A)= No. of males, (α) =No. of females.and (B) = No. of online newspaper readers,

(β) = No. of offline newspaper readers. &(AB)=No. of males reading online newspaper = 78

(Aβ) = No. of males reading offline newspaper = 16& (αB)= No. of females reading online newspaper = 36 & (αβ)= No. of females reading offline newspaper = 40

a) Coefficient of association: $Q = \dfrac{\{(AB)(\alpha\beta) - (A\beta)(\alpha B)\}}{\{(AB)(\alpha\beta) + (A\beta)(\alpha B)\}} = 0.6883$

b) Coefficient of Colligation: $Y = \dfrac{\sqrt{(AB)(\alpha\beta)} - \sqrt{(A\beta)(\alpha B)}}{\sqrt{(AB)(\alpha\beta)} + \sqrt{(A\beta)(\alpha B)}} = 0.3989$

I) Run Test for newspaper buying tendency (daily and weekly)

H_o: The sequence of newspaper buying tendency is random. V/S

H_1: The sequence of newspaper buying tendency is not random.

The sequence is,

WDDWDWWWWDDDWDDDDDWWWWDWDDWDDDWDDDDDDDDWWDDDDDDWDDWDDDDDDDD

DDDDDDDDDDDDDDDDDDDDDWDDDWDDDDDDDDDWWWDWDDDDDDDDDDDWDDDWDDDDDWW

WDDDDDDDDDDDDDWWDDDDWDWDDDDDDDDDDDDDDDDDDDDDDDDD

W=Weekly, D=Daily

$r = 42$ (No. of runs);$n_1 = 136$ (No. of D's)$n_2 = 34$ (No. of W's)

Now, $E(r) = \frac{n+2}{2} = 86$; $V(r) = \frac{n(n-2)}{4(n-1)} = 42.2485$

Test statistic, $Zo = \frac{r - E(r)}{\sqrt{V(r)}} \sim N(0,1)$; $|Zo| = 6.7693$

$$Z_{\alpha/2} = Z_{0.025} = 1.96$$

J) Run test for newspaper reading tendency (online and offline)

H_0: The sequence of reading newspaper tendency is random V/S.

H_1: The sequence of reading newspaper tendency is not random.

Given: $n = 170$ The sequence is,

NYYNYYYYYYNNYYNNYNNYNNYNNNNYYNNNNYYYNNYNNYNNNYYNYNNNNNYYNNNYNYNNYN
NYYYYYYYYYNNNNNNNNNNYNNNNNNNNNNNNNNYNNYNNYYNYYYYYYYNYNYYYYYYYNYN
YNYNNYYNYYNYYNNNNYYNNYYNYYNNNNNNNYNYYYYYY

N=No, Y=Yes

$n_1 = 76$ (No. of Y's) ; $n_2 = 94$ (No. of N's) ; $r = 68$ (No. of runs)

Now, E (r) = $\frac{n+2}{2} = \frac{170+2}{2} = 86$;   V(r) = $\frac{n(n-2)}{4(n-1)}$ =42.2485

Test Statistic is, $Z_0 = \frac{r - E(r)}{\sqrt{V(r)}} \sim N(0,1)$; $|Z_o| = 2.7692$; $Z_{\alpha/2} = Z_{0.025} = 1.96$

K) Median test for money paid on newspaper in a week in slum and rural.

H_0: Amount paid on newspaper in a week in slum and rural area is same.   V/S

H_1: Amount paid on newspaper in a week in slum and rural area is not same.

$$Sample\ median = size\ of\ \left(\frac{n_1 + n_2 + 1}{2}\right) th\ observation = 25.5$$

Observation table:

	Sample form		
	First sample	Second sample	Total
Observation < 25.5	37	18	55
Observation > 25.5	14	41	55
Total	51	59	110

M_1=37, M_2=18, n_1=51, n_2=59

Test statistics is,

$$\chi_o^2 = \frac{(n_1 + n_2)[M_1(n_2 - M_2) - M_2(n_1 - M_1)]^2}{n_1 n_2 [M_1 + M_2](n_1 + n_2 - M_1 - M_2)} \sim \chi_1^2$$

$\chi_o^2 = 19.3386$; $\chi_1^2 = 3.8414$

L) Median test for amount paid on newspaper in a week in rural and urban area

H_0: Amount paid on newspaper in a week in rural and urban area is same.   V/S

H_1: Amount paid on newspaper in a week in rural and urban area is not same.

$$Sample\ median = size\ of\ \left(\frac{n_1 + n_2 + 1}{2}\right) th\ observation = 28$$

Observation table:

	Sample from		
	First sample	Second sample	Total
Observation<28	19	24	43
Observation>28	40	36	76
Total	59	60	119

M_1=19, M_2=24, n_1=59, n_2=60

Test statistics is, $\chi_o^2 = \frac{(n_1 + n_2)[M_1(n_2 - M_2) - M_2(n_1 - M_1)]^2}{n_1 n_2 [M_1 + M_2](n_1 + n_2 - M_1 - M_2)} \sim \chi_1^2$

$\chi_o^2 = 0.9257$; $\chi_1^2 = 3.8414$

M) Median test for amount paid on newspaper in a week in slum and urban area

H_0: Amount paid on newspaper in a week in slum and urban area is same V/S   .

H_1: Amount paid on newspaper in a week in slum and urban area is not same.

$$Sample\ median = size\ of\ \left(\frac{n_1 + n_2 + 1}{2}\right)th\ observation = 25$$

Observation table:

	Sample from		
	First sample	Second sample	Total
Observation<25	34	19	53
Observation>25	17	41	58
Total	51	60	111

M_1=34, M_2=19, n_1=5, n_2=60

Test statistic is,

$$\chi_o^2 = \frac{(n_1 + n_2)[M_1(n_2 - M_2) - M_2(n_1 - M_1)]^2}{n_1 n_2 [M_1 + M_2](n_1 + n_2 - M_1 - M_2)} \sim \chi_1^2$$

$$\chi_o^2 == 7.6317\ ; \chi_1^2 = 3.8414$$

N) Analysis of variance for average amount paid on newspaper in the slum, rural and urban

H_0: Average amount paid on newspaper in the slum, rural and urban is same.

V/S

H_1: Average amount paid on newspaper in the slum, rural and urban is not   same.

Observation Table:

Groups	Count	Sum	Average	Variance
Slum	51	1108	21.7255	81.2831
Rural	59	2004	33.9661	705.9299
Urban	60	1712	28.5333	606.8294

ANOVA Table:

Source of Variation	Sum of Square	d.f.	M.S.S.	F value	F tab
Between Groups	4100.8835	2	2050.4417	4.2373	3.0501
Within Groups	80811.0224	167	483.8983	-	-
Total	84911.9059	169	-	-	-

O) Z test for average amount paid on newspaper in the slum and rural area.

H_0: Average amount paid on newspaper in the slum and rural area is same. V/S

H_1: Average amount paid on newspaper in the slum and rural area is not same.

$\bar{x}_1$ = Average mean of slum area = 21.7254& $\bar{x}_2$ = Average mean of rural area = 33.9661

σ_1^2 = Sample variance of slum area = 81.2831& σ_2^2 = Sample variance of rural area = 705.9298

Under H_0 test statistic is, $|Z| = \left| \dfrac{\bar{x}_1 - \bar{x}_2}{\sqrt{\dfrac{\sigma_1^2}{n_1} + \dfrac{\sigma_2^2}{n_2}}} \right|$

$$Z = -3.3242; \quad |Z| = 3.3242; \quad z_{\alpha/2} = Z_{0.025} = 1.96$$

the alternative hypothesis is two sided there for the P-Value is given by following formula;

$$P = 2[1 - \Phi|3.3242|] \quad \text{and} \therefore P = 0.000887$$

P) Z test for average amount paid on newspaper in the rural and urban area

H_0: Average amount paid on newspaper in the rural and urban area is same. V/S

H_1: Average amount paid on newspaper in the rural and urban area is not same.

$\overline{x}_1$ = Average mean of rural area = 33.9661 & $\bar{x}_2$ = Average mean of urban area = 28.5333

σ_1^2 = Sample variance of rural area = 705.9299 & σ_2^2 = Sample variance of urban area = 606.8294

Under H_0 test statistic is, $Z = 1.1562$; $z_{\alpha/2} = Z_{0.025} = 1.96$

Here the alternative hypothesis is two sided there for the P-Value is given by following formula;

$$P = 2[1 - \Phi|1.1562|] = 0.2475$$

Q) Z test for two samples mean for average amount paid on newspaper in the slum and urban area.

H_0: Average amount paid on newspaper in the slum and urban area is same. V/S

H_1: Average amount paid on newspaper in the slum and urban area is not same.

Here $\bar{x}_1$ = Average mean of slum area = 21.7254 & $\bar{x}_2$ = Average mean of urban area = 28.5333

σ_1^2 = Sample variance of slum area = 81.2831 & σ_2^2 = Sample variance of urban area = 606.8294

Under H_0 test statistic is, $|Z| = 1.9896$; $z_{\alpha/2} = Z_{0.025} = 1.96$

Here the alternative hypothesis is two sided there for the P-value is given by following formula;

$$P = 2[1 - \Phi|Z_0|] = 0.0467$$

R) Mann Whitney test for average amount paid on newspaper in the slum and rural area

H_0: Average amount paid on newspaper in the slum and rural area is same. V/S

H_1: Average amount paid on newspaper in the slum and rural area is not same.

n_1 = No. of observation in the first sample = 51 & n_2 = No. of observation in the second sample = 59

R_1 = Sum of ranks of first sample = 2147.5 & R_2 = Sum of ranks of second sample = 3954.5

$U1 = n_1 n_2 + \dfrac{n_1(n_1+1)}{2} - R_1 = 2187.5$ & $U2 = n_1 n_2 + \dfrac{n_2(n_2+1)}{2} - R_2 = 824.5$

U=Min. $\{U_1, U_2\}$ = 824.5

n_1 and n_2 are large then distribution of U is approximately normal with

$$E(U) = \left(\frac{n_1 \times n_2}{2} \right) = 1504.5 \quad \& \quad V(U) = \frac{n_1 n_2 (n_1 + n_2 + 1)}{12} = 27833.25$$

Test statistics is, $|Z| = \left| \dfrac{U - E(U)}{\sqrt{V(U)}} \right| \sim N(0,1)$; $|Z| = 4.0759$; $Z_{\alpha/2} = Z_{0.025} = 1.96$

S) Mann Whitney test for average amount paid on newspaper in the slum and urban area.

H_0: Average amount paid on newspaper in the slum and urban area is same. V/S

H_1: Average amount paid on newspaper in the slum and urban area is not same.

Here, n_1 = No. of observation in the first sample = 51 & n_2 = No. of observation in the second sample = 60

R_1 = Sum of ranks of first sample = 2093.5 & R_2 = Sum of ranks of second sample = 3469.5

$U1 = n_1 n_2 + \dfrac{n_1(n_1+1)}{2} - R_1 = 2292.5$ & $U2 = n_1 n_2 + \dfrac{n_2(n_2+1)}{2} - R_2 = 1420.5$

U=Min. $\{U_1, U_2\}$ = 1420.5

n_1 and n_2 are large then distribution of U is approximately normal with

$$E(U) = \left(\frac{n_1 \times n_2}{2} \right) = 1530 \quad \& \quad V(U) = \frac{n_1 n_2 (n_1 + n_2 + 1)}{12} = 28560$$

Test statistics is, $|Z_0| = \left| \dfrac{U - E(U)}{\sqrt{V(U)}} \right| \sim N(0,1)$; $Z_0 = 16.8997$; $Z_{\alpha/2} = Z_{0.025} = 1.96$

T) Mann Whitney test for average amount paid on newspaper in the rural and urban area

H_0: Average amount paid on newspaper in the rural and urban area is same. V/S

H_1: Average amount paid on newspaper in the rural and urban area is not same.

n_1 = No. of observation in the first sample = 59 & n_2 = No. of observation in the second sample = 60

R_1 = Sum of ranks of first sample = 3836 & R_2 = Sum of ranks of second sample = 3243

$U1 = n_1 n_2 + \dfrac{n_1(n_1+1)}{2} - R_1 = 1474$ & $U2 = n_1 n_2 + \dfrac{n_2(n_2+1)}{2} - R_2 = 2127$

U=Min. $\{U_1, U_2\} = 1474$

n_1 and n_2 are large then distribution of U is approximately normal with

$$E(U) = \left(\frac{n_1 \times n_2}{2}\right) = 1770 \quad \& \quad V(U) = \frac{n_1 n_2 (n_1 + n_2 + 1)}{12} = 35400$$

Test statistics is, $|Z| = \left|\frac{U - E(U)}{\sqrt{V(U)}}\right| \sim N(0,1)$; $|Z_0| = 1.5732$

Critical value at 5% $Z_{\alpha/2} = Z_{0.025} = 1.96$

MAJOR FINDING

- Lokmat newspaper is mostly read by primary educated peoples.
- Most of the males read Lokmat newspaper and most of the females read Pudhari newspaper.
- PG and UG educated peoples mostly prefers Pudhari newspaper.
- The attribute Education status and Newspapers are independent of each other.
- The attribute Area and Newspapers are independent of each other.
- The attribute Gender and Types of news are independent of each other.
- The proportion of newspaper reader in urban and rural area is not same.
- The proportion of male and female of reading daily newspaper is same.
- The attribute Gender and Online newspaper readers are positively associated to each other.
- The average amount paid on newspaper in the slum, rural and urban area is not same.
- The average amount paid on newspaper in the rural and urban area is same.

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